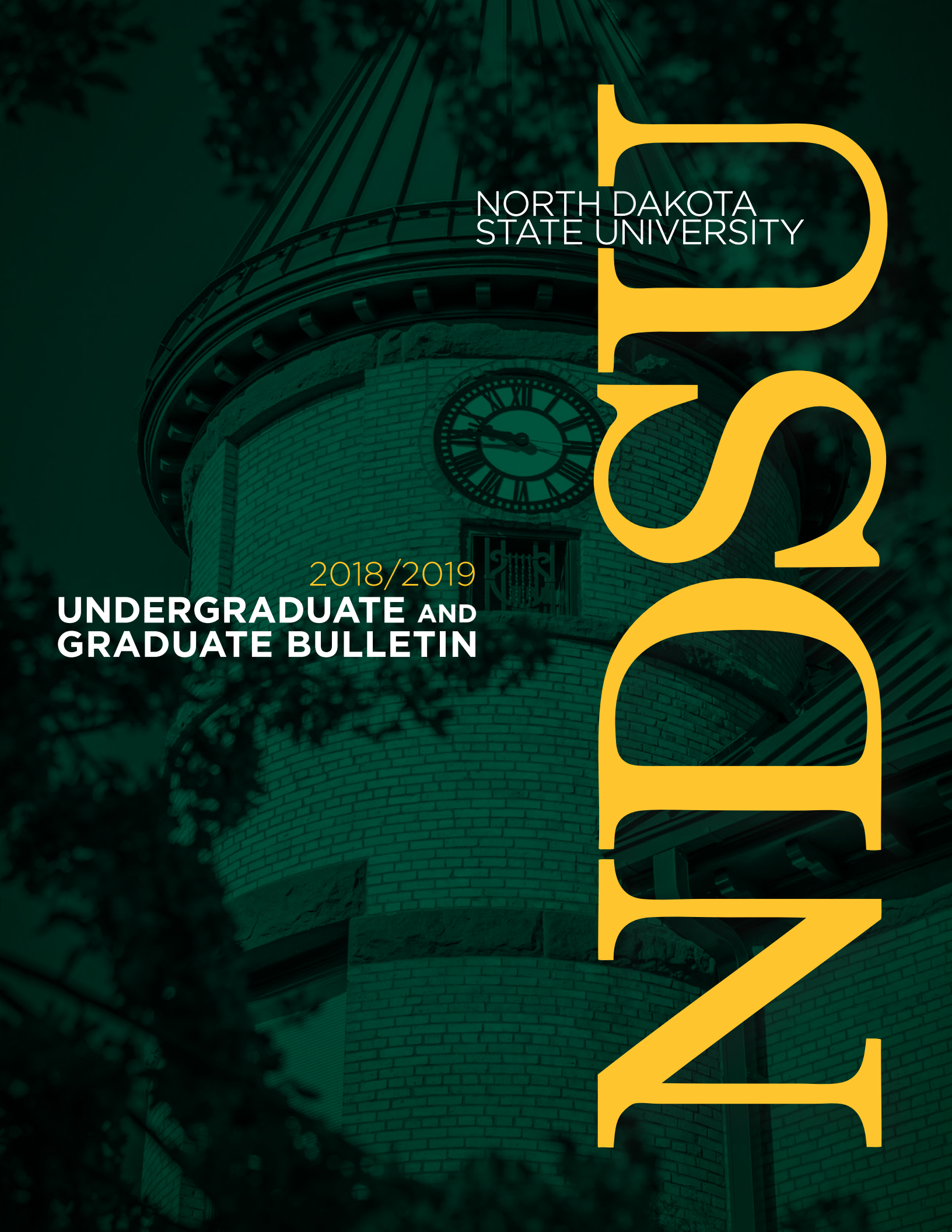

NORTH DAKOTA STATE UNIVERSITY

NDSU

2018/2019

UNDERGRADUATE AND GRADUATE BULLETIN

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

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Accounting

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-8651
- **Department Web Site:**
  www.ndsu.edu/business/departments/afis/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/accounting/

Accounting is a profession that deals with providing financial information used in making business decisions. Accounting involves a range of skills that includes collecting, measuring, interpreting, analyzing, and communicating financial activity. A major in Accounting focuses on the development of such skills along with an understanding of the legal, social, and ethical responsibilities involved in the accounting profession.

Financial accountants prepare financial statements used in investing and lending decisions. Auditors examine financial statements and attest to their status. Management accountants evaluate and communicate internal financial information used by managers to operate a business. Forensic accountants specialize in the investigation and detection of, and protection against, fraud and abuse. Accountants also provide tax advisory services to firms, clients, and governmental agencies. With their specialized knowledge concerning the internal operation of a business, many accountants provide management advisory services. Also, because of the specialized knowledge, many accountants advance into management positions.

Students majoring in Accounting are required to learn how to apply technology in business and must take courses in many other aspects of business to understand how an accountant's work relates to marketing, management, finance, and production.

This four-year program leads to a Bachelor of Science degree with a major in Accounting. Completion of this program qualifies students to take the examinations required to become a Certified Management Accountant (CMA), Certified Internal Auditor (CIA), and Certified Fraud Examiner (CFE).

Students interested in sitting for the Certified Public Accounting (CPA) exam need an additional 28 credit hours beyond the 122 credit hours required for the Accounting major. Students are encouraged to satisfy the additional credit hours through the Master of Accountancy (M.Acc.) degree. Additional information about the M.Acc. program can be found in the Graduate Bulletin (p. 860) online.

Accounting Minor

Students earning majors in other fields may select a minor in Accounting. A minor includes ACCT 200 Elements of Accounting I, ACCT 201 Elements of Accounting II, ACCT 311 Intermediate Accounting I, and ACCT 320 Cost Management Systems, plus six credits in approved accounting courses. In addition, students must earn a 2.50 cumulative grade-point average in the accounting courses to be awarded a minor. A minor approval form is required and can be found at www.ndsu.edu/business. Completion of a minor in Accounting provides students with additional depth in accounting that many employers prefer.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman					
Fall	**Credits**	**Spring**	**Credits**		
ENGL 110	4	COMM 110	3		
PSYC 111 or SOC 110	3	ENGL 120	3		
Gen Ed Humanities/Fine Arts & Cultural Diversity	3	MATH 144	4		
Gen Ed Wellness	2	Gen Ed Sci & Tech (w/lab)	4		
Non-Major Elective	3	Non-Major Elective	3		
	15		17		
Sophomore					
Fall	**Credits**	**Spring**	**Credits**		
ACCT 200	3	ACCT 201	3		
ECON 201	3	ECON 202	3		
MIS 116	3	PHIL 216	3		
STAT 330	3	STAT 331	2		
Non-Major Elective	4	Gen Ed Science & Tech	3		
	16		14		
Junior					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
ACCT 311	4	ACCT 312	4	ACCT 397[1]	3
ACCT 320	3	ACCT 420	3		
ENGL 320	3	BUSN 430	3		
MRKT 320	3	MGMT 320	3		
MIS 320	3				
	16		13		3
Senior					
Fall	**Credits**	**Spring**	**Credits**		
ACCT 318 or 418	3	BUSN 489	3		
ACCT 421	3	300-400 Level Business Electives (2)	6		
FIN 320	3	300-400 Level Accounting Elective	3		
300-400 Level Business Elective	3				
Non-major Elective	4				
	16		12		

Total Credits: 122

[1] Complete one of the following options: ACCT 413 Internship, ACCT 397 Cooperative Education Program, UNIV 492 Study Abroad Program, or AGEC 371 Export Management. Requires successful completion of ACCT 311 and faculty advisor's prior approval.

Aerospace Studies

Department Information

- **Department Location:**
  Bentson/Bunker Field House
- **Department Phone:**
  701-231-8186

- **Department Web Site:**
  www.ndsu.edu/afrotc/
- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/aerospace-studies/

The Air Force Reserve Officer's Training Corps (AFROTC) program is conducted by the Department of Aerospace Studies. The purpose of this program is to enable qualified undergraduate and graduate students to become commissioned officers in the United States Air Force.

AFROTC learning experiences will be of long-range value whether one pursues a military or civilian career. Upon graduation and completion of the AFROTC curriculum, each student is commissioned a second lieutenant in the United States Air Force.

The initial assignment options available to the Air Force second lieutenant include the following:

1. Enter the Air Force and complete the designated technical training course prerequisite to the student's specialty, i.e., flight training, research and development, management, or support functions.
2. Apply for a delay in entering active duty for the purpose of pursuing an advanced degree.
3. Enroll in one of several Air Force sponsored graduate study programs while serving with full pay as an Air Force officer.

The Aerospace Studies curriculum is divided into two courses of instruction: the General Military Course (GMC), which parallels the freshman and sophomore academic years, and the Professional Officer Course (POC), which parallels the junior and senior academic years. Students in the four-year program normally attend four weeks of field training at Maxwell AFB, AL during the summer between their sophomore and junior years. The student who chooses not to enroll in the GMC (first two years) may still earn a commission by enrolling in a special two-year program during the junior and senior years. Admission to this special program requires the student to make application early in the sophomore year. Qualified students will then participate in a six-week field-training program at an Air Force base the summer prior to their junior or senior year.

AFROTC college scholarships are awarded to the best-qualified students and range in length from one to five years. These grants cover the cadet's tuition, incidental lab fees and most textbooks. In addition, cadets receive a tiered monthly allowance. For example, cadets enrolled in the Professional Officer Corps (POC) receive $450 per month during their junior academic year and $500 per month during their senior academic year. Incentive scholarships also are available for students not already on scholarship.

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

Agribusiness

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-7441
- **Department Web Site:**
  www.ag.ndsu.edu/agecon
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/agribusiness/

Agribusiness Major

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

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

In the Agribusiness program, students are exposed to a range of methods useful in agribusiness decision-making. Agribusiness graduates will master problem-solving skills to face challenges likely to be encountered in their professional careers.

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

Collaboration with the College of Business (http://bulletin.ndsu.edu/colleges/business) leads to the concurrent satisfaction of one of the minors offered by the College of Business. Students may select business courses for the minor that complement their agribusiness interests.

Agribusiness Minor

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

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ECON 189[1]	1	ENGL 120	3
MATH 103 (pre-req for Math 144)	3	ECON 201	3
ENGL 110	4	MATH 144	4
Science & Tech Gen Ed w/ Lab	4	Humanities & Fine Arts Gen Ed	3
Wellness Gen Ed	2	Ag Science Elective	3
	14		16
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
AGEC 242	3	AGEC 244	3
ECON 202	3	AGEC 246	3
COMM 110	3	ECON 341	3
ACCT 200	3	ACCT 201	3
MIS 116	3	Humanities & Fine Arts Gen Ed	3
	15		15
Junior			
Fall	**Credits**	**Spring**	**Credits**
AGEC 339	3	AGEC 344	3
ECON 343	3	AGEC 346	3
STAT 330	3	STAT 331	2
Upper Division English for Gen Ed	3	Science & Tech Elective	2
Elective for Minor	3	Ag Science Elective	3
		Elective for Minor	3
	15		16
Senior			
Fall	**Credits**	**Spring**	**Credits**
AGEC 444, 446, or MGMT 320*	3	AGEC 445	3
One additional course from the area of specialization*	3	Electives for Minor	10
Ag Science Elective	3	AGEC 397	1-3

300 Level English Elective	3	
Electives for Minor	3	
	15	14-16

Total Credits: 120-122

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

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

Agricultural Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/agricultural-education/

The agricultural education major prepares students to teach at the secondary, post-secondary and adult levels in agricultural education programs. North Dakota State University is designated by the State Board of Career and Technical Education as the recognized institution for preparing teachers of agricultural education. Agricultural education students begin their preparatory work in the pre-agricultural education program offered through the College of Agriculture, Food Systems, and Natural Resources. After completing their introductory education course (usually during the sophomore year), students may apply to the School of Education to pursue agricultural education.

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

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
AGRI 189	1	ANSC 223	2
ANSC 114	3	ASM 125	3
ENGL 110	4	CHEM 117 or 121	3
HNES 100 or 111	2	CHEM 117L or 121L	1
MATH 104	3	ECON 201	3
PLSC 110	3	ENGL 120	3
	16		15

Second Year			
Fall	**Credits**	**Spring**	**Credits**
AGEC 242	3	ANSC Elective	3
BIOL 150	3	BIOL 315	3
BIOL 150L	1	BIOL 315L	1
ECON 202	3	EDUC 322	3
EDUC 321	3	COMM 110	3
H&CE 232	3	Humanities & Fine Arts	3
Complete Praxis Core Academic Skills Exam		PLSC Elective	3
		Apply to the School of Education	
	16		19
Third Year			
Fall	**Credits**	**Spring**	**Credits**
AGEC Elective	3	ASM 264	3
ASM 115	3	EDUC 489	3
EDUC 451	3	ENGL 358	3
H&CE 444	3	H&CE 480	3
Humanities & Fine Arts	3	IME 335	3
PLSC 210	3	SOIL 210	3
PLSC 211	1		
	19		18
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
AGEC 342	3	H&CE 483	1
AGRI Elective	3	H&CE 487	9
ANSC Elective	3	H&CE 488	3
EDUC 486	3		
H&CE 481	3		
Apply for Student Teaching			
Complete Praxis PLT Exam			
Complete Praxis II Content Exam			
	15		13

Total Credits: 131

Agricultural and Biosystems Engineering

Department Information

- **Department Location:**
  Agricultural and Biosystems Engineering
- **Department Phone:**
  701-231-7261
- **Department Email:**
  ndsu.asm@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/aben/
- **Degrees Offered:**
  B.S.A.B.En.

- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/agricultural-biosystems-engineering/

Agricultural and Biosystems Engineering Major

The Agricultural and Biosystems Engineering (ABEN) program prepares men and women for careers requiring application of physical, biological, and engineering sciences to develop solutions relating to: the design and production of machine systems; the production and handling of biological materials; processing of food, feed, fiber, and fuel; and the preservation of natural resources and environmental quality. A major in Agricultural and Biosystems Engineering can serve a broad range of career interests and can provide excellent career opportunities for men and women from diverse backgrounds.

The program educational objectives of this major are that graduates are expected to have established themselves as practicing engineers who, within a few years of graduation:

1. Successfully address emerging engineering challenges in the design or evaluation of machine systems, processing systems, and natural resources and environmental systems affecting the production of food, feed, and other biobased products;
2. Effectively use professional communication, critical thinking, and interpersonal skills as team leaders and team members; and
3. Responsibly serve the public and their employers by participating in professional development and by maintaining the highest standard of professional ethics.

These objectives support the department mission of developing and extending knowledge through engineering and technology that advances the productivity of agricultural production, the processing and utilization of biological materials, and the management of environmental resources.

Agricultural and biosystems engineering integrates engineering topics, engineering design, and biological sciences in a single program with two concentrations: agricultural engineering and biosystems engineering. While there is considerable overlap between the agricultural engineering (AGEN) and the biosystems engineering (BSEN) concentrations, the BSEN concentration includes a heavier emphasis on fundamental biological and chemical sciences. The AGEN concentration includes a heavier emphasis in the physical sciences. A wide range of electives in related disciplines can be used to compliment the disciplinary course work and to prepare for specific career interests. Although not required by the curriculum, students are encouraged to take advantage of Cooperative Education experiences or the opportunity of paid internships where they gain hands-on experience in engineering.

Agricultural Engineering Option

Career opportunities for graduates in agricultural engineering are many and diverse. Graduates may work for companies and agencies that design, develop, test, and manufacture power and machine systems; handle, store, and process agricultural commodities; design environmental controls and housing systems for plant and animal production; design equipment and systems for processing, manufacturing, distribution and quality protection of food products; design systems for management of air, land and water resources; design and manage crop irrigation systems; and develop electrical and electronic applications for agricultural problems. Graduates with an agricultural engineering concentration may also pursue graduate degrees in engineering, business, or law. By selecting appropriate elective courses, students may emphasize areas such as agricultural systems, environmental systems, biomaterials and processing systems, or an emphasis area designed by the student in consultation with an adviser.

The faculty assist with career planning and job placement of graduates. Students interested in careers involving production, delivery, management, and technical support of systems for food, agricultural, or closely related industries rather than engineering or design should consider the Agricultural Systems Management major (p. 37) offered by the College of Agriculture, Food Systems, and Natural Resources (http://www.ag.ndsu.edu/academics).

Plans of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ABEN 110	3	ABEN 496 (Ag Tech Expo)	1
CHEM 121	3	ME 212	3
ENGL 110	4	ME 221	3
MATH 165	4	CHEM 122	3
CHEM/BIO Elective	3	ENGL 120	3
		MATH 166	4
	17		17

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
ABEN 255	3	ABEN 263	3
COMM 110	3	PHYS 252	4
ME 222	3	PHYS 252L	1
ME 223	3	MATH 266	3
MATH 259	3	ME 350	3
MATH 128	1	Computer Elective	3
Gen Ed Elective	2		
	18		17
Junior			
Fall	**Credits**	**Spring**	**Credits**
IME 460	3	ABEN 377	3
CE 309	3	ABEN 482	3
ENGL 321, 324, or 459	3	ECE 301	3
ENGR 402	1	ABEN Elective	3
ABEN Elective	3	Gen Ed Elective	3
CHEM/BIO Elective	3		
	16		15
Senior			
Fall	**Credits**	**Spring**	**Credits**
ABEN 486	2	ABEN 487	2
ABEN 491	1	Tech Elective	3
IME 440	2	CHEM/BIO Elective	3
ABEN Elective	3	Gen Ed Elective	3
Gen Ed Elective	3	Gen Ed Elective	3
Tech Elective	5	BUS/COMM Elective	3
	16		17

Total Credits: 133

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

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

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
ABEN 255	3	ABEN 263	3
CHEM 240	3	PHYS 252	4
COMM 110	3	PHYS 252L	1
MATH 128	1	MATH 266	3
MATH 259	3	Gen Ed Elective	3
ME 222	3	CHEM/BIO Elective	3
	16		17
Junior			
Fall	**Credits**	**Spring**	**Credits**
CE 309	3	ABEN 444	3
IME 440	2	ABEN 482	3
IME 460	3	ME 350	3
ENGL 321, 324, or 459	3	ABEN Elective	3
ENGR Elective	3	Gen Ed Elective	5
CHEM/BIO Elective	3		
	17		17
Senior			
Fall	**Credits**	**Spring**	**Credits**
ABEN 486	2	ABEN 487	2
ABEN 491	1	ABEN Elective	3
ENGR 402	1	ENGR Elective	3
ABEN Elective	3	Gen Ed Elective	3
Gen Ed Elective	3	Tech Elective	3
ENGR Elective	3		
Tech Elective	3		
	16		14

Total Credits: 133

Agricultural Communication

Department Information

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

Agricultural communication is a 42-credit major offered by the Department of Communication. This course of study is for students who have strong interest in both agriculture and in communication who want to work as a communication specialist for agribusiness. Students might work for a livestock or grain association, as an editor of a specialized publication or as the advocate for a farm or ranching organization.

Students interested in pursuing an undergraduate degree offered by the Department of Communication must first complete all courses and requirements associated with the pre-communication preparation designation. Once all pre-communication preparation courses and requirements

are met, the student completes and submits the pre-communication form, available on the department website, to the department's academic assistant. After verification of accuracy, the student is accepted into the professional program and can continue pursuing a degree in the Department of Communication.

Pre-Communication Preparation

Students must complete 19 credits of selected courses with a 3.0 cumulative GPA or above to become an agricultural communication major. The courses are COMM 110; COMM 112; COMM 114; COMM 189; COMM 212; COMM 214; and ENGL 120. Pre-communication preparation courses may be retaken only once.

Agricultural Communication Major

Students majoring in agricultural communication may earn a Bachelor of Science degree (includes an approved minor in an agriculture program) or a Bachelor of Arts degree (includes a modern language proficiency) upon completion of all pre-communication preparation courses and requirements. The agricultural communication major combines the resources and expertise of two units, communication and agriculture, to produce trained communicators who can explain science, technologies and complex agricultural issues to diverse audiences. Students will complete an applied capstone course after completing all other required course work.

Agricultural Communication Minor

Many other majors offered at North Dakota State University can be greatly enhanced by an agricultural communication minor. The 21-credit minor includes a 12-credit core and nine credits of communication professional specialization.

Plan of Study

This plan is designed to provide you with guidance on the order in which to take your required courses. It can be used by students at any point in their coursework (including students with transfer credit). We have had many students join the department later than their first year and still graduate on time. Your faculty advisor can help you create a plan of study that is customized to your goals and timeline.

First Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 112	3	COMM 110	3
COMM 114	3	ENGL 120	3
COMM 189	1	Global Perspectives GE	3
ENGL 110 (or placement into ENGL 120)	4	Humanities/Arts GE	3
Quantitative Reasoning GE	3	Science/Technology GE	3
Wellness GE	2	Science/Technology Lab GE	1
	16		16
Second Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 133	3	COMM 200	3
COMM 212	3	COMM 320	3
COMM 220	3	Minor or Language Coursework	3
Minor or Language Coursework	3	Humanities/Arts GE	3
Science/Technology GE	3	Science/Technology GE	3
	15		15
Third Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 310	3	COMM 362	3
COMM 496	3	Major Elective	3
Major Elective	3	Major Elective	3
Minor or Language Coursework	3	Minor or Language Coursework	3
Upper Division Writing	3	AHSS Requirement	3
	15		15

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 431	3	COMM 465	3
Major Elective	3	Major Elective	3
Minor or Language Coursework	3	Minor or Language Coursework	3
AHSS Requirement	3	AHSS Requirement	3
Additional Coursework or Internship	3	Additional Coursework or Internship	3
	15		15

Total Credits: 122

Agricultural Economics

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-7441
- **Department Web Site:**
  www.ag.ndsu.edu/agecon
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/agricultural-economics/

Agricultural Economics Major

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

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

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

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ECON 189[1]	1	ECON 201	3
MATH 103 (pre-req for Math 144)	3	MATH 144	4
ENGL 110	4	ENGL 120	3
Wellness Gen Ed	2	Hum/FA Gen Ed	3
Sci & Tech Gen Ed	4	Ag Sci Elective	3
	14		16

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
COMM 110	3	AGEC 244	3
AGEC 242	3	AGEC 246	3
ECON 202	3	ECON 341	3
MIS 116	3	Ag Sci Elective	3
Sci & Tech Gen Ed	2	Hum/FA Gen Ed	3
	14		15
Junior			
Fall	**Credits**	**Spring**	**Credits**
AGEC 339	3	AGEC 344 or 346 (or 342 in Fall)	3
ECON 324 or 343	3	ACCT 201	3
ACCT 102 or 200	3	AGEC 300/400 Elective	3
STAT 330	3	300 Level English	3
Upper Level Comm	3	Ag Sci Elective	3
		STAT 331	2
	15		17
Senior			
Fall	**Credits**	**Spring**	**Credits**
AGEC 375 (or AGEC 484 in Spring)	3	AGEC 300/400 Elective	3
AGEC 300/400 Elective	3	AGEC 420 or 445 (Capstone)	3
AGEC 444 or 446 (Capstone)	3	Free Electives	8
Free Electives	6		
	15		14

Total Credits: 120

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

Agricultural Systems Management

Department Information

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

Agricultural Systems Management

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

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

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

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

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

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

Students interested in the design, testing, manufacturing, and development aspects of products, processes, or systems for agricultural production, food, and value-added processing of commodities, or sustainable management of environmental resources should consider the Agricultural and Biosystems Engineering (p. 31) curriculum.

Curriculum Options

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

Agricultural Systems Management Minor

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

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ASM 115	3	ASM 496 (Field Exp./Ag Tech Expo)	1
ASM 125	3	COMM 110	3
ENGL 110	4	CSCI 114 or MIS 116	3
MATH 103	3	ENGL 120	3
Elective (Option)	3	MATH 105	3
		HUM/FINE ARTS & CULTURAL DIVERSITY	3
	16		16
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
ASM 225	3	ASM 264	3
ACCT 102	3	ASM 264L	1

ECON 201	3	ECON 202	3
PHYS 211	3	PSYC 111	3
PHYS 211L	1	Elective (Option)	3
Elective (Free)	3	Elective (Free)	3
	16		16
Junior			
Fall	**Credits**	**Spring**	**Credits**
ASM 323	3	ASM 373	3
CHEM 121	3	ASM 374	1
STAT 330	3	CHEM 122	3
WELLNESS	2	ENGL 320, 321, 324, or 459	3
Elective (Option)	6	Elective (Option)	3
		Elective (Free)	3
	17		16
Senior			
Fall	**Credits**	**Spring**	**Credits**
ASM 354	3	ASM 429	3
ASM 378	3	ASM 475	2
ASM 491	1	ASM 454	3
HUM/FINE ARTS	3	Elective (Option)	6
Elective (Option)	6		
	16		14

Total Credits: 127

Animal Science

Department Information

- **Department Location:**
  Hultz Hall
- **Department Phone:**
  701-231-7641
- **Department Email:**
  ndsu.ansc@ndsu.edu
- **Department Web Site:**
  www.ag.ndsu.edu/ansc/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/animal-science/

Animal Science Major

The Animal Science major encompasses physiology, nutrition, genetics, reproduction, marketing, management, and husbandry of livestock and companion animals; the important scientific understanding for the utilization of animal products; and experiences necessary for leadership in, and advocacy for, industries that provide animals and animal products that benefit humans.

Curriculum Options

Five study options are available for the animal science major.

- **Animal Production, Management and Husbandry:** This option is designed for students desiring a background in the principles of animal management and husbandry. It includes broad training in animal husbandry, production and management. Employment opportunities include

careers in livestock production, allied support fields, and in technical support fields including agricultural positions within the Cooperative Extension Service.

- **Animal Biomedical Science:** This option offers students a more scientific approach to animal science, preparing them for veterinary medicine, graduate research in animal science, teaching, food technology and the biotechnology industry. Students may receive an animal science degree while meeting academic requirements for application to veterinary schools.
- **Animal Agribusiness:** This option is designed for students desiring a background in the business and economic principles as they apply to the livestock industry. It leads to broad training in animal husbandry, production, business, and management. Employment opportunities include careers in agribusiness, sales and marketing of livestock and products for the livestock industry, and a variety of public and private institutions which serve the business of animal agriculture.
- **Livestock Media:** This option offers students an opportunity to acquire skills in journalism, advertising, and public relations in addition to the fundamentals of animal science. Employment opportunities include working for a variety of media outlets including print and virtual media, TV, radio, magazines, breed associations, or commodity organizations as well as positions involved in public relations in the livestock industry.
- **Meat Science:** This option provides the opportunity to emphasize knowledge about the science of muscle biology and evaluation and processing of red meat. This option prepares students for a broad variety of career opportunities in the meat industry including management, sales, meat inspection, and meat marketing.

Animal Science Minor

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

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

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

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ANSC 101	1	ANSC 240	3
ANSC 114	3	BIOL 111 or 150	3
ENGL 110 (C)	4	BIOL 111L or 150L	1
VETS 135	3	ENGL 120	3
MATH 103	3	COMM 110 (C)	3
CHEM 117 or 121 (S)	3	Gen Ed Humanities & Fine Arts and Cultural Diversity (A & D)	3
CHEM 117L or 121L (S)	1		
	18		16
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
AGEC 242	3	AGEC 244	3
ANSC 230, 231, 232, or 235	2	BIOC 260	4
ECON 201 (B & G)	3	STAT 330 (R)	3
ENGL 120 (C)	3	Ben Ed Humanities & Fine Art (A)	3
MICR 202 & 202L (S)	3	Gen Ed Science & Technology (S)	3
	14		16
Junior			
Fall	**Credits**	**Spring**	**Credits**
ANSC 300	3	ANSC 324	3
ANSC 323	3	ANSC 340	3

ANSC 357	3	ANSC 380	2
ANSC 370	3	ANSC 463 & 463L	4
ANSC 379, 393, or 396	2	Gen Ed Upper Division Writing (C)	3
	14		15

Senior			
Fall	**Credits**	**Spring**	**Credits**
ANSC 488**	3	ANSC 478	3
Gen Ed Social & Behavioral Sciences (B)	3	ANSC 480, 482, 484, or 486**	3
Animal Prod, Mgt, & Husbandry Elective	3	Elective	3
Animal Prod, Mgt, & Husbandry Elective	3	Elective	4
Gen Ed Wellness (W)	2		
	14		13

Total Credits: 120

** Two production courses are required. ANSC 488 is offered during fall semester; ANSC 480, 482,484, and 486 are offered during spring semester.

Anthropology

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-8657
- **Department Web Site:**
  www.ndsu.edu/socanth/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/anthropology/

Anthropology is the study of the human condition and experience over both time and space. It sets itself apart from other social sciences in its holistic aspiration to understand all aspects of humankind: past, present and future; cultural and biological. This holistic approach is reflected in the primary subdisciplines of study including archaeology, cultural anthropology, linguistic anthropology, physical anthropology, and applied anthropology. Anthropology is both the study and celebration of the diversity of human lifeways, reminding us that despite our different cultures, we are all members of the human family and share a common nature and a common destiny.

Across subdisciplines and geographical areas at NDSU we take a critical approach to understanding human variation, past, present, and future. Our focal geographical areas include North America, Latin America, the Caribbean, and South Asia with other areas of the world represented throughout the curriculum.

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ANTH 111	3	ANTH 204	3
SOC 110	3	ENGL 120	3
ENGL 110	4	GE Humanities/Fine Arts	3

Science/Techonology	3	Wellness	2-3
Humanities/Fine Arts	3	GE Global Perspective	3
	16		14-15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
ANTH 205	3	COMM 110	3
Major Elective	3	Major or Language	3
Minor or Language	3	Science/Technology	3
AHSS Requirement	3	Additional course	3
GE Science/Technology	4	Major elective	3
	16		15
Third Year			
Fall	**Credits**	**Spring**	**Credits**
Major elective	3	Major Elective	3
Major Elective	3	Minor or Language	3
Minor or Language	3	Upper Level Writing	3
Additional course	3	Quantitative Reasoning	3
Additional course	3	Additional course	3
	15		15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
ANTH 471 or 481	3	ANTH 470 or 480	3
ANTH 489	1	Major elective	3
Minor or Language	3	Minor or Language	3
AHSS Requirement	3	Additional course @ 300-400 level	3
Additional course @ 300-400 level	3	Additional course	3
Additional course @ 300-400 level	3		
	16		15

Total Credits: 122-123

Apparel, Retail Merchandising and Design

Department Information

- **Department Location:**
  E. Morrow Lebedeff Hall
- **Department Phone:**
  701-231-8604
- **Department Web Site:**
  www.ndsu.edu/adhm/index.html
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/apparel-retail-merchandising-design/

Apparel, Retail Merchandising and Design

If you are looking for a career in a fast-paced environment that provides new opportunities each day, then a degree in Apparel, Retail Merchandising and Design (ARMD) is just for you. The global textile and apparel industry is made up of companies that produce fibers, yarns, and textile and apparel

products for consumers around the world. National and global retailers provide goods and services to consumers everywhere, via multi-channel retailing involving traditional stores, catalogs, online venues, including social networking sites.

The undergraduate program in ARMD offers students opportunities to develop new approaches for dealing with challenges facing all areas of the global textile, apparel, and retail industry. Students are involved in designing new solutions for an ever-evolving global industry. Because of the size and scope of the industry, there are a variety of career opportunities available worldwide.

Students gain aesthetic, technical, practical, and professional skills in two option areas. The first option is retail merchandising that provides students with a firm grasp of business strategy. Graduates hold positions as buyers, store managers, visual merchandisers, marketing managers, sales and account executives, and trend forecasters with many retail companies. An option in apparel studies focuses on developing, designing, and marketing materials and products within this global industry. Students develop a trained eye and skills to showcase and sell products to a fashion-conscious consumer. Graduates have accepted positions in product development, technical design, fashion journalism, quality control, museum collection management, and theatrical costuming. Others have used their skills to successfully run their own businesses.

Plans of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Apparel Studies Option

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ADHM 171	3	ADHM 181	3
CSCI 114 or MIS 116	3	COMM 110	3
ENGL 110	4	ENGL 120	3
Science & Tech Lab	4	PSYC 111 or SOC 110	3
Wellness	2	Minor/Elective/STATS prereq	3
	16		15
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
ECON 105	3	ADHM 155 or 370	3
Minor/Elective	3	ADHM 271	3
STAT 330*	3	ADHM 272	3
Humanities/Fine Arts	3	Prof Elective	3
Prof Elective	3	Science/Tech	4
	15		16
Junior			
Fall	**Credits**	**Spring**	**Credits**
ADHM 310	3	ENGL 320	3
ADHM 366	3	Prof Elective	3
ADHM 367	1	Minor Elective	3
ADHM 385	3	Minor Elective	3
ADHM 375	1	Prof Elective	3
ADHM 489**	1		
Prof Elective	3		
	15		15
Senior			
Fall	**Credits**	**Spring**	**Credits**
ADHM 486	3	ADHM 481	3
Minor/Elective	3	Minor/Elective	3

Minor/Elective	3	Prof Elective	3
Minor/Elective	3	Elective (as needed)	7
Prof Elective	3		
	15		16

Total Credits: 123

* Prerequisites may apply

** Minimum 1 credit Study Tour in consultation with your advisor. Three-credit Study Tour is typically offered in Summer

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Retail Merchandising Textile Production Option

Freshman					
Fall	**Credits**	**Spring**	**Credits**		
ADHM 171	3	ACCT 102	3		
ENGL 110	4	ADHM 181	3		
CSCI 114 or MIS 116	3	COMM 110	3		
Science & Tech Lab	4	ENGL 120	3		
Wellness	2	Minor/Elective/STATS prereq	3		
	16		15		
Sophomore					
Fall	**Credits**	**Spring**	**Credits**		
ADHM 310	3	ADHM 271	3		
PSYC 111	3	ADHM 272	3		
Science/Tech	3	ECON 105	3		
STAT 330*	3	Humanities Fine Arts	3		
ADHM 489**	1	Elective	3		
	13		15		
Junior					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
ADHM 366	3	ADHM 370	3	ADHM 496	3-6
ADHM 367	1	ADHM 386	3		
ADHM 372	3	MGMT 320	3		
ADHM 375	1	MRKT 410	3		
ENGL 320	3	Elective	3		
MRKT 320	3				
	14		15		3-6
Senior					
Fall	**Credits**	**Spring**	**Credits**		
ADHM 385	3	ADHM 481	3		
ADHM 470	3	Business or Prof Elective	3		
ADHM 486	3	COMM 383 or BUSN 383 (or alternative COMM course)	3		
MRKT 362	3	Prof Elective	3		

Prof Elective	3	Elective	4
	15		16

Total Credits: 122-125

* Prerequisite may apply

** Minimum 1 credit Study Tour in consultation with your advisor. Three-credit Study Tour is typically offered in Summer.

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Retail Merchandising Interior Merchandising Option

Freshman					
Fall	**Credits**	**Spring**	**Credits**		
CSCI 114 or MIS 116	3	ADHM 151	3		
ADHM 161	3	COMM 110	3		
ADHM 171	3	ECON 105	3		
ENGL 110	4	ENGL 120	3		
PSYC 111	3	Wellness	2		
	16		14		
Sophomore					
Fall	**Credits**	**Spring**	**Credits**		
ADHM 251	3	ADHM 271	3		
ADHM 264	2	ADHM 272	3		
Science & Tech	3	STAT 330*	3		
ACCT 102	3	Science & Tech w/Lab	4		
Minor/Elective/STATS prereq	3	Elective	3		
	14		16		
Junior					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
ADHM 315 (or 316 in the Spring)	3	ADHM 386	3	ADHM 496	3-6
ADHM 366	3	ADHM 368	2		
ADHM 367	1	COMM 383 or BUSN 383 (or Alternative)	3		
ADHM 375	1	ENGL 320	3		
MGMT 320	3	MRKT 320	3		
Elective/Diversity	3	ADHM 261	3		
ADHM 489**	1				
	15		17		3-6
Senior					
Fall	**Credits**	**Spring**	**Credits**		
ADHM 372	3	ADHM 481	3		
ADHM 470	3	MRKT 362	3		
MRKT 410	3	BUSN Elective	3		
BUSN Elective	3	BUSN Elective	3		

Elective (as needed)	3	
	15	12

Total Credits: 122-125

* Prerequisites may apply.

** Minimum 1 credit Study Tour in consultation with your advisor. Three-credit Study Tour is typically offered in Summer.

Architecture

Department Information

- **Department Location:**
  Klai Hall
- **Department Phone:**
  701-231-6151
- **Department Email:**
  ndsu.ala@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/ala/
- **Degrees Offered:**
  B.S.Arch.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/architecture/

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

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

Selective Admission

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

The Program

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

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

Special Notice

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

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENVD 101	3	ENVD 104	1
ENVD 102	1	ENVD 172	3
ENVD 130	3	ENGL 120	3
ENGL 110	4	COMM 110	3
ARCH 321	3	ARCH 322	3
PHYS 120	3	Gen Ed Quantitative Reasoning Requirement	3
		Gen Ed Wellness Requirement	2
	17		18
Second Year			
Fall	**Credits**	**Spring**	**Credits**
ARCH 271	6	ARCH 272	6
ARCH 231	3	ARCH 232	3
ARCH 233	1	ARCH 344	3
ARCH 323	3	PSYC 111	3
Gen Ed Science & Tech Requirement	3	PHIL Elective	3
	16		18
Third Year			
Fall	**Credits**	**Spring**	**Credits**
ARCH 371	6	ARCH 372	6
ARCH 341	3	ARCH 450	3
ARCH 351	4	ARCH 454	3
ARCH 453	3	ARCH 461	3
Gen Ed Science & Tech Lab Requirement	1	ENGL 326 or 357	3
	17		18
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
ARCH 471	6	ARCH 472, 474, or 475	6
ARCH 443	3	SOC 110	3
ANTH 111	3	Elective	3
Gen Ed Science & Tech Requirement	3	Elective	2
Elective	3		
	18		14

Total Credits: 136

Art

Department Information

- **Department Location:**
  Renaissance Hall
- **Department Phone:**
  701-231-8818
- **Department Web Site:**
  www.ndsu.edu/visualarts/

- **Degrees Offered:**
  B.S.; B.A.; B.F.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/art/

Art Major

The Department of Visual Arts offers four undergraduate degrees: The Bachelor of Fine Arts, the Bachelor of Science in Art Education, the Bachelor of Arts, and the Bachelor of Science. The B.F.A.is a professional degree featuring a studio art concentration, The B.S. in Art Education is a K-12 Art Education degree while the B.A. and B.S.are liberal arts degrees. All areas of study require studio components with emphasis areas possible in Graphic Design, Ceramics, Painting, Sculpture, Printmaking, Drawing and Photography.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ART 122	3	ART 131	3
ART 124	3	ART 211 (A)	3
ART 210 (A)	3	ENGL 120 (C)	3
ENGL 110 (C)	4	Gen Ed Quantitative Reasoning	3
Gen Ed Social & Behavioral Sci and Global Perspectives	3	ART 100 Level - Intro Studio	3
	16		15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
ART 230	3	Gen Ed Science & Tech/Lab	4
ART 100 Level - Intro Studio	3	ART 100 Level - Intro Studio	3
ART 100 Level - Intro Studio	3	AHSS College Requirements	3
COMM 110 (C)	3	Minor Coursework	3
Gen Ed Science & Technology (S)	3	ART 100 Level - Intro Studio	3
	15		16
Third Year			
Fall	**Credits**	**Spring**	**Credits**
ART 200 Level - Emphasis Studio	3	ART 100 Level - Intro Studio	3
ART 100 Level - Intro Studio	3	ART 335	3
ART 452	3	ART 300 Level - Intro Studio	3
Gen Ed Science & Tech	3	Minor Coursework	6
Minor Coursework	3		
	15		15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
ART 400 Level - Emphasis Studio	3	ART 489	3
ART 200 Level - Studio Elective	3	ART 400 Level - Emphasis Studio	3
AHSS College Requirements	3	Gen Ed Social and Behavioral & Cultural Diversity	3
Gen Ed Wellness	2	Minor Coursework	3

Minor Coursework	3	Gen Ed Upper Division Writing	3
	14		15

Total Credits: 121

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ART 122	3	ART 131	3
ART 124	3	ART 211 (A)	3
ART 210 (A)	3	ENGL 120 (C)	3
ENGL 110 (C)	4	Gen Ed Quantitative Reasoning (R)	3
Gen Ed Social & Behavioral Sci and Global Perspectives (B & G)	3	ART 100 Level - Intro Studio in Emphasis Area	3
	16		15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
ART 230	3	Gen Ed Science and Tech with Lab (S)	4
ART 100 Level - Intro Studio	3	ART 100 Level - Intro Studio	3
ART 200 Level - Emphasis Studio	3	ART 45X - Art History Rotation	3
Art 45X - Art History Rotation	3	ART 300 Level- Emphasis Studio	3
Gen Ed Science and Tech (S)	3	COMM 110 (C)	3
		*Foundations Portfolio Review	
	15		16
Third Year			
Fall	**Credits**	**Spring**	**Credits**
ART 200 Level - Secondary Studio Area	3	ART 335	3
ART 100 Level - Intro Studio	3	ART 100 Level - Intro Studio	3
ART 45X - Art History Rotation	3	ART 300 Level - Emphasis Studio	3
Gen Ed Social & Behavioral Sci and Cult Diversity (B & D)	3	Gen Ed Science & Tech (S)	3
ART 300 Level - Studio Emphasis	3	Gen Ed Wellness (W)	2
		*Apply for Baccalaureate	
	15		14
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
ART 400 Level - Emphasis Studio	3	ART 489	3
Art 489 - Baccalaureate Project	3	ART 400 Level - Emphasis Studio	3
ART 100 Level - Intro Studio	3	ART 400 Level - Studio or Art History Elective	3
Gen Ed Upper Division Writing (C)	3	ART 400 Level - Studio Elective	3
ART 300 Level - Studio Elective	3	Elective	2

*Capstone Exhibition 1		*Capstone Exhibition 2	
	15		14

Total Credits: 120

Art Education

Department Information

- **Department Location:**
  Renaissance Hall
- **Department Phone:**
  701-231-8818
- **Department Web Site:**
  www.ndsu.edu/visualarts/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/art-education/

No overview information available for this major.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ART 122	3	ART 131	3
ART 124	3	ART 211 (A)	3
ART 210 (A)	3	ENGL 120 (C)	3
ENGL 110 (C)	4	Gen Ed Wellness (W)	2
Gen Ed Social and Behavioral Sci & Global Perspectives (B & G)	3	Gen Ed Quantiative Reasoning (R)	3
		ART 100 Level - Intro Studio	3
	16		17
Second Year			
Fall	**Credits**	**Spring**	**Credits**
ART 230	3	EDUC 322	3
EDUC 321	3	Gen Ed Science and Tech with Lab (S)	4
COMM 110 (C)	3	ART 100 Level - Intro Studio	3
ART 100 Level - Intro Studio	3	Gen Ed Social & Behavioral Sci and Cult Diversity (B & D)	3
ART 45X - Art History Rotation	3	ART 45X - Art History Rotation	3
*Complete Praxis Core Academic Skills Exam		*Foundations Portfolio Review	
		*Apply to School of Education	
	15		16
Third Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 451	3	ART 335	3

ART 200 Level - Studio Emphasis	3	EDUC 481	2-3
ART 100 Level - Intro Studio	3	Gen Ed Science & Tech (S)	3
ART 45X - Art History Rotation	3	Gen Ed Upper Division Writing (C)	3
ART 100 Level - Intro Studio	3	ART 300 Level - Studio Emphasis	3
		*Apply for Baccalaureate	
	15		14-15

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 482	2-3	EDUC 485	1
EDUC 486	3	EDUC 487	9
ART 489	3	EDUC 488	3
ART 400 Level - Studio Emphasis	3		
Gen Ed Science & Tech (S)	3		
*Capstone Exhibition			
*Apply to Student Teaching (Meeting TBA)			
*Complete Praxis Content and PTL exams			
	14-15		13

Total Credits: 120-122

Behavioral Statistics

Department Information

- **Department Location:**
  Morrill Hall
- **Department Phone:**
  701-231-8734
- **Department Email:**
  ndsu.stats@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/statistics/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/behavioral-statistics/

This degree is a joint effort between the Department of Statistics (http://bulletin.ndsu.edu/departments/statistics) and the Department of Psychology (http://bulletin.ndsu.edu/departments/psychology). It is recommended that a student wishing to obtain a degree in Behavioral Statistics consult with an adviser in both departments. This major prepares students for careers involving collecting and analyzing data on human behavior, for example, in Medicare, insurance, market research, or health, educational and social services. Graduates of this program are expected to have good quantitative reasoning skills and to have strong people skills. ***Note:*** *this curriculum also fulfills requirements for the major in Psychology.*

Plan of study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	ENGL 120	3
MATH 103 (or higher level)	3	Humanities & Fine Arts Gen. Ed.	3

PSYC 111	3	Any 200 level PSYC class	3
Science & Technology Gen. Ed.	3	Science & Technology Gen. Ed.	3
Social & Behavioral Sciences Gen. Ed.	3	Science & Technology Lab	1
		Social & Behavioral Sciences Gen. Ed.	3
	16		16

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
STAT 330	3	STAT 331	2
200 level PSYC	3	PSYC 351	3
PSYC 350	3	COMM 110	3
Science & Technology Gen. Ed.	3	Humanities & Fine Arts Gen. Ed.	3
Wellness Gen. Ed.	2	Cultural Diversity Gen. Ed.	3
	14		14

Junior			
Fall	**Credits**	**Spring**	**Credits**
Global Perspectives Gen. Ed.	3	Hum/Soc. Science Elective	3
200- 400 Level PSYC Elective	3	PSYC Behavior Elective	3
200- 400 Level PSYC Elective	3	PSYC Behavior Elective	3
Hum/Soc. Science Elective	3	STAT Elective	3
PSYC Behavior Elective	3	STAT Elective	3
	15		15

Senior			
Fall	**Credits**	**Spring**	**Credits**
400 level PSYC class	3	PSYC 480, 489, or STAT 491	3
STAT 462	3	STAT 470 or 471	3
Elective	3	Elective	3
Elective	3	Elective	3
Elective	3	Elective	3
	15		15

Total Credits: 120

Biochemistry and Molecular Biology

Department Information

- **Department Location:**
  Ladd Hall
- **Department Phone:**
  701-231-8694
- **Department Email:**
  ndsu.chemistry@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/chemistry/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/biochemistry-molecular-biology/

The Biochemistry and Molecular Biology major is designed to give students a detailed understanding of the chemistry of living matter. Careers exist in medical, pharmaceutical, food processing, and agricultural laboratories. Graduates also will have excellent preparation for graduate school or schools of medicine, dentistry, veterinary science, and business.

Students with an interest in biochemistry earn the Bachelor of Science degree in biochemistry and molecular biology. This provides flexibility in the selection of courses for those students who plan to seek employment in areas related to biochemistry, enter graduate or medical school, or teach in high schools or higher education institutions. The program provides training in biochemistry, botany, microbiology, zoology or in applied areas according to the student's interest. In addition to the courses in chemistry, physics and mathematics, an additional 16 credits in biological sciences, 18 credits of electives in the humanities and social sciences, nine credits in English, three credits in speech and two credits in wellness are required. The pre-medical student is encouraged to take a year of upper-level zoology.

Biochemistry Minor

A minor in Biochemistry also is available. Contact the department (https://www.ndsu.edu/chemistry) for details.

Biochemistry is concerned with the chemistry of the materials fundamental to life and contributes toward the understanding of the structure and functioning of all organisms. Because of the rapid advances in the areas of biotechnology, molecular biology and genetic engineering, biochemistry is an exciting area for study and research.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
BIOL 150 & 150L	4	MATH 166	4
CHEM 150 or 121	3	CHEM 151 or 122	3
CHEM 160 or 121L	1	CHEM 161 or 122L	1
ENGL 110 (Communication Gen Ed)	4	ENGL 120 (Communication Gen Ed)	3
MATH 165 (Quant. Reasoning Gen Ed)	4	Humanities/Fine Arts Gen Ed	3
		Social & Behavioral Sci Gen Ed	3
	16		17
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
COMM 110 (Communication Gen Ed)	3	PHYS 252 & 252L (Science & Tech Gen Ed)	5
CHEM 341	3	CHEM 342	3
CHEM 353	1	CHEM 354	2
BIOL 315	3	Humanities/Fine Arts and Global Perspectives Gen Ed	3
PHYS 251 & 251L (Science & Tech Gen Ed)	5	Social & Beh Sci and Cultural Diversity Gen Ed	3
	15		16
Junior			
Fall	**Credits**	**Spring**	**Credits**
BIOC 460	3	CHEM 380	1
BIOC 460L	1	BIOC 461	3
CHEM 431	3	BIOC 474	3
MICR 350 & 350L	5	STAT 330	3

ENGL 321 or 324 (Communication Gen Ed)	3	300-400 Level Science Elective[1]	3
		300-400 Level Science Elective[1]	3
	15		16
Senior			
Fall	**Credits**	**Spring**	**Credits**
BIOC 473	3	BIOC 487	3
BIOC 483	3	CHEM 491	2
CHEM 465	4	300-400 Level Science Electives[1]	3
Humanities or Social Science College Requirement[2]	3	Humanities or Social Science College Requirement[2]	3
		Wellness Gen Ed	2
	13		13

Total Credits: 121

1 Courses in BIOL, BOT, ZOO, CHEM, CSCI, MICR, PSCI, PHYS, PPTH, or STAT. No more than 6 credits from one prefix may apply. Research credits (CHEM 494/BIOC 494) may count towards 3 of these credits.

2 Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education in the humanities & fine arts and the social & behavioral sciences categories (A & B). These credits must come from outside the department of the student's major.

Biological Sciences

Department Information

- **Department Location:**
  Stevens Hall
- **Department Phone:**
  701-231-7087
- **Department Web Site:**
  www.ndsu.edu/biology/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/biological-sciences/

A Biological Sciences degree is available in a traditional broad-based sequence or in an Environmental Science option.

Biological Sciences Standard Option

Biological Sciences is a comprehensive field of biology that prepares students for a variety of careers in human health, environmental science, conservation, and plant and animal biology. With its many areas of emphasis, the program integrates studies in zoology, botany, and biological sciences and offers students the flexibility to customize their field of study to align course selection with educational and professional goals. The program integrates broad-based biology foundation classes with specializations such as biomedical science or conservation biology, in later years. With appropriate course selection, the Biological Sciences degree also can provide a broad understanding of the complex relationship between the living and nonliving world. Students will be able to choose a research based course that focuses on plants, wildlife, antibiotics, or learning.

Environmental Science Option

Environmental Science is characterized by an integrative, multidisciplinary approach to environmental issues of concern to humans. This represents an exciting, rewarding area of science, which requires an especially strong academic background and an ability to think both analytically and comprehensibly.

For students interested in careers that address solving environmental problems, there is the Biological Sciences major with an Environmental option. This rigorous option incorporates balanced studies in the natural sciences (biology, chemistry, physics, and earth sciences) with social sciences

(economics, political science, and sociology). It also involves technology, business, law, ethics, and human relations and behavior. Students interested in this option should visit with an adviser to obtain the specific requirements. Environmental Science students may not pursue a minor in Biology.

Biological Sciences Education and Comprehensive Science Education Majors

Students interested in Biological Sciences Education (p. 57) or Comprehensive Science Education (p. 67) are encouraged to declare a double major in the discipline and in education (i.e., Biological Sciences Education and Biological Sciences). Such double majors may be earned by successful completion of a few additional credits. Students should contact advisers in Biological Sciences for details.

Students who intend to teach life sciences in the secondary schools should make their intentions known to the School of Education and consult with a biology education adviser in the Department of Biological Sciences (https://www.ndsu.edu/biology) early in their programs to make certain that they have a well-designed program and take the professional education courses required for state teacher certification.

The Comprehensive Science Education major is designed to prepare the secondary general science teacher. This major is an especially good preparation for students who may find themselves teaching several different science courses. Information about curriculum and other requirements is available from the School of Education (https://www.ndsu.edu/education) and the education adviser in the Department of Biological Sciences. Biological Sciences Education and Comprehensive Science Education majors cannot pursue a minor in Biology.

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 189	1	BIOL 151 & 151L	4
BIOL 150 & 150L	4	CHEM 122 & 122L	4
CHEM 121 & 121L	4	ENGL 120	3
ENGL 110	4	MATH 146 or 165	4
MATH 103	3		
	16		15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 252	3	BIOL 270, 271, or 272	3
BIOL 315 & 315L	4	PHYS 120 or 211 ***and*** 211L ***and*** 212 ***and*** 212L	3
CHEM 240, 341 ***and*** 341L, or 342 ***and*** 342L	3-4	BIOL 364 or 370	3
COMM 110	3	Social & Behavioral Sciences Gen Ed	3
Humanities & Fine Arts Gen Ed	3	Wellness Gen Ed	2
	16-17		14
Third Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 300-400 Elective	3	BIOL 300-400 Elective	3
BIOL 359	3	Free Elective	9
ENGL 324	3	Social & Behavioral Science/Global Diversity Gen Ed	3
Free Elective	3		
Humanities & Fine Arts/Cultural Diversity Gen Ed	3		
	15		15

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 300-400 Elective	6	BIOL 491	2-5
Free Elective	9	BIOL 300-400 Elective	3
		Free Elective	9
	15		14-17

Total Credits: 120-124

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Pre-Professional SChool

First Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 189	1	BIOL 151	3
BIOL 150	3	BIOL 151L	1
BIOL 150L	1	CHEM 122	3
CHEM 121	3	CHEM 122L	1
CHEM 121L	1	MATH 146	4
MATH 103	3	ENGL 120	3
ENGL 110	4		
	16		15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 252	3	BIOL 270	3
BIOL 315	3	BIOL 370	3
BIOL 315L	1	CHEM 342	3
CHEM 341	3	CHEM 342L	1
CHEM 341L	1	PSYC 111	3
COMM 110	3	SOC 110	3
	14		16
Third Year			
Fall	**Credits**	**Spring**	**Credits**
PHYS 211	3	PHYS 212	3
PHYS 211L	1	PHYS 212L	1
BIOL 359	3	BIOL 460	3
BIOC 460	3	Recommended Pre-Requisite	3
ENGL 324	3	Humanities and Fine Arts/Cultural Diversity Gen Ed	3
Wellness Gen Ed	2	College Requirement	3
	15		16
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 300-400 Elective	6	BIOL 491	1-5
Recommended Pre-Requisite	3	BIOL 300-400 Elective	6

Humanities and Fine Arts/Global Perspective Gen Ed	3	Recommended Pre-Requisite	6
College Requirement	3		
	15		13-17

Total Credits: 120-124

Biological Sciences Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/biological-sciences-education/

Biological sciences, in the broadest sense, is the study of life. As such, it is a subject of great diversity and requires a background in many academic disciplines. A biologist must have a basic understanding of and be able to synthesize knowledge from physics, chemistry, geology, math and the social sciences as they relate to living systems. The biological sciences courses needed for a major are selected from a variety of life science departments at North Dakota State University.

Students who want to obtain broad training and knowledge in the life sciences can major in biological sciences or biological sciences education. These degrees differ primarily in that the latter includes the education sequence needed for teacher certification in both North Dakota and Minnesota. (It is advised that students who intend to teach in Minnesota meet with the science education advisor early to discuss additional requirements for teacher certification in that state.)

The biological sciences education major prepares you not only for secondary school science teaching, but also for pre-professional programs, graduate school and other career areas. You will have a solid biological sciences major while developing an adequate proficiency in related science areas. This type of preparation allows greater flexibility for potential teaching positions that cross descriptive areas.

First Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 124	3	BIOL 151	3
BIOL 124L	1	BIOL 151L	1
BIOL 189	1	CHEM 122	3
BIOL 150	3	CHEM 122L	1
BIOL 150L	1	COMM 110	3
CHEM 121	3	ENGL 120	3
CHEM 121L	1	MATH 146	4
ENGL 110	4		
Wellness Gen Ed	2		
	19		18
Second Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 220	3	BIOL 221	3
BIOL 220L	1	BIOL 221L	1
EDUC 321	3	EDUC 322	3
GEOL 105	3	GEOL 106 (Meets Global Perspectives Gen Ed requirement)	3

GEOL 105L	1	GEOL 106L	1
PHYS 211	3	PHYS 212	3
PHYS 211L	1	PHYS 212L	1
Humanities & Fine Arts Gen Ed	3	Social & Behavioral Sciences Gen Ed	3
Complete Praxis Core Academic Skills Exam		Apply to the School of Education	
	18		18

Third Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 364	3	BIOC 260	4
CHEM 240	3	BIOL 491	2
EDUC 451	3	BIOL 315L	1
ENGL 324	3	BIOL 315	3
STAT 330	3	EDUC 481	3
Humanities & Fine Arts Gen Ed	3	Computer Science Elective	3
		ZOO 300-400 Elective	3
	18		19

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 359	3	EDUC 485	1
BOT 300-400 Elective	3	EDUC 487	9
EDUC 486	3	EDUC 488	3
EDUC 489	3		
BIOL 370	3		
Social & Behavioral Sciences Gen ed	3		
Apply for Student Teaching			
Complete Praxis PLT Exam			
Complete Praxis II Content Exam			
	18		13

Total Credits: 141

Biomedical Engineering

Department Information

- **Department Phone:**
  701-231-7494
- **Department Web Site:**
  www.ndsu.edu/coe/
- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/biomedical-engineering/

Biomedical engineering is highly relevant to the 21st century research and education needs of the citizens of North Dakota and providing opportunity to students in one of the highest demand fields today. The current high quality education received by engineering students at NDSU will be augmented with the biomedical engineering minor allowing graduates to more readily be able to contribute to the global demand for medical technologies and innovations. Employers are supportive and encouraging the addition of biomedical minor at NDSU.

Biotechnology

Department Information

- **Department Location:**
  Van Es Hall
- **Department Phone:**
  701-231-7520
- **Department Web Site:**
  www.ndsu.edu/majors/biotech/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/biotechnology/

Biotechnology is an interdisciplinary field based on a combination of biology and technology. It includes the application of science and technology to the design of new plants, animals, and microorganisms that have improved characteristics. The methodologies include the use of recombinant DNA for gene cloning and gene transfers between organisms, culture of plant and animal cells and tissues, fusion of animal cells or plant protoplasts, and the regeneration of whole plants from single cells.

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

Biotechnology offers seemingly unlimited opportunities to combine genes from related or unrelated species to produce useful organisms with desirable properties that were not previously found in nature. The development of crop plants that are resistant to herbicides or insects, the production of human growth hormone and insulin by genetically engineered bacteria, and the development of unique vaccines are all examples of successful biotechnology.

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

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

Biotechnology Minor

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

Department did not develop a 4 year plan of study.

Botany

Department Information

- **Department Location:**
  Stevens Hall
- **Department Phone:**
  701-231-7087
- **Department Web Site:**
  www.ndsu.edu/biology/
- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/botany/

The science of botany is the study of plants including plant structure, function, systematics and ecology. Students study a wide variety of activities such as the relationship of plants to each other and their environment, plant growth and metabolism, classification and identification of plants, plant cell composition and plant heredity.

Business Administration

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-8651
- **Department Web Site:**
  www.ndsu.edu/business/departments/mm/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/business-administration/

Business Administration Major

The Business Administration major is designed to provide students with a broad background in all of the aspects of business. Business Administration might be an appropriate major for students who will either work in smaller organizations or own their businesses, which will require a broader understanding of business. In addition, some organizations may seek generalists rather than specialists because they may be more adaptable in rapidly changing business environments. This major might also be appropriate for students intending to go on to graduate studies that would benefit from a broad understanding of business, e.g., law school. The Business Administration major curriculum is also designed with a 21-credit business elective block plus 3 credits of 300-400 level free electives built into the program. These electives allow students to pursue their personal or professional interest in certain business domains, which can be in forms of a specific track, certificate, and/or topic-based courses fitting the business knowledge/skills they want to develop.

Supply Chain Management Track

The Supply Chain Management track provides students with the background necessary to perform well in a wide range of supply chain environments. Students are exposed to areas such as transportation and logistics, supply chain modeling, vendor managed inventory, supplier and customer relationship management, revenue management, purchasing, cost of ownership, and risk assessment.

Business Administration Minor

Majors outside the College of Business often select a minor in Business Administration to enhance their competencies and marketability through business-related knowledge and skills. A minor in Business Administration requires a minimum of 24 credits. At least 12 credits in 300-400 level BUSN, FIN, MGMT, and MRKT courses must be completed at NDSU in the College of Business. Prior departmental approval is required for any 300-400 level course not completed at NDSU but used to satisfy the minor requirements.

Students must earn a 2.50 grade point average that is based on the courses used for the Business Administration minor. A minor approval form is required and can be found at https://www.ndsu.edu/business/programs/majors/minors/business-administration-minor. This minor is not available to students with majors in the College of Business.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	COMM 110	3
MATH 144	4	ENGL 120	3
PSYC 111	3	MIS 116	3
ECON 201	3	ECON 202	3
Gen Ed Wellness	2	Non-major Elective	3
	16		15

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
ACCT 200	3	ACCT 201	3
PHIL 216	3	STAT 331	2
SOC 110	3	Gen Ed Humanities/Fine Arts	3
STAT 330	3	Gen Ed Science & Technology (w/ lab)	4
Gen Ed Science & Technology	3	Non-Major Elective	3
	15		15
Junior			
Fall	**Credits**	**Spring**	**Credits**
ENGL 320	3	BUSN 430	3
FIN 320	3	MIS 320	3
MGMT 320	3	BUSN 340	3
MRKT 320	3	MGMT 470	3
Gen Ed Cultural Diversity	3	300-400 Level Business Elective (1)[1]	3
	15		15
Senior			
Fall	**Credits**	**Spring**	**Credits**
BUSN 431	3	BUSN 489	3
300-400 Level Business Electives (3)[1]	9	300-400 Level Business Electives (3)[1]	9
Non-major Elective	2	300-400 Level Elective	3
	14		15

Total Credits: 120

[1] These 21 credits (7 business elective courses) must include at least 3 different course prefixes within the College of Business (i.e., ACCT, BUSN, ENTR, FIN, MGMT, MIS, and MRKT).

Note:

- Business Administration majors can pursue a supply chain management track as part of their program, provided that the 300-400 level business and free electives taken meet the track requirements.

Chemistry

Department Information

- **Department Location:**
  Ladd Hall
- **Department Phone:**
  701-231-8694
- **Department Email:**
  ndsu.chemistry@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/chemistry/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/chemistry/

The ACS certified Chemistry major is the basic chemistry degree designed for students seeking careers in the chemical industry, or careers in law, government, journalism, business, etc., that would benefit from a strong background in the physical sciences and mathematics. Many B.S. graduates

go on to M.S. or Ph.D. studies. Other degree options include a biochemistry option (also ACS certified), a polymers option (also ACS certified), a pre-professional option, and a chemistry education option.

Students may apply for scholarships available from the Department of Chemistry and Biochemistry and the Department of Coatings and Polymeric Materials (http://bulletin.ndsu.edu/departments/coatings-polymeric-materials). See the College/Departmental Scholarships (https://www.ndsu.edu/bisonconnection/finaid/scholarships) page on the NDSU One Stop web site.

Pre-Professional Chemistry Option

This option is designed for students interested in medical, dental, optometry, or veterinary professional school, but who wish to have an alternative career path to careers in industry, law, government, journalism, business, etc., that would benefit from a strong background in the physical sciences and mathematics. This option also provides excellent preparation for graduate study in biochemistry, biotechnology, and molecular biology.

Polymers Option (ACS Certified)

This program is for students who wish to prepare for a career as a chemist in coatings and polymers industries, or for graduate school in polymer chemistry. This is the only program in the U.S. that combines an ACS-certified B.S. degree in Chemistry with a coatings and polymeric materials curriculum. Students have numerous opportunities to participate in the summer research and cooperative programs sponsored by the industry. Scholarship support from the Department of Coatings and Polymeric Materials (https://www.ndsu.edu/cpm) is available to students who elect this option.

Pre-Chemistry Education Option

This option is designed for the student interested in a disciplinary major in chemistry, but who is also considering becoming a chemistry and physics teacher. The curriculum includes physics coursework beyond the usual chemistry major to enable the graduate to teach physics in most states. For teacher certification, students must apply to the School of Education (https://www.ndsu.edu/education) to enroll in the additional requirements. ACS certification may be earned by taking CHEM 471 Physical Chemistry Laboratory, CHEM 429 Inorganic Chemistry Laboratory, and CHEM 432 Analytical Chemistry II/CHEM 432L Analytical Chemistry II Laboratory, as additional courses.

Scholarships starting in the sophomore year are available for students in the Chemical Education option.

Plan of Study

B.S. Chemistry, ACS Certified

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	ENGL 120	3
CHEM 150 & CHEM 160	4	COMM 110	3
MATH 165	4	CHEM 151 & CHEM 161	4
BIOL 150	3	MATH 166	4
Gen Ed Social & Behavioral Sci and Cultural Diversity	3	Gen Ed Humanities and Fine Arts	3
	18		17
Second Year			
Fall	**Credits**	**Spring**	**Credits**
CHEM 341	3	CHEM 342	3
CHEM 353	1	CHEM 354	2
MATH 128	1	MATH 266	3
MATH 259	3	PHYS 252 & 252L	5
PHYS 251 & 251L	5	Gen Ed Wellness	2

Gen Ed Humanities & Fine Arts and Global Perspectives	3		
	16		15
Third Year			
Fall	**Credits**	**Spring**	**Credits**
CHEM 431 & 431L	5	CHEM 365	3
CHEM 364	3	CHEM 380	1
CHEM 471	2	Electives	9
ENGL 324	3		
Gen Ed Social and Behavioral Sci	3		
	16		13
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
BIOC 460 & 460L	4	CHEM 425	3
CHEM 432 & 432L	4	CHEM 429	2
Electives	6	CHEM 491	2
		Electives	6
	14		13

Total Credits: 122

Chemistry Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/chemistry-education/

Add overview content here.

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
CHEM 121 or 150 (Must be matching lab with lecture)	3	CHEM 122 or 151 (Must be matching lab with lecture)	3
CHEM 121L or 160 (Must be matching lab with lecture)	1	CHEM 122L or 161 (Must be matching lab with lecture)	1
COMM 110	3	EDUC 321	3
ENGL 110	4	ENGL 120	3

GEOL 105	3	GEOL 106	3
GEOL 105L	1	GEOL 106L	1
MATH 165	4	MATH 166	4
		Complete Praxis Core Academic Skills Exam	
	19		18
Second Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 150	3	CHEM 342	3
BIOL 150L	1	CHEM 342L	1
CHEM 341	3	CSCI 114 or MIS 116	3
CHEM 341L	1	PHYS 252	4
EDUC 322	3	PHYS 252L	1
PHYS 251	4	STAT 330	3
PHYS 251L	1	Humanities & Fine Arts Gen Ed	3
Wellness Gen Ed	2		
Apply to the School of Education			
	18		18
Third Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 124	3	EDUC 481	3
BIOL 124L	1	EDUC 486	3
CHEM 364	3	CHEM 365	3
EDUC 451	3	MATH 266	3
EDUC 489	3	MATH 128 (Co-Requisite of MATH 266)	1
MATH 265 or 259	3-4	CHEM 491	2
Social & Behavioral Science Gen Ed	3	Humanities & Fine Arts Gen Ed	3
	19-20		18
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
BIOC 460	3	EDUC 485	1
CHEM 425	3	EDUC 487	9
CHEM 431	3	EDUC 488	3
CHEM 431L	2		
ENGL 324	3		
Social & Behavioral Science/Cultural Diversity Gen Ed	3		
Apply for Student Teaching			
Complete Praxis PLT Exam			
Complete Praxis II Content Exam			
	17		13

Total Credits: 140-141

Civil Engineering

Department Information

- **Department Location:**
  Civil & Industrial Engineering
- **Department Phone:**
  701-231-7244
- **Department Web Site:**
  www.ndsu.edu/ce/
- **Degrees Offered:**
  B.S.C.E.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/civil-engineering/

Civil Engineering Major

The Civil Engineering curriculum is designed to give students a strong mathematical, scientific and engineering background in all of the areas of the field. At the same time it provides students with an opportunity to place further emphasis on his/her chosen areas through technical electives.

Twelve credits of technical electives are required. Students are required to choose three technical electives from the five major areas, while at the same time satisfying the ABET design requirement. All Civil Engineering students must take a capstone design course, CE 489 Senior Design, which is designed to bring concepts learned in different courses to culminate in a major design experience.

Students interested in structural engineering may choose courses such as finite element analysis, advanced steel design, timber design, pre-stressed concrete, foundation engineering, bridge evaluation and rehabilitation, stability of structures, and dynamics of structures.

Students interested in water resources, or environmental engineering may choose courses such as solid waste management, applied hydrology, watershed modeling, ground water and seepage, water and wastewater engineering, open channel flow, hazardous waste management, and water quality management.

Students interested in transportation engineering may choose courses such as transportation planning, airport planning and design, railway planning and design, geometric highway design, or traffic engineering and pavement design.

Students interested in geotechnical engineering may choose courses in foundation engineering, earth slopes, and geosynthetics, earthquake engineering and advanced soil mechanics.

The curriculum includes a core of social humanistic subjects to provide the student with a background essential to a proper understanding of the role of engineering in society.

Students in Civil Engineering are strongly encouraged to participate in internships to enhance their classroom education with practical experience in engineering-related positions in industry.

Students transferring into Civil Engineering from other departments or institutions are encouraged to do so no later than the beginning of the junior year if they plan to complete the degree requirements within two academic years.

All Civil Engineering students at NDSU are required to have a minimum cumulative grade-point average of 2.0 for graduation and have received a grade of 'C' or better in the following courses and all prerequisites in sequence for these courses, before enrolling in any civil engineering courses that utilize these courses as prerequisites.

Code	Title	Credits
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 128	Introduction to Linear Algebra	1
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 223	Mechanics of Materials	3

Graduate programs leading to Master of Science and Doctor of Philosophy degrees are available in specialized fields. For more complete details, see the Graduate Bulletin (p. 860) online.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
CHEM 121	3	CE 111	2
CHEM 121L	1	CHEM 122	3
ENGL 110	4	CHEM 122L	1
ENGL 120	3	COMM 110	3
MATH 165	4	MATH 166	4
GEN ED HUMANITIES CATEGORY "A"	3	ME 221	3
	18		16
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
CE 204	4	IME 460	3
CE 212	3	MATH 266	3
GEOL 105	3	ME 223	3
MATH 128 (129)	1	PHYS 252	4
MATH 259 (265)	3	GEN ED WELLNESS CATEGORY "W"	2
ME 222	3		
	17		15
Junior			
Fall	**Credits**	**Spring**	**Credits**
CE 309	3	CE 303	2
CE 316	3	CE 303L	1
ENGL 321	3	CE 343	4
ENGR 402	1	CE 370	3
ME 350	3	CE 371	1
ENGR 311 (FULFILLS GEN ED CATEGORY "A")	3	CE 408	3
		CE 418	4
	16		18
Senior			
Fall	**Credits**	**Spring**	**Credits**
CE 310	1	CE 483	3
CE 404	3	CE 489	3
CE 444	3	IME 440	2
ENGR 312 (FULFILLS GEN ED CATEGORY "B")	3	Technical Elective	3
GEN ED SOCIAL SCIENCES CATEGORY "B"	3	Technical Elective	3
Technical Elective	2	Technical Elective	2

Technical Elective	2	
	17	16

Total Credits: 133

Coatings and Polymeric Materials

Department Information

- **Department Location:**
  Research 1
- **Department Phone:**
  701-231-7633
- **Department Web Site:**
  www.ndsu.edu/cpm/
- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/coatings-polymeric-materials/

Everybody uses products that are painted or coated in everyday life, but often take coatings for granted. However, a $100 billion industry exists to supply paints and coatings worldwide that decorate, protect and provide function to automobiles, building, furniture, aircraft, ships, appliances, bridges, medical devices, electronic devices and countless other objects. The performance of these coatings depends critically on specially tailored polymers, which form coating films. Thus, coatings scientists must also be good polymer scientists. Other scientific disciplines are also important to the coatings scientist, such as organic chemistry, electrochemistry, rheology, surface chemistry, chemical analysis, photochemistry, mathematics, physics and several branches of engineering and materials science.

North Dakota State University started offering polymer and coatings chemistry courses in 1905. Of the few universities offering training that focuses on the technology of paints and coatings, NDSU has the longest and most extensive experience. Over the decades, the Department of Coatings and Polymeric Materials has established a worldwide reputation for education and research. Today, there is a high demand for coatings and polymer scientists at all degree levels, providing coatings and polymer materials graduates with abundant job opportunities. NDSU graduates are especially sought after by companies in the paint, coatings, and polymer industries. Graduates of the program are employed by major paint, coatings, polymer, and chemical companies with many graduates attaining upper management positions. At the undergraduate level, Bachelor of Science degrees in science and engineering with a coatings and polymeric materials minor are offered. Master's and doctoral degrees are available at the graduate level. A 4+1 accelerated B.S./M.S degree program is also available.

Community Development

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-8657
- **Department Web Site:**
  www.ndsu.edu/socanth/
- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/community-development/

The Community Development minor is an applied, multidisciplinary minor. The purpose of the minor is to prepare students to integrate community development concepts into their own occupations; to recognize the relationships of social, economic, and development change on community viability and sustainability; and to take a more active role in the affairs of their own communities. The minor consists of 18 credits that includes coursework and an experiential component. Requirements include SOC 404 Community Assessment and SOC 405 Community Development and a minimum of three credits in each of the following areas: economics, business, and social science.

Comprehensive Science Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/comprehensive-science-education/

Add overview content here.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
CHEM 121 or 150 (Must be matching lab with lecture)	3	CHEM 122 or 151 (Must be matching lab with lecture)	3
CHEM 121L or 160 (Must be matching lab with lecture)	1	CHEM 122L or 161 (Must be matching lab with lecture)	1
ENGL 110	4	EDUC 321	3
GEOL 105	3	ENGL 120	3
GEOL 105L	1	GEOL 106 (Global Perspectives Gen Ed Requirement)	3
MATH 165	4	GEOL 106L	1
PHYS 110	3	MATH 166	4
		Complete Praxis Core Academic Skills Exam	
	19		18
Second Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 150	3	CHEM 342	3
BIOL 150L	1	CHEM 342L	1
CHEM 341	3	CSCI 114 or MIS 116	3
CHEM 341L	1	PHYS 252	4
EDUC 322	3	PHYS 252L	1
PHYS 251	4	STAT 330	3
PHYS 251L	1	Humanities/Fine Arts Gen Ed	3
Wellness Gen Ed	2		
Apply to the School of Education			
	18		18
Third Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 124	3	BIOC 260	4
BIOL 124L	1	BIOL 151	3
BIOL/ZOO/BOT Elective	3	BIOL 151L	1

COMM 110	3	BIOL 491	2
EDUC 451	3	EDUC 481	3
EDUC 489	3	EDUC 486	3
Social and Behavioral Science Gen Ed	3		
	19		16
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 472	4	EDUC 485	1
BIOL/ZOO/BOT Elective	3	EDUC 487	9
ENGL 324	3	EDUC 488	3
Social and Behavioral Science/ Cultural Diversity Gen Ed	3		
Humanities/Fine Arts Gen Ed	3		
Apply for Student Teaching			
Complete Praxis PLT Exam			
Complete Praxis II Content Exam			
	16		13

Total Credits: 137

Computer Engineering

Department Information

- **Department Location:**
  Electrical and Computer Engineering
- **Department Phone:**
  701-231-7019
- **Department Web Site:**
  www.ndsu.edu/ece/
- **Degrees Offered:**
  B.S.Cpr.E.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/computer-engineering/

Computer Engineering Major

The Computer Engineering program provides a background in three broad areas: computer hardware, software, and hardware-software integration. Fundamental topics included in the program are embedded systems, computer architecture, digital systems, software engineering, computer networks, and operating systems. In addition, the program includes core subjects that are common to all engineering disciplines and basic university studies in humanities and social science. The Computer Engineering program at NDSU is accredited by the Engineering Accreditation Commission of ABET (http://www.abet.org).

CpE Specialization

The Computer Engineering program allows students to tailor their studies within broad parameters. Students are encouraged to develop an individual program of study in close consultation with their advisers. Examples are available to illustrate how specialization may be obtained in a number of different technical areas. Students may mix and match from the examples to suit their particular interests. Technical areas include the following:

- **Computer Architecture/Digital VLSI** -- VLSI Designers and Computer Architects design computer system hardware, including how the CPU communicates with various types of memory, and high-performance multi-processor systems. VLSI Design focuses on the lower levels of abstraction: transistor-level and physical-level design; whereas Computer Architecture focuses on the higher levels of abstraction: architecture and gate-level design.
- **Cyber Physical Systems** deal with the interaction of computing elements monitoring/controlling physical entities, often in a large network.

- **Embedded Systems** deal with the design of a dedicated computer system to perform a specific task, often requiring real-time constraints. An example is a smartphone.
- **Computer Systems** deals with the close interaction between a system's hardware and software.

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
CHEM 121	3	ECE 111[1]	3
Wellness Gen Ed	2	ENGL 120	3
ECE 173	4	MATH 129	3
ENGL 110	4	MATH 166	4
MATH 165	4	PHYS 251	4
	17		17
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
EE 206	4	COMM 110	3
MATH 265	4	ECE 320	3
CSCI 222	3	MATH 266	3
ECE 275	4	ECE 374	4
Science Lab Gen Ed	1	CSCI 161	4
	16		17
Junior			
Fall	**Credits**	**Spring**	**Credits**
CSCI 413	3	ECE 341	3
ECE 343	4	ECE 401	1
CSCI 459	3	ECE 376	4
ENGR 402	1	CSCI 474	3
ECE 474	3	ECE 475	4
	14		15
Senior			
Fall	**Credits**	**Spring**	**Credits**
ECE 403	2	ECE 405	3
ENGL/Upper Level Writing[2]	3	ECE Elective or CSCI 467: Alg. Analysis	3
ECE Elective	3	Humanities/Fine Arts Gen Ed Elective	3
Tech Elective	3	Social/Behavioral Sci. Gen Ed Elective[4]	3
Humanities/Fine Arts Gen Ed Elective[3]	3	Tech Elective	3
Social/Behavioral Sci. Gen Ed Elective[4]	3		
	17		15

Total Credits: 128

1 Students must take ECE 111 prior to enrolling in ECE courses listed above in the Junior or Senior years; otherwise, students must take an additional ECE Elective in lieu of ECE 111.

2 Select from ENGL 320, 321, 324 or 459 to satisfy the Upper Level Writing for General Education.

3 Suggested to take ENGR 311.

4 Suggested to take ENGR 312, ECON 105, ECON 201 or ECON 202..

PROGRAM NOTES:

ECE Elective: any didactic ECE 4xx course (not x93, 494, 496).

Tech Elective: any didactic 4xx course from ECE or CSCI, or any of the following: CSCI 336, CSCI 366, CSCI 372, ECE 311, ECE 321, ECE 351, ECE x93, ECE 494, ECE 496 (max 3 credits), ENGR 310, PHYS 252, IME 440, IME 456, IME 460 and IME 470.

Students must earn a "C" or better in ECE 173, ECE 275, EE 206 and all required MATH courses, before enrolling in ECE courses listed above in the Junior or Senior years.

Computer Science

Department Information

- **Department Location:**
  Quentin Burdick Building
- **Department Phone:**
  701-231-8568
- **Department Web Site:**
  www.ndsu.edu/cs/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/computer-science/

Computer Science Major

The computer science undergraduate programs, based on recommendations of the Association for Computing Machinery, consist of a core of courses required for majors and a large selection of service courses and advanced courses. A grade of 'C' or better is required in all Computer Science courses. In the core, students are offered an opportunity to study concepts, applications, and implementation techniques that provide a broad practical base for both further study and a career in computing. Through a variety of service courses, every student in the university is provided an opportunity to develop computer literacy or competency. Through advanced undergraduate and graduate courses, students are offered an opportunity for in-depth study of such topics as artificial intelligence, programming languages, mobile applications, computer networks, security, information assurance, office automation, bioinformatics, software development, data mining, and data base management systems. Students are encouraged to choose elective courses from related areas including business, economics, engineering, mathematics, operations research, and statistics.

After completing part of their studies, students will find many opportunities to work part time as a research assistant to a scientist on campus, or as an intern with a local business, applying what they have learned in the classroom. Cooperative education opportunities starting in the junior year are available.

The B.A. concentrates on web development. Students receive an applied grounding in application design, web development, and deployment.

The B.S. program provides the widest exposure to computing with emphasis on high level languages, software development and advanced mathematical concepts.

Top students are encouraged to inquire about the 4+1 program providing a fast track through graduate school resulting in combined Bachelor's and Master's Degrees.

Computer Science Minor

A minor in Computer Science requires at least 17 semester hours of select computer science courses. A grade of 'C' or better is required in all courses applied toward the computer science minor.

Plans of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

B.S. Calculus Ready 4-Year Plan

Freshman			
Fall	**Credits**	**Spring**	**Credits**
CSCI 160	4	CSCI 161	4
CSCI 189	1	MATH 166	4
MATH 165	4	ENGL 120	3
Gen Ed Science/Tech and Lab	4	Gen Ed Science/Tech	3
ENGL 110	4	Gen Ed HUM/FA and Glob Perspectives	3
	17		17
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
CSCI 213	3	CSCI 313	3
CSCI 222	3	CSCI 336	3
COMM 110	3	Gen Ed SOC/Beh Sci and Cult Diversity	3
Gen Ed SOC/BehSci	3	Gen Ed Wellness	2-3
Gen Ed Science/Tech	3	Elective	3
	15		14-15
Junior			
Fall	**Credits**	**Spring**	**Credits**
CSCI 372	3	CSCI 467	3
STAT 367	3	STAT 368	3
CSCI 366	3	CSCI 374	3
Gen Ed HUM/FA	3	ENGL 321 or 324	3
CSCI Elective I	3	Elective	3
	15		15
Senior			
Fall	**Credits**	**Spring**	**Credits**
CSCI 489	3	CSCI 415	3
CSCI 474	3	CSCI 445	3
CSCI elective II	3	CSCI Elective III	3
Additional Elective	3	Additional Elective	6
	12		15

Total Credits: 120-121

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

B.S. Preparatory Mathematics Course Required

Freshman					
Fall	**Credits**	**Spring**	**Credits**		
CSCI 189	1	CSCI 160	4		
CSCI 122 or 159	3	ENGL 120	3		
ENGL 110 or 120	4-3	Gen Ed Science/Tech	3		
Gen Ed Science and Tech	4	Pre-Calculus course	3		
Pre-Calculus course per placement	3				
	15-14		13		
Sophomore					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
CSCI 161	4	COMM 110	3	CSCI 213	3
MATH 165	4	MATH 166	4		
Gen Ed Science/Tech	3	Gen Ed Soc/Beh Sci and Glob Persp	3		
Gen Ed Soc/Beh Sci	3	Gen Ed Hum/FineArt and Cult Div	3		
Gen Ed Wellness	2				
	16		13		3
Junior					
Fall	**Credits**	**Spring**	**Credits**		
CSCI 222	3	CSCI 313	3		
CSCI 366	3	CSCI 336	3		
STAT 367	3	CSCI 374	3		
CSCI 372	3	STAT 368	3		
Gen Ed Hum/FineArt	3				
	15		12		
Senior					
Fall	**Credits**	**Spring**	**Credits**		
CSCI Elective I	3	CSCI Elective III	3		
CSCI Elective II	3	CSCI 445	3		
CSCI 474	3	CSCI 415	3		
CSCI 489	3	CSCI 467	3		
ENGL 321 or 324	3	Elective	6		
	15		18		

Total Credits: 120-119

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

B.A. Plan of Study

First Year			
Fall	**Credits**	**Spring**	**Credits**
CSCI 189	1	ENGL 120	3
CSCI 159	3	CSCI 160	4

MATH 105	3	MATH 146	4
CSCI 114	3	First Year Language 102	4
ENGL 110	4		
First Year Language 101	4		
	18		15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
CSCI 161	4	COMM 110	3
COMM 260	3	CSCI 222	3
Second Year Language 201	3	CSCI 371	3
Gen Ed Soc/Beh Sci	3	Second Year Language 202	3
	13		12
Third Year			
Fall	**Credits**	**Spring**	**Credits**
CSCI 213	3	CSCI 313	3
STAT 330	3	STAT 331	2
COMM 261	3	ENGL 321 or 324	3
Gen Ed Wellness	2	Gen Ed Science	3
Gen Ed Science and Tech/Lab	4	Gen Ed Soc/Beh Sci	3
	15		14
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
CSCI 366	3	CSCI 445	3
CSCI 489	3	Elective (#300 or higher)	3
CSCI 488	3	Gen Ed	6
Elective (#300 or higher)	3	Elective	3
Elective	6		
	18		15

Total Credits: 120

Computer Science and Mathematics

Department Information

- **Department Location:**
  Quentin Burdick Building or Minard Hall
- **Department Web Site:**
  www.ndsu/edu/cs/ or www.ndsu.edu/math/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/computer-science-mathematics/

This option is available for students who wish to take advantage of the close connections between Computer Science and Mathematics.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
CSCI 189	1	CSCI 161	4
CSCI 160	4	MATH 166	4
MATH 129	3	COMM 110	3
MATH 165	4	Gen Ed Science/Tech and Lab	4
ENGL 110	4	Gen Ed Wellness	2-3
	16		17-18
Second Year			
Fall	**Credits**	**Spring**	**Credits**
CSCI 213	3	CSCI 313	3
MATH 265	4	MATH 266	3
MATH 270	3	MATH 329	3
STAT 367	3	STAT 368	3
Gen Ed Science/Tech	3	Gen Ed Science/Tech	3
	16		15
Third Year			
Fall	**Credits**	**Spring**	**Credits**
CSCI 366	3	CSCI 336	3
CSCI 372	3	CSCI 467	3
CSCI 374	3	MATH 300-400 level	3
MATH 420	3	Gen Ed Upper Division Writing	3
Gen Ed Humanities/Fine Art and Cult Diversity	3	Gen Ed Social/Behavioral Sci and Glob Perspective	3
	15		15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
CSCI 489	3	CSCI 445	3
MATH 491	1-5	Additional CSCI (418 or 453) or any 400 Level MATH course	3
MATH 300-400 level	3	Gen Ed Social/Behavioral Science	3
Gen Ed Humanities/Fine Art	3	Elective	4
Elective	3		
	13-17		13

Total Credits: 120-125

Computer Science and Physics

Department Information

- **Department Location:**
  Quentin Burdick Building or South Engineering
- **Department Web Site:**
  www.ndsu.edu/cs/ or www.ndsu.edu/physics/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/computer-science-physics/

Since the dawn of the computer age, Computer Science and Physics have been closely intertwined disciplines. Computational physics is now an established branch of physics, complementing experiment and theory, that develops and applies computer modeling approaches to the solution of a wide range of physical problems. At the same time, software development (e.g., for graphics and data mining applications) is increasingly inspired by physics. Computer modeling, including simulation and numerical analysis, is an essential component of modern research and development. Correspondingly, the demand is growing for scientists with multidisciplinary training that combines fundamental knowledge of physics and computer science with practical skills in programming and computation. The Computer Science and Physics double major program is designed to allow students to complete the core requirements of both majors in a four-year degree. Graduates of the program will have a unique background qualifying them to work in industry or to pursue graduate studies in physics, computer science, engineering, or other technical fields.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
PHYS 171	1	ENGL 120	3
MATH 165	4	PHYS 251 & 251L	5
CSCI 160	4	PHYS 251R	1
CSCI 189	1	MATH 129 or 329	3
ENGL 110 (Based on placement)	4	MATH 166	4
Wellness Gen Ed	2	CSCI 161	4
	16		20
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
PHYS 252 & 252L	5	PHYS 350	3
PHYS 252R	1	MATH 266	3
MATH 265	4	COMM 110	3
CSCI 213	3	CSCI 336	3
MATH 270	3	Humanities/Fine Arts Gen Ed	3
	16		15
Junior			
Fall	**Credits**	**Spring**	**Credits**
PHYS 360	3	PHYS 370	3
CSCI 366	3	ENGL 324	3
PHYS 355	3	PHYS 361	3
Social/Behavioral Sci and Cult Diversity Gen Ed	3	CSCI 372	3
Humanities/Fine Arts & Global Perspectives Gen Ed	3	CSCI 374	3
	15		15
Senior			
Fall	**Credits**	**Spring**	**Credits**
PHYS 361	3	PHYS 489	2
PHYS 462	3	CSCI 467	3
Physics Elective	3	PHYS 486	3
CSCI 474	3	CSCI 313	3

CSCI 4XX Computer Science Elective	3	or CSCI 4XX Computer Science Elective	
PHYS 485	3	Humanities/Fine Arts Gen Ed	3
PHYS 488	1	Social/Behavioral Science Gen Ed	3
	19		17

Total Credits: 133

Construction Engineering

Department Information

- **Department Location:**
  Construction Management and Engineering
- **Department Phone:**
  701-231-6202
- **Department Web Site:**
  www.ndsu.edu/construction/
- **Degrees Offered:**
  B.S.Cons.E.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/construction-engineering/

Construction Engineering Major

Construction Engineering involves the planning, design, and management of construction facilities, such as highways, bridges, airports, railroads, buildings, dams, and reservoirs. The construction of such projects requires the knowledge of engineering, management, economics, and business. Construction Engineering is differentiated from Construction Management from the standpoint of the use of math, science, and engineering to design projects and processes and analyze problems. Construction Engineering is involved in a variety of construction disciplines, including: commercial, residential, transportation, and infrastructure systems. Construction Engineers are also involved in the engineering design of temporary structures, cost estimating, planning and scheduling, material procurement, selection of equipment, and cost control. Due to their diverse skills, there is a very high demand for Construction Engineers.

The Department of Construction Management and Engineering offers a Bachelor of Science degree in Construction Engineering which offers a blend of engineering and construction courses. The program is designed for those who want to work in the construction industry and enjoy the status of a professional engineer. A thorough knowledge of the physical sciences, math, and engineering is developed during the first two years followed by construction management and engineering courses. The technical side of the program is balanced with requirements in writing, humanities, social science, and communications. The Bachelor of Science degree in Construction Engineering is accredited by the Engineering Accreditation Commission of the ABET (http://www.abet.org).

Program Educational Objectives (PEO)

The Educational Objectives of the Construction Engineering Degree Program describe the career and professional accomplishments that we expect our graduates to achieve early in their careers. Within the first few (3-5) years after graduation, we expect our alumni:

1. To maintain a sustained program of continuing education and life-long learning with a focus on contemporary issues.
2. To be productive construction engineers and/or construction managers who are pursuing or have attained professional registration.
3. To be effective communicators who work on multidisciplinary teams.
4. To be engaged engineering professionals who are aware of and comprehend the ethical, social, environmental, and economic impacts of engineering solutions.
5. To be engaged citizens who become involved and seek leadership roles in professional societies and community organizations.

Student Outcomes (SO)

The Program Educational Objectives are further connected to 11 Student Outcomes, developed by ABET (http://www.abet.org), which describe what students are expected to know and be able to do by the time of graduation. These outcomes relate to the skills, knowledge, and behaviors that students acquire in their matriculation through the program. The Student Outcomes are listed below:

a) An ability to apply knowledge of mathematics, science, and engineering to the field of Construction Engineering.

b) An ability to design and conduct experiments, as well as to analyze and interpret data.

c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, and sustainability, with a focus on Construction Engineering systems, components, or processes.

d) An ability to function on multi-disciplinary teams.

e) An ability to identify, formulate, and solve Construction Engineering problems.

f) An understanding of professional and ethical responsibility within the general field of Construction Engineering.

g) An ability to communicate effectively.

h) The broad education necessary to understand the impact of Construction Engineering solutions in a global, economic, environmental, and societal context.

i) A recognition of the need for, and an ability to engage in life-long learning.

j) A knowledge of contemporary issues.

k) Ability to use the techniques, skills, and modern engineering tools necessary for Construction Engineering practice.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
CM&E 111	1	CM&E 212	3
CM&E 200	3	MATH 166	4
MATH 165 (Gen Ed R Category)	4	ENGL 120 (Gen Ed C Category)	3
ENGL 110 (Gen Ed C Category)	4	CHEM 122 (Gen Ed S Category)	3
CHEM 121 (Gen Ed S Category)	3	ME 221	3
CHEM 121L (Gen Ed L Category)	1	Economics (Gen Ed B/G Category)*	3
	16		19
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
CM&E 204	3	CM&E 240	3
Social Behavior (Gen Ed B Category)	3	PHYS 252 (Gen Ed S Category)	4
MATH 128	1	COMM 110 (Gen Ed C Category)	3
MATH 259	3	MATH 266	3
ME 222	3	ME 223	3
GEOL 105 or 106 (Gen Ed S Category)	3	Wellness (Gen Ed W Category)	2
	16		18
Junior			
Fall	**Credits**	**Spring**	**Credits**
CM&E 305	3	CM&E 301	3
CM&E 380	3	CM&E 315	3
CE 309	3	CE 303	2
CE 316	3	CE 303L	1
STAT 330 (Gen Ed R Category)	3	CE 343	4
		CM&E 405	3
	15		16

Senior			
Fall	**Credits**	**Spring**	**Credits**
CM&E 403	3	CM&E 489	3
4XX Technical Elective**	3	4XX Technical Elective**	3
4XX Technical Elective**	3	4XX Technical Elective**	3
ENGL 320 or 321 (Gen Ed C Category)	3	Humanities/Fine Arts (Gen Ed A Category)	3
Humanities & Diversity (Gen Ed A&D Category)	3	BUSN 431	3
ENGR 402	1		
	16		15

Total Credits: 131

*To satisfy the Gen Ed Category B requirements, a student can choose between two options: ECON 105 plus an additional course within Category B OR ECON 201 and ECON 202. Both options satisfy the Gen Ed Catogory G.

** Refer to list of Construction Engineering Technical Electives (CE 400 Level Courses) (http://bulletin.ndsu.edu/undergraduate/colleges/engineering/construction-management-engineering/construction-engineering/#majortext) Minimum 12 Credits)

Gen Ed Category description can be found on the General Education page (p. 820).

Construction Management

Department Information

- **Department Location:**
  Construction Management and Engineering
- **Department Phone:**
  701-231-6202
- **Department Web Site:**
  www.ndsu.edu/construction/
- **Degrees Offered:**
  B.S.Cons.M.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/construction-management/

Construction Management Major

Construction management is a combination of technology, construction techniques, and management to meet the needs of the rapidly growing construction industry. The program is designed to prepare students for the art of achieving maximum profit by efficient use of people, machines, materials and other resources to complete a construction project on time and to the satisfaction of the owner. A meld of engineering, construction, management and business gives the student a background and understanding of a management point of view in the construction industry. The Bachelor of Science in Construction Management program is accredited by the American Council for Construction Education (http://www.acce-hq.org).

Graduation Requirement

A minor in Business Administration offered by the College of Business is required for all B.S. in Construction Management students. Juniors and seniors are required to have a minimum cumulative GPA of 2.50 to be admitted into the minor program. A minor in Business Administration requires a minimum GPA of 2.50 in the courses that satisfy the minor. In addition, a cumulative GPA of 2.50 overall is required to graduate with a B.S. in Construction Management degree.

Program Learning Outcomes (PLO)

Program Learning Outcomes establish the minimum level of learning outcomes, defined by the Construction Management program. The Construction Management program shall provide students, by the time of their graduation:

1. The basic skills necessary to plan, organize, monitor and control resources to manage the overall construction process.
2. The knowledge and skills to apply computer and software applications for a career in construction.

3. The knowledge and skills necessary to identify, define, and compare construction materials, methods, and equipment alternatives.
4. The necessary communication skills for the successful practice of the construction profession.
5. The professional abilities and skills to pursue life#long learning within the broader societal context of the construction profession.

The Program Learning Outcomes are further supported by the Student Learning Outcomes.

Student Learning Outcomes (SLO)

Student Learning Outcomes establish the minimum level of learning and the body of knowledge, defined by ACCE (http://www.acce-hq.org), that students are expected to achieve or have by the time of graduation. Upon graduation from Construction Management program, graduates shall be able to:

1. Create written communications appropriate to the construction discipline.
2. Create oral presentations appropriate to the construction discipline.
3. Create a construction project safety plan.
4. Create construction project cost estimates.
5. Create construction project schedules.
6. Analyze professional decisions based on ethical principles.
7. Analyze construction documents for planning and management of construction processes.
8. Analyze methods, materials, and equipment used to construct projects.
9. Apply construction management skills as a member of a multi-disciplinary team.
10. Apply electronic-based technology to manage the construction process.
11. Apply basic surveying techniques for construction layout and control.
12. Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.
13. Understand construction risk management.
14. Understand construction accounting and cost control.
15. Understand construction quality assurance and control.
16. Understand construction project control processes.
17. Understand the legal implications of contract, common, and regulatory law to manage a construction project.
18. Understand the basic principles of sustainable construction.
19. Understand the basic principles of structural behavior.
20. Understand the basic principles of mechanical, electrical and piping systems.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
CM&E 111	1	CM&E 212	3
CM&E 200	3	ENGL 120 (Gen Ed C Category)	3
ENGL 110 (Gen Ed C Category)	4	MATH 146 (Gen Ed R Category)[#]	4
MATH 105 or 107	3	COMM 110 (Gen Ed C Category)	3
CHEM 121 (Gen Ed S Category)[*]	3	Economics (Gen Ed B/G Category)[***]	3
CHEM 121L (Gen Ed L Category)[*]	1	Social Behavior Elective (Gen Ed B Category)	3
	15		19
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
CM&E 204	3	CM&E 203	3
CM&E 250	3	CM&E 240	3

PHYS 211 (Gene Ed S Category)*	3	CM&E 260	3
PHYS 211L (Gene Ed L Category)*	1	Humanities (Gen Ed A Category)	3
GEOL 105 (Gene Ed S/G Category)	3	Humanities & Diversity (Gen Ed A&D Category)	3
ACCT 102	3		
	16		15

Junior

Fall	Credits	Spring	Credits
CM&E 305	3	CM&E 301	3
CM&E 380	3	CM&E 315	3
STAT 330	3	CM&E 405	3
ENGL 320 or 321 (Gen Ed C Category)	3	BUSN 431**	3
MGMT 320**	3	MRKT 320 or FIN 320**	3
	15		15

Senior

Fall	Credits	Spring	Credits
CM&E 403	3	CM&E 488	3
CM&E 421	3	CM&E 453	3
CM&E 430	3	Wellness (Gen Ed W Category)	2
CM&E 450	3	Business Admin Minor 300/400 Elective**	3
Business Admin Minor 300/400 Elective**	3	Business Admin Minor 300/400 Elective**	3
	15		14

Total Credits: 124

An overall minimum CGPA of 2.50 and a minor in Business Administration with a minor GPA of 2.50 are required to graduate with a B.S. in Construction Management.

*All science courses require the companion lab with the exception of geology.

**To be eligible for enrollment into 300/400 level courses offered by the College of Business requires application for a minor in Business Administration(BA).

*** To satisfy the Gen Ed Category B, a student can choose between two options: ECON 105 plus an additional course within Category B OR ECON 201 and ECON 202. Both options satisfy the Gen Ed Category G requirements and the requirements for the BA minor.

Gen Ed Category description can be found on the General Education page (p. 820).

Criminal Justice

Department Information

- **Department Location:**
  Putnam Hall
- **Department Phone:**
  701-231-8567
- **Department Web Site:**
  www.ndsu.edu/cjps/
- **Degrees Offered:**
  B.S.; B.A.

- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/criminal-justice/

Criminal Justice Major

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

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

Students who are interested in pursuing a master's degree may be eligible for the department's accelerated master's program. Through this program, students may complete both the bachelor's degree in Criminal Justice and the Master of Science degree in Criminal Justice Administration in as little as five years.

The Criminal Justice curriculum is an interdisciplinary program drawing on the social sciences, behavioral sciences, humanities, computer sciences, and accounting. A total of 53 credits in criminal justice and related coursework is required for the major. A basic background in the social sciences, behavioral sciences, and civics is helpful.

Criminal Justice Minor

The minor in Criminal Justice provides an opportunity for students with majors in fields outside of the Criminal Justice program to gain valuable knowledge regarding criminological theory and the history, operation and effectiveness of various parts of the criminal and juvenile justice system. The criminal justice minor consists of 18 credits.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
CJ 201	3	CJ 230	3
MATH 104 or 103	3	CJ 210 or 270	3
ENGL 110	4	ENGL 120	3
ANTH 111 (Cultural Diversity)	3	COMM 110	3
PSYC 111	3	SOC 110	3
	16		15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
CJ 270 or 210	3	CJ 325 or POLS 325	4
POLS 230	3	AHSS Requirement	3
STAT 330	3	Humanities / Fine Arts Gen Ed	3
Science Gen Ed w/ Lab	4	Science/Tech Gen Ed (Global Perspectives)	3
Minor	3	Minor	3
	16		16
Third Year			
Fall	**Credits**	**Spring**	**Credits**
CJ 406 or 407	3	CJ 460	3
CJ 330 or POLS 431	3	CJ 410 or 461	3
ENGL 320 or 358	3	Science/Tech Gen Ed	3

Humanities / Fine Arts Gen Ed	3	AHSS Requirement	3
Wellness Gen Ed	2	Minor	3
	14		15

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
CJ 465	3	CJ elective	3
CJ 407 or 406	3	CJ elective	3
CJ 489	1	Minor	3
Minor	3	Minor	3
Minor	3	Minor or 300-400 level elective	3
	13		15

Total Credits: 120

Crop and Weed Science

Department Information

- **Department Location:**
  Loftsgard Hall
- **Department Phone:**
  701-231-7971
- **Department Web Site:**
  www.ag.ndsu.edu/plantsciences/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/crop-weed-science/

Crop and Weed Sciences Major

Instruction in crop and weed sciences includes field and forage crop production and management, weed science, general and plant genetics, plant breeding, and biotechnology. The study of botany and other plant sciences, entomology, plant pathology, and soil science is basic or related to crop and weed sciences. Students may obtain either a major or minor. The Crop and Weed Sciences major or minor is intended for general use in sales, research, and technical services (crop consultant) of agribusinesses involved in seed, chemical, and other plant production, protection, and management aspects; in natural resources conservation service; by those interested in production agriculture; or as a prerequisite for graduate study. For more details on M.S. and Ph.D. degrees, see the Graduate School Bulletin (p. 860).

Curriculum Options

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

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

Special Opportunities

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

Crop and Weed Sciences Minor

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

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
PLSC 189	1	SOIL 210	3
PLSC 110	3	BIOL 151	3
BIOL 150	3	BIOL 151L	1
BIOL 150L	1	ENGL 120	3
ENGL 110	4	Gen Ed Social & Behavioral Sci	3
MATH 103	3	Gen Ed Wellness	2
	15		15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
PLSC 215	1	PLSC 225	3
PPTH 324	3	PLSC 312	1
CHEM 121	3	MICR 202	2
CHEM 121L	1	MICR 202L	1
COMM 110	3	CHEM 122	3
Gen Ed Humanities/Fine Arts & Cult Diversity	3	CHEM 122L	1
Free Elective	2	ECON 201	3
		STAT 330	3
	16		17
Third Year			
Fall	**Credits**	**Spring**	**Credits**
PLSC 320	3	PLSC 315	3
ENT 350	3	PLSC 315L	1
CHEM 240 or BOT 460	3	PLSC 323	3
Gen Ed Humanities/Fine Arts	3	SOIL 322	3
Free Elective	3	PLSC 380	3
		Free Elective	3
	15		16
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
PLSC 444	3	PLSC 455	3
PLSC upper level elective	2	PLSC 491	1
PLSC upper level elective	2	Free Elective	3
ENGL 320, 321, or 324	3	Free Elective	3

Free Elective	3	Free Elective	3
	13		13

Total Credits: 120

Dietetics

Department Information

- **Department Location:**
  E. Morrow Lebedeff Hall
- **Department Phone:**
  701-231-7487
- **Department Web Site:**
  www.ndsu.edu/hnes/undergraduate_programs/dietetics/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/dietetics/

Dietetics Major

There are three options within the Dietetics major: (a) Dietitian Education Program, (b) Didactic Program, and (c) the Accelerated BS/MS in Dietetics and Nutrition. All programs include all didactic courses required to be accredited by the The Academy of Nutrition and Dietetics. Only graduates of ACEND-accredited programs are eligible to take the exam to become a Registered Dietitian Nutritionist (RDN) or Nutrition and Dietetics Technician, Registered (NDTR).

Students with a major in Dietetics are employed in many settings such as hospitals, clinics, community health programs, businesses, industries, school food services, and as consultants in homes for the elderly and other service institutions. Research and development opportunities are available in industry, government, and universities; in regulation of food quality through government agencies; and within companies as communication specialists.

Note: *Transfer credits in dietetics or food and nutrition from other institutions must have grades of 'C' or better to be accepted for the Dietetics program at NDSU.*

Dietitian Education Program (DEP) Option

This option prepares professional dietetic practitioners for work in entry-level positions in hospitals, nursing homes, out-patient clinics, businesses, and community agencies. Students in the Dietitian Education Program will complete 1,200 supervised practice hours as part of the undergraduate curriculum allowing them to take the registration examination upon graduation. The Dietitian Education Program has a gerontology concentration to train students on the health concerns of the aging population.

Didactic Program in Dietetics (DPD) Option

This option meets the requirements for entrance into an accredited dietetic internship and prepares graduates for internships in hospitals, as well as in health care related organizations. After earning the BS in dietetics, graduates will need to complete the 1200 supervised practice hours (internship) in order to be eligible to take the registration exam for dietitians.

Acceptance into either Dietetics program is competitive and enrollment is limited. Students who have completed the prerequisite courses apply for admission in February. The Accreditation Council for Education in Nutrition and Dietetics (ACEND) accredits both program options.

Accelerated BS/MS in Dietetics and Nutrition

In 2024, the Accreditation Council for Education in Nutrition and Dietetics will require students to hold Bachelor's and Master's degree, as well as completing 1200 hours of supervised practice, in order to be eligible to take the Registration Exam for Dietitians. The Accelerated BS/MS in Dietetics and Nutrition is a comprehensive program that includes all 3 components and will allow students to earn their eligibility for registration in just 5 years. Students earn a B.S. in Dietetics (after year 4), an M.S. in Exercise Science & Nutrition (after year 5), and earn 1492.5 hours of supervised practice (by the end of year 5). Admission to the program does not require the GRE, but students will have to apply to the graduate school for acceptance.

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ANTH 111*	3	Humanities/Fine Arts	3
CHEM 117	3	ECON 105	3
ENGL 110	4	ENGL 120	3
Humanities/Fine Arts	3	HNES 141	1
MATH 103 or 104**	3	MICR 202	2
		MICR 202L	1
		PSYC 111	3
	16		16
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
BIOL 220	3	Applications are due for the DEP and DPD	
BIOL 220L	1	BIOC 260	4
COMM 110	3	BIOL 221	3
HNES 250	3	BIOL 221L	1
HNES 291	1	HNES 251	3
PSYC 211 or 280	3	STAT 330	3
	14		14
Junior			
Fall	**Credits**	**Spring**	**Credits**
HNES 261	3	HNES 354	4
HNES 261L	2	HNES 361	3
HNES 351	4	HNES 361L	3
HNES 442	3	HNES 400	3
HNES 442L	2	VETS 115	1
HNES 452	3		
	17		14
Senior			
Fall	**Credits**	**Spring**	**Credits**
Upper Division Writing***	3	Elective	14
HNES 458	4		
HNES 460	3		
HNES 481	1		
HNES 491	1		
Elective	3		
	15		14

Total Credits: 120

* SOC 110 and Cultural Diversity may be substituted for ANTH 111.

** If the "Pre-calculus Math Placement Test" indicates MATH 105 or higher, student may select an elective in place MATH 103 or Math 104.

*** Upper-Division Writing may include: ENGL 320, 324, 325, 358, or 459.

Plans of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman					
Fall	**Credits**	**Spring**	**Credits**		
ANTH 111[1]	3	Humanities	3		
CHEM 117	3	ECON 105	3		
ENGL 110	4	ENGL 120	3		
Humanities/Fine Arts	3	HNES 141	1		
MATH 103 or 104[2]	3	MICR 202	2		
		MICR 202L	1		
		PSYC 111	3		
	16		16		
Sophomore					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
BIOL 220	3	Applications are due for all dietetics options.		Upper Division English (for accelerated students only)	3
BIOL 220L	1	BIOC 260	4	Combined/Accelerated Degree Program Declaration forms due to grad school for accelerated students	
COMM 110	3	BIOL 221	3		
HNES 250	3	BIOL 221L	1		
HNES 291	1	HNES 251	3		
PSYC 211 or 280	3	STAT 330	3		
	14		14		3
Junior					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
undefined		HNES 354	4	STAT 725 (Accelerated students only)	3
HNES 261	3	HNES 354L	2		
HNES 261L	2	HNES 361	3		
HNES 351	4	HNES 361L	3		
HNES 442	3	HNES 400	3		
HNES 442L	2	VETS 115	1		
HNES 452	3				
	17		16		3
Senior					
Fall	**Credits**	**Spring**	**Credits**		
Upper Division Writing[3]	3	HNES 480	12		
HNES 458[5]	4	HNES 777[4]	3		
HNES 458L	3				
HNES 460[5]	3				
HNES 460L	3				
HNES 710[4]	3				

HNES 790[4]	1		
	20		15
Fifth Year			
Fall	**Credits**	**Spring**	**Credits**
HNES 798[4]	3	HNES 726[4]	3
HNES 713[4]	3	HNES 798[4]	3
Elective[4]	2-3		
	8-9		6

Total Credits: 148-149

1 SOC 110 and Cultural Diversity may be substituted for ANTH 111.

2 If the "Pre-calculus Math Placement Test" indicates MATH 105 or higher, student may select an elective in place MATH 103 or Math 104.

3 Upper-Division Writing may include: ENGL 320, 324, 325, 358, or 459.

4 These courses are taken by Accelerated BS/MS in Dietetics and Nutrition students. Undergraduate DEP students do not take these.

5 Acclerated BS/MS in Dietetics and Nutrition Students will takeHNES 658 Advanced Medical Nutrition Therapy in place of HNES 458 and HNES 660 Foodservice Systems Management II in place of HNES 460

Accelerated BS/MS in Dietetics and Nutrition Degree Requirements

- If a student is interested in this option, they should speak with the Undergraduate Advisor for Dietetics in the College of Human Development & Education Academic Advising Center located in EML 270.
- Students intending to pursue the Accelerated option will need a 3.5 overall GPA and a 2.75 science GPA by the end of their 4th and 5th semesters to be eligible for the program.
- Students will also be required to complete a Combined/Accelerated Degree Program Declaration Form during the summer after semester 4 and then apply to the Graduate School during semester 5.
- GRE is not required.

Earth Science Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/earth-science-education/

Add overview content here.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
CHEM 121 or 150 (Must be matching lecture and lab)	3	CHEM 122 or 151 (Must be matching lecture and lab)	3
CHEM 121L or 160 (Must be matching lecture and lab)	1	CHEM 122L or 161 (Must be matching lecture and lab)	1

GEOL 105	3	EDUC 321	3
GEOL 105L	1	ENGL 120	3
ENGL 110	4	GEOL 106	3
MATH 165	4	GEOL 106L	1
PHYS 110	3	SOIL 217	3
		Complete Praxis Core Academic Skills Exam	
	19		17

Second Year

Fall	Credits	Spring	Credits
BIOL 150	3	BIOL 151	3
BIOL 150L	1	BIOL 151L	1
COMM 110	3	CSCI 122	3
EDUC 322	3	GEOG 412	3
GEOL 303	1	STAT 330	3
GEOL 350	3	PHYS 212	3
PHYS 211	3	PHYS 212L	1
PHYS 211L	1		
Apply to the School of Education			
	18		17

Third Year

Fall	Credits	Spring	Credits
BIOL 124	3	EDUC 481	3
BIOL 124L	1	EDUC 486	3
EDUC 451	3	GEOL 350 (Elective)	3
EDUC 489	3	GEOL 422	3
GEOL 420	3	GEOL 423	1
GEOL 421	1	GEOL 491	1
Humanities/Fine Arts and Cultural Diversity Gen Ed	3	Social and Behavioral Science Gen Ed	3
Wellness Gen Ed	2		
	19		17

Fourth Year

Fall	Credits	Spring	Credits
BIOC 260	4	EDUC 485	1
BIOL Elective	3	EDUC 487	9
ENGL 324	3	EDUC 488	3
GEOL Elective	3		
Humanities/Fine Arts Gen Ed	3		
Social and Behavioral Science Gen Ed	3		
Apply for Student Teaching			
Complete Praxis PLT Exam			

Complete Praxis II Content Exam		
	19	13

Total Credits: 139

Economics

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-7441
- **Department Web Site:**
  www.ag.ndsu.edu/agecon
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/economics/

Economics Major

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

The department offers two tracks within the Economics majors:

- **General Economics:** This track offers students more flexibility in terms of economics field course selection—15 credits of economics electives, 3 credits of which may be in agricultural economics, finance, and business administration.
- **Quantitative Economics:** This track is designed for students who desire to pursue a graduate degree in economics after college, or for students who desire a quantitative approach to economics. Students with strong quantitative and/or statistical backgrounds are highly encouraged to select the quantitative economics track.

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

Economics Minor

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

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ECON 189[1]	1	ECON 201	3
MATH 103 (pre-req for Math 144)	3	ENGL 120	3
ENGL 110	4	HUM/FA Gen Ed	3
MIS 116	3	MATH 144	4
Soc Behav Sci Gen Ed	3	Wellness Gen Ed	2
	14		15

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
ECON 202	3	ECON 341	3
STAT 330 (or STAT 367 for Quantitative Option)	3	HUM/FA Gen Ed	3
Soc Behav Sci Gen Ed	3	Sci & Tech Gen Ed	3
Sci & Tech Gen Ed	4	STAT 331	2
COMM 110	3	Minor Electives	6
	16		17
Junior			
Fall	**Credits**	**Spring**	**Credits**
ECON 343	3	ECON 400 Elective	3
ECON 410 (or ECON 400 elective required for Quantitative Option)	3	300 Level English	3
HUM/FA Gen Ed	3	Minor or Free Electives	6
Minor or Free Electives	2-4	MATH 266 or STAT 368 (if taking Quantitative Option)	3
MATH 259 or 265 (if taking Quantitative Opton)	3-4		
	14-17		15
Senior			
Fall	**Credits**	**Spring**	**Credits**
ECON 400 Elective	3	ECON 400 Elective	6
Minor or Free Electives	11-12	Minor or Free Electives	9
	14-15		15

Total Credits: 120-124

[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

Electrical Engineering

Department Information

- **Department Location:**
  Electrical and Computer Engineering
- **Department Phone:**
  701-231-7019
- **Department Web Site:**
  www.ndsu.edu/ece/
- **Degrees Offered:**
  B.S.E.E.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/electrical-engineering/

Electrical Engineering Major

The Electrical Engineering program at NDSU is accredited by the Engineering Accreditation Commission of ABET (http://www.abet.org).

EE Specialization

The Electrical Engineering program is designed to reflect the broad nature of the field, and students may tailor their studies within broad parameters. Students are encouraged to develop an individual program of study in close consultation with their advisers. Examples are available to illustrate

how specialization may be obtained in a number of different technical areas. Students may mix and match from the examples to suit their particular interests. Technical areas include the following:

- **Biomedical Engineering** is firmly based in engineering and the life sciences. The integration of medicine and engineering serves to provide appropriate products, tools, and techniques for research diagnosis and treatment by health care professionals. Some important products are artificial hearts, medical imaging (MRI, ultrasound, CT scans), prosthetic devices, and computer aids for diagnosis. Biomedical engineers help identify the problems and needs that can be solved using engineering technology and systems methodology to provide high-quality health care at reasonable cost.
- **Communication and Signal Processing** are closely related fields within electrical engineering. Communication is the process of transferring information from one point in time and space to another point. Signal processing involves signal representation, as well as signal design and filtering. Students with this specialization find challenging opportunities worldwide to meet the need for more convenient, inexpensive, and reliable communication and signal processing.
- **Computer Engineering** involves both hardware and software for small and large computers and for all products that include dedicated computers within, such as smart phones, game consoles, and automobiles.
- **Control Engineering** deals with the design and implementation of algorithms for controlling physical systems. Examples include active suspension for cars, auto pilots for aircraft, and robot motion control.
- **Electromagnetics** includes electromagnetic compatibility, fiber optics, antennas, microwave devices, radar, sonar, satellite systems, power and communication transmission lines, grounding, shielding, and propagation.
- **Electronics and Microelectronics** deal with integrated circuits, VLSI, transistors, lasers, consumer electronics, defense electronics, power electronics, and electronic materials.
- **Optical Engineering**, developed jointly with the Department of Physics (https://www.ndsu.edu/physics), prepares future engineers in such areas as quantum theory; coherent/incoherent polarized/non-polarized light; geometric, physical, and Fourier optics; holography; and image processing and acquisition.
- **Power Systems** deals with the generation, transmission, distribution, and utilization of electric energy subject to safety, environmental, and economic concerns.
- **Nanotechnology** deals with the study of electric materials at the nanoscale level for applications such as solar cells and sensors.

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
CHEM 121	3	ECE 111[1]	3
Wellness Gen Ed	2	ENGL 120	3
ECE 173	4	MATH 129	3
ENGL 110	4	MATH 166	4
MATH 165	4	PHYS 251	4
	17		17
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
EE 206	4	COMM 110	3
MATH 265	4	ECE 311	4
PHYS 252	4	MATH 266	3
ECE 275	4	Tech Elective	3
Gen Ed Science Lab	1	Humanities/Fine Arts Gen Ed	3
	17		16
Junior			
Fall	**Credits**	**Spring**	**Credits**
ECE 320	3	ECE 341	3
ECE 321	2	ECE 401	1
ECE 376	4	ECE 331	4
ECE 351	4	Tech Elective	3

ENGL/Upper Level Writing Gen Ed[3]	3	ECE 343	4
	16		15
Senior			
Fall	**Credits**	**Spring**	**Credits**
ECE 403	2	ECE 405	3
ENGR 402	1	ECE Elective	3
ECE Elective	3	ECE Elective	3
Tech Elective	3	Humanities/Fine Arts Gen Ed [2]	3
Social/Behavioral Sciences Gen Ed [4]	3	Tech Elective	3
Social/Behavioral Sciences Gen Ed [4]	3		
	15		15

Total Credits: 128

1 Students must take ECE 111 prior to enrolling in ECE courses listed above in the Junior and Senior year; otherwise, students must take an additional ECE Elective in lieu of ECE 111.

2 Suggested to take ENGR 311.

3 Select from ENGL 320, 321, 324 or 459 to satisfy the Upper Level Writing for General Education.

4 Suggested to take either ENGR 312, ECON 105, ECON 201, or ECON 202.

PROGRAM NOTES:

ECE Elective: any didactic ECE 4xx course (not x93, 494, 496).

Tech Elective: ECE 374, any didactic ECE 4xx course, ECE x93 or 494 (max 6 credits total between x93 and 494), ECE 496 (max 3 credits), or any course from accompanying list.

Students must earn a "C" or better in ECE 173, ECE 275, EE 206 and all required MATH courses, before enrolling in ECE courses listed above in the Junior or Senior years.

Elementary Education & Human Development and Family Science

Department Information

- **Department Location:**
  E. Morrow Lebedeff Hall
- **Department Phone:**
  701-231-8268
- **Department Web Site:**
  www.ndsu.edu/hdfs/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/elementary-education-human-development-family-science/

The Human Development and Family Science (Child Development option) & Elementary Education program is a collaborative effort between NDSU and Valley City State University (http://www.vcsu.edu) (VCSU). Through this curriculum, offered on the NDSU campus, students are concurrently enrolled in both universities, culminating in a bachelor's degree from NDSU in Human Development and Family Science (Child Development option) as well as a bachelor's degree from VCSU in Elementary Education. Students are certified to teach Elementary Education in public schools and may, with additional course work and an additional student teaching experience, be certified to teach kindergarten as well. The HDFS degree complements and strengthens the Elementary Education curriculum and helps future teachers understand development and its diversity, making them more effective teachers and helping them work with children from a wide variety of backgrounds.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman					
Fall	**Credits**	**Spring**	**Credits**		
HD&E 189	1	ENGL 120	3		
HDFS 135	3	MATH 104	3		
PSYC 111	3	CSCI 114 or MIS 116	3		
ENGL 110	4	HIST 103 or 104	3		
COMM 110	3	HDFS 230 or PSYC 250	3		
Science & Tech Gen Ed	3				
	17		15		
Sophomore					
Fall	**Credits**	**Spring**	**Credits**		
HDFS Elective (any level)	3	HDFS 330	3		
HDFS 242	3	HDFS 300-400 level elective	3		
HDFS 250	3	Science & Tech Gen Ed	3		
Science & Tech Gen Ed	3	EDUC 250: Introduction to Education	3		
Co-Req Science & Tech Gen Ed Lab Course	1	EDUC 283: Understanding Cultural Diversity	3		
Humanities & Fine Arts Gen Ed	3				
	16		15		
Junior					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
HDFS 475	3	HD&E 320	1	EDUC 210: Creative Activities	2
HDFS 300-400 level elective	3	EDUC 315: Math Methods	3		
EDUC 300: Education Technology	2	EDUC 320: Social Studies Methods	3		
EDUC 240: Exceptional Students	3	EDUC 321: Foundation of Reading	3		
MATH 277: Math for Elementary Education I	3	EDUC 330: Children's Literature	3		
EDUC 352: Culturally Diverse Practicum	1	EDUC 450: Assessment & Education Issues	2		
GEOG 111	2	MATH 278: Math for Elementary Education II	2		
	17		17		2
Senior					
Fall	**Credits**	**Spring**	**Credits**		
ENGL 320, 325, 358, or 459	3	HDFS 496*	1		
EDUC 322: Language Arts Methods	3	EDUC 400: Educational Psychology	2		
EDUC 323: Reading Methods	2	EDUC 490: Student Teaching	10		
EDUC 350: Elementary Education Practicum	2	EDUC 491: Seminar (Senior Portfolio)	1		

EDUC 355: Science Methods	3	
	13	14

Total Credits: 126

* Students should NOT enroll themselves in HDFS 496 via Campus Connection. The NDSU Registration and Records office automatically enrolls students in the course during the student's teaching semester.

Emergency Management

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-5595
- **Department Web Site:**
  www.ndsu.edu/emgt/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/emergency-management/

Emergency Management Major

The major prepares students for success as practitioners in emergency management as well as related fields. The rigor of the major also prepares students for graduate work. The major is ideally-suited for students seeking emergency management as a career of first choice. Student career success is built upon the following five program attributes:

1. Provide a broad educational foundation that supports graduates' entry into different settings where emergency management is practiced (e.g., government at all levels; businesses; schools and colleges; healthcare industry; non-profit organizations; humanitarian efforts; etc.);
2. Support evidence-based practice by exposing students to the rich research and science available;
3. Promote and foster experiential opportunities through focused class activities and required internships;
4. Develop skills necessary to the effective practice of emergency management (e.g., communication; collaboration; teamwork; leadership; critical thinking; problem-solving, etc.); and,
5. Support student professional development through faculty mentoring focused on familiarizing students with the roles of and opportunities to pursue training and experience and cultivate professional networks prior to graduation.

Numerous career opportunities are available to those graduating with an emergency management major. Positions are available at all levels of government including city, county, state, and federal. A wide variety of local, national, and international voluntary organizations routinely hire people educated in emergency management, and there is increasing emphasis on hiring individuals educated in emergency management in the private, business sector.

Recent program graduates found employment as a regional emergency planner, homeland security planner, business continuity specialist, hospital emergency manager, emergency manager with the National Guard, public health emergency preparedness coordinator, and disaster insurance adjuster, to name a few examples.

Of note, just as with any degree program in higher education, an emergency management student does not graduate and necessarily go on to be an emergency manager. Graduates consistently find employment in the military, law enforcement, emergency medical services, and fire departments as well. And, many graduates from our degree program go on to work in fields unrelated to emergency management. Our alumni report that the skills and knowledge acquired through our undergraduate degree program in emergency management are highly marketable to other professions and fields.

Emergency Management Minor

The Department of Emergency Management offers an emergency management minor with four transcripted minor sub-plan options. Each sub-plan minor option is designed to complement a set of student interests and majors. Options include:

- Vulnerability and Capacity Building
- Risk and Resilience Management
- Homeland Security
- Comprehensive Emergency Management

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year					
Fall	**Credits**	**Spring**	**Credits**		
EMGT 101	3	EMGT 261 or 263	3		
ENGL 110	4	ENGL 120	3		
Gen Ed Humanities/Fine Arts	3	Gen Ed Science & Tech w/ Lab	4		
Gen Ed Quantitative Reasoning	3	Gen Ed Humanities/Fine Arts	3		
Gen Ed Wellness	2-3	COMM 110	3		
	15-16		16		
Second Year					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
EMGT 291	3	EMGT 263 or 261	3	EMGT 496	6
EMGT 262 or 264	3	EMGT Elective	3		
Gen Ed Science & Tech	3	Gen Ed Science & Tech	3		
AHSS Humanities - College Requirement[See Department Recommended Gen Ed Course List]	3	AHSS Arts - College Requirement[See Department Recommended Gen Ed Course List]	3		
AHSS Social Sciences - College Requirement[See Department Recommended Gen Ed Course List]	3	Gen Ed Social & Behavioral Sci	3		
	15		15		6
Third Year					
Fall	**Credits**	**Spring**	**Credits**		
EMGT 264 or 262	3	EMGT Elective	3		
Gen Ed Upper Level Writing	3	EMGT Elective	3		
Minor Course	3	Minor Course	3		
Minor Course	3	Minor Course	3		
Any Additional Elective or Additional EMGT Elective	3	Any Additional Elective or Additional EMGT Elective	3		
	15		15		
Fourth Year					
Fall	**Credits**	**Spring**	**Credits**		
EMGT Elective	3	EMGT 410[(Capstone)]	3		
EMGT Elective	3	Minor Course	3		
Minor Course	3	Any Additional Electives or Additional EMGT Electives	6		
Any Additional Electives / Additional EMGT Electives	3				
	12		12		

Total Credits: 121-122

English

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7143
- **Department Web Site:**
  www.ndsu.edu/english/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/english/

The English studies major offers students the flexibility to follow interests in literatures, linguistics, and creative, technical, and professional writing. The curriculum joins the strengths of a traditional humanities education with the career outcomes today's students seek. English majors develop strong communication skills, multiple research strategies, flexibility in responding to complex situations, and effective project-management skills. Career success is tied to the ability to understand, restate, and analyze complex ideas and texts for multiple audiences. Such success requires habits of investigation, the ability to critically analyze sources of information, and the self-assurance to handle unfamiliar materials and situations. The department offers multiple opportunities to develop these skills both in the classroom and outside university walls working with and for authentic clients.

The English department offers a Bachelor of Arts (B.A.) and a Bachelor of Science (B.S.) in English as well as a B.A. and a B.S. in English education. Departmental offerings include:

B.A. and B.S. in English – These degrees require 45 credits in English courses beyond first-year composition. The B.A. degree requires functional proficiency in at least one language other than English, typically 14 credits of course work in that language. The B.S. degree requires a minor. The flexibility of the single major in English studies means that students can emphasize course work in literatures, linguistics, writing studies, or a balance of these.

B.A. and B.S. in English Education – These degrees require 39 credits in English courses beyond first-year composition and 34 credits in education courses. The B.A. degree requires functional proficiency in at least one language other than English, typically 14 credits of course work in that language. The B.S. degree in English education with a communication option requires 20 credits in communication courses and leads to certification in both English and speech. English education majors should contact the School of Education or the English education advisor for additional requirements.

English Minors – Minor sequences are available for literature, creative writing, and writing studies. The minors require a minimum of 21 credits in English beyond first-year composition.

Literature – This minor gives students the opportunity to read widely in literature, develop analytical skills, and hone writing skills. Courses include Literary Analysis, literature survey courses, elective literature and film courses, and one writing course.

Creative Writing – This minor offers students the opportunity to take seven courses in a sequence designed to develop analytic abilities, writing skills, and an understanding of the student's own creative process.

Writing Studies – This minor provides students with the opportunity to write creatively and professionally, and to explore emerging communication technologies. Courses include Introduction to Writing Studies, elective writing courses, and one upper-level literature or linguistics course.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	ENGL 200-level elective	3
ENGL 167	3	COMM 110	3
Gen Ed Quantitative Reasoning	3	Gen Ed Science & Tech	3
Minor or Free Elective	3	Gen Ed Social & Behavioral Sci	3

Gen Ed Social & Behavioral Sci	3	ENGL 120	3
	16		15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 275	3	ENGL 272	3
ENGL cultural diversity or 300-level	3	ENGL Cultural Diversity or 300-level	3
Gen Ed Science & Tech w/ Lab	4	Gen Ed Science & Tech	3
AHSS Area 2	3	AHSS Area 3	3
Gen Ed Wellness	2	Minor or Free Elective	3
	15		15
Third Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL Early Period Survey	3	ENGL 358	3
Minor or Free Elective	3	ENGL Cultural Diversity or 300-level	3
ENGL Cultural Diversity or 300-level	3	ENGL Later Period Survey	3
Minor or Free Elective	3	Minor or Free Elective	3
Minor or Free Elective	3	Minor or Free Elective	3
	15		15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 467	3	ENGL 400-level	3
ENGL 400-level	3	ENGL 400-level	3
Minor or Free Elective	4	Minor or Free Elective	3
Minor or Free Elective	3	Minor or Free Elective	3
Minor or Free Elective	3	Minor or Free Elective	3
	16		15

Total Credits: 122

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	COMM 110	3
ENGL 167	3	Gen Ed Science & Tech	3
Gen Ed Quantitative Reasoning	3	Gen Ed Social & Behavioral Sci	3
Gen Ed Social & Behavioral Sci	3	ENGL 120	3
Language 101	4	Language 102	4
	17		16
Second Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 275	3	ENGL 272	3
ENGL cultural diversity or 300-level	3	Scence & Tech	3
Gen Ed Science & Tech w/ Lab	4	AHSS Area 3	3
Gen Ed Wellness	2-3	200-level English Elective	3

Language 201	3	Language 202	3
	15-16		15
Third Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL Early Period Survey	3	ENGL 358	3
ENGL Cultural Diversity or 300-level	3	ENGL Cultural Diversity or 300-level	3
AHSS Area 3	3	ENGL Later Period Survey	3
Free Elective	3	Free Elective	3
English Cultural Diversity or 300-level elective	3	Free Elective	3
	15		15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 467	3	ENGL 400-level	3
ENGL 400-level	3	ENGL 400-level	3
Free Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
Free Elective	3	Free Elective	3
	15		15

Total Credits: 123-124

English Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/english-education/

Add overview content here.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 110	3	ENGL 240	3
ENGL 110 or 120	3-4	ENGL 272	3
Science or Technology	3	Science & Technology	3
Wellness	2	Quantitative Reasoning	3
LANG (First-Year Language I)	4	LANG (First-Year Language I)	4

		ENGL 120 (if not taken in Fall)	3
	15-16		19
Second Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 321	3	EDUC 322	3
ENGL 209	3	ENGL 316 or 318	3
ENGL 315 or 317	3	ENGL 360	3
Science & Technology	4	Social/Behavioral Science	3
LANG (Second-Year Language I)	3	LANG (Second-Year Language II)	3
Complete Praxis Core Academic Skills Exam		Apply to the School of Education	
	16		15
Third Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 451	3	EDUC 481	3
Elective	3	EDUC 489	3
ENGL 222	3	Elective	3
ENGL 300/400 Literature (Elective)	3	ENGL 358	3
Social/Behavioral Science	3	ENGL 380	3
	15		15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 482	3	EDUC 485	1
EDUC 486	3	EDUC 487	9
ENGL 300/400 Literature (Elective)	3	EDUC 488	3
ENGL 435	3		
ENGL 458	3		
Apply for Student Teaching			
Complete Praxis PLT Exam			
Complete Praxis II Content Exam			
	15		13

Total Credits: 123-124

Environmental Geology

Department Information

- **Department Location:**
  Geosciences Building
- **Department Phone:**
  701-231-8455
- **Department Web Site:**
  www.ndsu.edu/geosci/
- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/environmental-geology/

As environmental stewardship becomes an increasingly important aspect of all career paths, the "Environmental Geology" minor complements and enhances a wide range of majors. Students interested in the Earth and the environment are invited to consider this rewarding and challenging minor.

The "Environmental Geology" minor is open to undergraduate students within all majors (except full Geology majors). The curriculum requires 19 - 20 semester hours within the courses listed below. Note that some of these courses also have chemistry and math prerequisites.

Equine Science

Department Information

- **Department Location:**
  Hultz Hall
- **Department Phone:**
  701-231-7641
- **Department Email:**
  ndsu.ansc@ndsu.edu
- **Department Web Site:**
  www.ag.ndsu.edu/ansc
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/equine-science/

The equine science program includes course work in equestrian styles, nutrition and physiology, selection and management of the horse enterprise. The roles of the horse in society—recreational, therapeutic and performance—are discussed. The department offers programs of study and extra-curricular activities that facilitate the development of the student in the horse industry at many diverse entry points.

The equine science major is designed to provide a strong overall background with supporting course work in the sciences, humanities and general education. The student will be prepared in equine production and management. The choice of a minor in equine science offers the student diversity in his or her educational program while preparing the participant for recreational endeavors involving horsemanship. A minor in equine science can accompany essentially any major offered at North Dakota State University. A minor in equine assisted activities and therapies provides students with a background in therapeutic horsemanship. This minor can accompany essentially any major offered at NDSU.

Equine science students are qualified to become involved in many diverse occupations. These include such varied activities as training horses, managerial support, sales of pharmaceuticals and livestock products, and other agribusiness professions. Graduates are likely to obtain employment at academic institutions, government stations, foreign assignments and private industry. Specific areas of employment are 4-H Extension opportunities, university and community college teaching, horse exhibitions and horse breeding operations. Animal feed sales, equine magazine publications and public relations for breeding operations provide many different avenues of opportunity.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ANSC 101	1	ANSC 223	2
ANSC 260	2	BIOL 111	3
MATH 103	3	BIOL 111L	1
ENGL 110	4	COMM 110	3
VETS 135	3	ENGL 120	3
Social/Behavioral Science and Cultural Diversity	3	Humanities/Fine Arts	3
	16		15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
AGEC 242	3	AGEC 244	3

ANSC 235	2	MICR 202	2
ANSC 261	1	MICR 202L	1
CHEM 117	3	STAT 330	3
CHEM 117L	1	ECON 201	3
ANSC 260L	1	Humanities/Fine Arts	3
Elective	3		
	14		15

Third Year			
Fall	**Credits**	**Spring**	**Credits**
ANSC 360	3	ANSC 364	3
PLSC 315	3	ANSC 358	2
ENGL 32X Upper-level Writing	3	BIOC 260	4
NRM/PLSC/RNG Any level course	3	ANSC 371	3
ANSC Elective	3	Elective	3
	15		15

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
ANSC 393/396 Internship/Research	2	ANSC 480	3
ANSC Elective	6	ANSC 478	3
Elective	5	ANSC 463	3
Wellness	2	ANSC 463L	1
		Elective	5
	15		15

Total Credits: 120

Exercise Science

Department Information

- **Department Location:**
  Bentson Bunker Fieldhouse
- **Department Phone:**
  701-231-7484
- **Department Web Site:**
  www.ndsu.edu/hnes/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/exercise-science/

Exercise Science Major

The Exercise Science major is accredited by the Commission on Accreditation of Allied Health Education Programs and endorsed by the American College of Sports Medicine. This curriculum covers the knowledge, skills, and abilities expected of an ACSM Certified Exercise Physiologist.

The Exercise Science major is designed to prepare students for entry-level positions in any of four health fitness settings: commercial, community, corporate, and clinical. Completion of the major will also act as a stepping stone to prepare the exceptional student for graduate education in exercise physiology/science, cardiac rehabilitation, physical therapy, sports nutrition, sports medicine, biomechanics, and other allied health professions.

The Exercise Science program includes a wide range of content from the study of physical activity and the associated acute and chronic physiological adaptations and responses to it, to health-fitness business management principles found in facilities worldwide. Majors are encouraged to select a minor in business, psychology, or other areas depending on their interests. Field experiences and a semester-long internship experience completed at

the end of the Exercise Science major afford the student an opportunity to select an area of specialization in the field from sites available throughout the country.

Students are encouraged to pursue appropriate professional certification from the American College of Sports Medicine, The National Strength and Conditioning Association, or The American Council on Exercise.

Pre-Professional/Professional Emphasis

Students are admitted to the Pre-Professional emphasis in Exercise Science when declaring the major. The Pre-Professional emphasis encompasses the freshman year and fall semester of the sophomore year; transfer students are also placed in the Pre-Professional emphasis upon acceptance to the university. Entrance into the Professional Emphasis occurs during the third semester of attendance for students who entered as freshmen; for transfer students, entrance occurs after the first semester of attendance.

Application guidelines are provided during HNES 170 Introduction to Exercise Science and during advising sessions with freshmen, as well as on the Exercise Science (https://www.ndsu.edu/hnes/exercise_science) web site. The following requirements must be met before beginning the professional course (sophomore, junior and senior level courses with prefix HNES) of study:

1. Successful completion of HNES 170 Introduction to Exercise Science with a grade of 'B' or better
2. Successful completion of BIOL 220 Human Anatomy and Physiology I/BIOL 220L Human Anatomy and Physiology I Laboratory with a grade of 'B' or better
3. Successful completion of MATH 103 College Algebra or MATH 104 Finite Mathematics or higher with a grade of 'B' or better
4. Successful completion of CHEM 121 General Chemistry I/CHEM 121L General Chemistry I Laboratory with a grade if 'B' or better
5. Minimum NDSU cumulative GPA of 3.00 or higher

Retention Standards

Students must meet the following retention standards (per semester) in order to maintain their status in the Exercise Science professional phase.

1. No more than two 'C' and no 'D' or 'F' grades may be earned in Exercise Science major classes.
2. Maintain a NDSU cumulative GPA of 3.00 on a 4.00 scale.

Exercise Science Major/Master of Athletic Training Program

Students who wish to attend NDSU for athletic training are advised to pursue this five-year program. The students will major in Exercise Science for their undergraduate degree and apply to the Master of Athletic Training (MATrg) graduate program to complete this program. Upon completion, the graduates will be able to take the Board of Certification (BOC) exam, earn the ATC credential and pursue employment as an athletic trainer.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110 or 120[Placement applies.]	3-4	COMM 110	3
HNES 170	2	CSCI 114 or MIS 116	3
PSYC 111	3	Humanities/Global	3
Electives	6	Electives	6
	14-15		15
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
** See note below		BIOL 221	3
BIOL 220	3	BIOL 221L	1
BIOL 220L	1	CHEM 122	3
CHEM 121 (pre or co-requisite: MATH 103)	3	CHEM 122L	1
CHEM 121L	1	HNES 365	3
PHYS 211 (pre-requisite: MATH 105)	3	STAT 330	3

PHYS 211L	1	Electives	3
HNES 250	3		
	15		17
Junior			
Fall	**Credits**	**Spring**	**Credits**
PSYC 211	3	HNES 368	3
HNES 374	3	HNES 370	3
HNES 375	3	HNES 371	3
HNES 496	1	HNES 465	3
Humanities/Diversity	3	HNES 466	1
Elective	1	HNES 491	1
		Electives	3
	14		17
Senior			
Fall	**Credits**	**Spring**	**Credits**
Upper Division Writing	3	HNES 475	12
HNES 472	3		
HNES 476	2		
HNES 496	1		
Electives	7		
	16		12

Total Credits: 120-121

** Students apply for Exercise Science Professional Status during fall semester of sophomore year.
Application guidelines are provided during HNES 170 Introduction to Exercise Science and during advising sessions with freshmen, as well as on the Exercise Science (https://www.ndsu.edu/hnes/exercise_science) web site. The following requirements must be met before beginning the professional course (sophomore, junior and senior level courses with prefix HNES) of study:

1. Successful completion of HNES 170 Introduction to Exercise Science with a grade of 'B' or better
2. Successful completion of BIOL 220 Human Anatomy and Physiology I/BIOL 220L Human Anatomy and Physiology I Laboratory with a grade of 'B' or better
3. Successful completion of MATH 103 College Algebra or MATH 104 Finite Mathematics or higher with a grade of 'B' or better
4. Successful completion of CHEM 121 General Chemistry I/CHEM 121L General Chemistry I Laboratory with a grade if 'B' or better
5. Minimum NDSU cumulative GPA of 3.00 or higher

† Consult your advisor for suggested electives for certain Graduate and Professional programs.

Extension Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/extension-education/

The Extension Education minor provides educational background and presentation skills for individuals who seek careers associated with the Cooperative Extension Service. This minor is offered through the Agricultural Education and the Family and Consumer Sciences Education programs.

The minor is appropriate for many majors across the University including Human Development and Education and the College of Agriculture, Food Systems, and Natural Resources.

Family and Consumer Sciences Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/family-consumer-sciences-education/

The family and consumer sciences education (FCSE) program at North Dakota State University has been approved by the State Board for Career and Technical Education for the preparation of family and consumer sciences teachers. The FCSE program is a versatile major due to the preparation of the student as both an educator and a family and consumer scientist. As an educator, the FCSE graduate is prepared to guide a variety of teaching-learning situations. Since education is a people-centered profession, the program focuses on characteristics of various learners or clients, learning principles and different applications of the teaching-learning process. A wide range of strategies for working with individuals or groups is included. Hands-on experience is provided throughout the program to develop the teaching skills learned in classes.

As a family and consumer sciences educator, the FCSE student is prepared with a comprehensive subject matter background. Courses from all areas of family and consumer sciences are included in the program. This contributes to the versatility of the major since the broad range of knowledge may be applied to a wide variety of settings. A graduate of the FCSE program is qualified to teach family and consumer sciences classes in occupational or non-occupational programs, adult programs, or to serve as an extension educator. The FCSE program meets the standards set by the National Council for Accreditation of Teacher Education (NCATE). Thus, graduates are readily employable throughout the United States. Student teaching is the culmination of the teaching program. Students have the opportunity to apply knowledge and skills acquired in college courses under the supervision of an experienced family and consumer sciences educator.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
MIS 116	3	COMM 110	3
ENGL 110	4	ENGL 120	3
HD&E 189	1	HDFS 341	3
HDFS 135	3	MATH 104	3
HDFS 230	3	SOC 110	3
PSYC 111	3		
	17		15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
ADHM 155 or 101	3	ENGL 358	3
CHEM 117	3	H&CE 469	3
CHEM 117L	1	HDFS 242	3
EDUC 321	3	HDFS 357	3
H&CE 232	3	HNES 141	1
HNES 200	3	HNES 217	3

Complete Praxis Core Academic Skills Exam		Apply to the School of Education	
	16		16
Third Year			
Fall	**Credits**	**Spring**	**Credits**
ADHM 366	3	ADHM 316	3
EDUC 322	3	ADHM 410	3
H&CE 467	3	EDUC 451	3
HDFS 186	3	H&CE 468	3
HNES 261	3	HDFS 462	3
HNES 261L	2		
	17		15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 486	3	H&CE 483	1
EDUC 489	3	H&CE 487	9
Gen Ed Science & Tech and Global Perspective	3	H&CE 488	3
H&CE 482	3		
HDFS 475	3		
Apply for Student Teaching			
Complete Praxis PLT Exam			
Complete Praxis II Content Exam			
	15		13

Total Credits: 124

Finance

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-8651
- **Department Web Site:**
  www.ndsu.edu/business/departments/afis/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/finance/

Finance Major

Finance is a discipline that studies the optimal ways of using monetary resources for individuals, businesses and all other organizations. The integration of global financial markets and institutions presents opportunities not seen in generations for Finance students and graduates. By providing a four-year, 123-credit-hour program that leads to a Bachelor of Science degree, we aim to prepare future leaders in corporate financial management, investment banking, business consulting, commercial lending, portfolio analysis and risk management.

The Finance program at NDSU currently offers students a broad base of knowledge centered on Finance, including Principles of Finance (FIN320), Investments (FIN410), Financial Derivatives (FIN420), Financial Institutions (FIN430), International Finance (FIN440), Corporate Finance (FIN460), Fixed-Income Securities (FIN470), and Applied Portfolio Management (FIN 480). The coursework also benefits students interested in pursuing Finance-related professional certifications such as the Certified Financial Planner (CFP) and Chartered Financial Analyst (CFA).

Based on the projection of the U.S. Bureau of Labor Statistics, employment among Finance professionals is expected to grow by 9 percent from 2010 to 2020. Among NDSU graduates, the average entry-level salary of a Finance major was $41,000 and the highest reported salary of a Finance major was $80,000 in 2015, according to NDSU Career Center (https://career.ndsu.edu/annual-employment-report).

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	COMM 110	3
MIS 116	3	ENGL 120	3
Gen Ed Humanities/Fine Arts	3	MATH 144	4
Gen Ed Wellness	2	PSYC 111 or SOC 110	3
Non-major Elective	3	Gen Ed Cultural Diversity	3
	15		16
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
ACCT 200	3	ACCT 201	3
ECON 201	3	ECON 202	3
PHIL 216	3	STAT 331	2
STAT 330	3	Non-major Elective	3
Gen Ed Science & Technology	3	Gen Ed Science & Tech (w/lab)	4
	15		15
Junior			
Fall	**Credits**	**Spring**	**Credits**
ENGL 320	3	BUSN 430	3
FIN 320	3	FIN 410	3
MGMT 320	3	FIN 430	3
MIS 320	3	300-400 Level CoB Elective	6
MRKT 320	3		
	15		15
Senior			
Fall	**Credits**	**Spring**	**Credits**
FIN 460	3	BUSN 489	3
300-400 Level Finance Elective	3	300-400 Level Finance Electives	6
300-400 Level CoB Elective	3	300-400 Level Approved Electives[1]	6
300-400 Level Approved Elective[1]	3		
Non-major Elective	2		
	14		15

Total Credits: 120

[1] Approved electives include College of Business courses or those with the following prefixes: AGEC, CSCI, ECON MATH, and STAT. Must earn a letter grade.

Food Safety

Department Information

- **Department Location:**
  Morrill Hall 311
- **Department Phone:**
  701-231-8944
- **Department Web Site:**
  www.ag.ndsu.edu/foodsafety
- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/food-safety/

Food Safety

Food Safety is a key component of global challenges to both health and resources and is becoming increasingly complex given the global dimensions of food supply, the need to reduce food waste, and the growing importance of the efficient use of natural resources. Food safety impacts all areas of the chain from production, transportation and storage, processing, distribution, marketing and regulation.

Food safety is the current target of tremendous interest, effort, and spending worldwide, but yet, is an area in which shortages of expertise are manifest. Individuals with this knowledge and training are often are heavily recruited for employment. The food safety minor was developed by an interdisciplinary team of faculty with expertise in food safety from several NDSU Colleges and Departments.

The minor in Food Safety (SAFE) requires completion of a total of 16 credits. Eight of these credits are the SAFE core courses, which are completed on-line. The remaining 8 credits are electives which may be selected from a wide range of disciplines including Agribusiness and Applied Economics, Animal Sciences, Emergency Management, Food Safety, Food Science, Microbiology, Plant Sciences and Plant Pathology. A minimum of eight credits must be taken at NDSU.

Food Science

Department Information

- **Department Location:**
  Harris Hall
- **Department Phone:**
  701-231-8790
- **Department Web Site:**
  www.ag.ndsu.edu/foodscience/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/food-science/

Food Science Major

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

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

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

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

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
AGRI 189	1	BIOL 150	3
CFS 210 or 200	2 or 3	CHEM 122 & 122L	4
CHEM 121 & 121L (Gen Ed Category S)	4	COMM 110 (Gen Ed Category C)	3
ENGL 110 (Gen Ed Category C)	4	ENGL 120 (Gen Ed Category C)	3
Gen Ed Humanities/Fine Arts (Gen Ed Category A)	3	MATH 146 or 165 (Gen Ed Category R)	4
	14-15		17
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
CFS 370	3	BIOC 260 (or BIOC 460/460L)	4
CSCI 114 or MIS 116 (Gen Ed Category S)	3	ECON 201 (Gen Ed Category B & G)	3
PHYS 211 & 211L (Gen Ed Category S)	4	HNES 250 (Gen Ed Category W)	3
Gen Ed Humanities/Fine Arts and Cultural Diversity (Gen Ed Category A and D)	3	Gen Ed Social and Behavioral Sci (Gen Ed Category B)	3
Elective	3	Elective	3
	16		16
Junior			
Fall	**Credits**	**Spring**	**Credits**
MICR 350 & 350L	5	STAT 330 (Gen Ed Category R)	3
ENGL 320, 321, or 324 (Gen Ed Category C)	3	CFS 470	3
CHEM 341 & 341L	4	CFS 471	1
		CFS 474	3
		CFS 452 or SAFE 452	3
		Elective	3
	12		16
Senior			
Fall	**Credits**	**Spring**	**Credits**
CFS 430 or ABEN 263	3	CFS 480	3
CFS 450	3	CFS 464	3
CFS 460	3	ANSC 340	3
CFS 461	1	Electives	4
MICR 453	3		

Elective	3	
	16	13

Total Credits: 120-121

Fraud Investigation

Department Information

- **Department Location:**
  Richard H. Barry Hall or Putnam Hall
- **Department Phone:**
  231-8651 or 231-8567
- **Department Web Site:**
  www.ndsu.edu/business/departments/afis/
- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/fraud-investigation/

Fraud Investigation

The Department of Accounting, Finance, and Information Systems, in collaboration with the Department of Criminal Justice and Political Science, offers a minor in Fraud Investigation. Students will study the causes of fraud, as well as the detection, investigation, and prevention of fraud. Students learn about the criminal justice system including law making, criminality, and prosecution of fraud and other types of crime. This minor will prepare students for possible careers in crime investigation, litigation support, or forensic accounting.

The Fraud Investigation minor has minimum entrance and completion requirements. See the Minor Requirements guide or contact the Department of Accounting, Finance, and Information Systems (https://www.ndsu.edu/business/departments/afis) or the Department of Criminal Justice and Political Science (https://www.ndsu.edu/cjps) for further information on requirements.

French

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7887
- **Department Email:**
  ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/modernlanguages/
- **Degrees Offered:**
  B.A.; B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/french/

Today's interconnected world generates the need to be able to communicate in more than one language. As networks of international cooperation and exchange grow in complexity, particularly among governments and businesses, those who possess foreign language competence become increasingly valuable. Moreover, it has been shown that learning a second language can improve one's overall writing and speaking ability.

Career Directions

Experience has shown that many students, with or without declared modern language majors or minors, find a second language background especially useful when combined with preparation in another professional field. Examples include public relations, journalism, TV and radio broadcasting, hotel management, publishing and editing, government service, banking, and management.

One of the more promising occupational fields for language students has been international business. Individuals with foreign language skills are finding increased opportunities with multinational corporations, especially in management and marketing. Many companies with international ties

recruit candidates possessing linguistic training because they recognize its correlation with effective verbal and written communication. Regardless of their specific majors, students are encouraged to contact the department for information and advice on career application of foreign language skills.

Students wishing to prepare for high school teaching should make this intention known to the School of Education and to the Department of Modern Languages to make certain that the requirements for state certification are met. Competitiveness and flexibility in the job market tend to be greater if certification can be obtained in two or more different areas.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	ENGL 120	3
Gen Ed Quantiative Reasoning	3	FREN 312	3
FREN 311	3	Gen Ed Wellness	2
Gen Ed Social and Behavioral Sciences	3	Gen Ed Science/Tech with lab	4
Gen Ed Science/Tech	3	AHSS College Requirement	3
	16		15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
FREN 315	3	One year of a Second Language Course	3-4
On year of a Second Language Course	3-4	AHSS College Requirement	3
Gen Ed Science/Tech	3	Minor Courses or Elective	6
COMM 110	3	FREN Upper-Division elective	3
Minor or 2nd major	3		
	15-16		15-16
Third Year			
Fall	**Credits**	**Spring**	**Credits**
FREN 350	3	FREN 492	12-15
FREN Upper-Division Elective	3		
Gen Ed Social & Behavioral Science	3		
Minor or 2nd major	9		
	18		12-15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
FREN Upper-Division Elective Course	3	FREN 489 (Senior Thesis)*	1
Minor or 2nd major	9	FREN Upper-Division Elective	3
FREN 360	3	FREN 401 or Upper-Division FREN Literature	3
		Minor Courses or Electives	6
	15		13

Total Credits: 119-124

* FREN 489: Senior Thesis must be completed after the study abroad experience.

** FREN Elective Courses: Select four of the following: FREN 340, 345, 360, 365, 370, 410, 412, 420, or 422.

*** Ancillary Courses: Choose at least two courses. Consult department or advisor for current list of approved ancillary electives. Western Civilization, History of Europe or Africa, World Literature, or any area of linguistics.

French Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/french-education/

Add overview content here.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110 (Gen Ed Category C)	4	COMM 110 (Gen Ed Category C)	3
FREN 311	3	ENGL 120 (Gen Ed Category C)	3
Quantitative Reasoning Gen Ed	3	FREN 312	3
Social & Behavioral Science Gen Ed	3	EDUC 321	3
Science & Technology w/ Lab Gen Ed	4	Social & Behavioral Science Gen Ed	3
		Complete Praxis Core Academic Skills Exam	
	17		15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 322	3	EDUC 451	3
EDUC 481	3	FREN Elective	3
FREN 315	3	FREN Elective	3
Wellness Gen Ed	2	Science & Technology Gen Ed	3
Science & Technology Gen Ed	3	Other Foreign Language	3
Apply to School of Education			
	14		15
Third Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 489	3	Semester Abroad (5 upper division French credits approved by advisor)	15
FREN 350	3		

FREN 360 (May be used as Gen Ed Category C)	3		
Other Foreign Language	3		
Elective	6		
	18		15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 486	3	EDUC 485	1
FREN 489	3	EDUC 487	9
FREN Elective	3	EDUC 488	3
FREN Elective	3		
French Special Methods (completed through Tri-College at MSUM or Concordia)	3		
Apply for student teaching			
Complete Praxis PLT Exam			
Complete Praxis II Content Exam			
	15		13

Total Credits: 122

French Studies

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7887
- **Department Email:**
  ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/modernlanguages/
- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/french-studies/

Broader in scope than the traditional minor which emphasizes linguistic competence, the French Studies minor combines systematic language study with courses in geography, history, civilization, and politics to enhance students' understanding of the global context of the language they have chosen to study. A languages studies minor requires 18 approved semester credits, including nine credits of language and civilization study beyond the intermediate level (FREN 311, FREN 312 and a civilization course in the language), a six-credit sequence in history, and an approved three-credit elective in Anthropology, Geography, or Political Science; study abroad is strongly encouraged.

General Agriculture

Department Information

- **Department Location:**
  Morrill Hall 315
- **Department Phone:**
  701-231-8790
- **Department Web Site:**
  www.ag.ndsu.edu/academics/
- **Degrees Offered:**

B.S.

- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/general-agriculture/

General Agriculture Major

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

Students electing to graduate with a General Agriculture major must file a "plan of study" with the General Agriculture Coordinating Committee by the third week of the semester in which they will complete at least 75 credits. This plan must an outline of courses to be taken to meet the disciplinary requirements and the Agriculture electives, for completion of the General Agriculture degree. Identification of the capstone course and any internship that the student plans to take should also be included in the plan of study.

The General Agriculture major is also a good approach to pursuit of a degree in Agricultural Education. A student may choose General Agriculture as a first major and Agricultural Education as a second major and complete the requirements for both degrees.

General Agriculture Minor

A minor in General Agriculture may be obtained by satisfactorily completing 24 credits with at least six credits in each of any four disciplines offered by the College of Agriculture, Food Systems, and Natural Resources. A minimum of eight credits must be taken at NDSU. Students must earn a 2.00 minimum GPA in the courses used to satisfy the minor requirements.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
AGRI 189	1	ENGL 120 (Category C)	3
ENGL 110 (Category C)	4	COMM 110 (Category C)	3
MATH 103 (or higher level Math)	3	Gen Ed Social & Behavioral Science and Global Perspectives (Categories B & G)	3
CHEM 117, 121, or BIOL 111 (Category S)	3	CSCI 114 or MIS 116 (Category S)	3
CHEM 117L, 121L, or BIOL 111L (Category S)	1	Gen Ed Wellness (Category W)	2
ANSC 114 (or other lower division class with CAFSNR prefix)	3	PLSC 110 (or other lower division class with CAFSNR prefix)	3
	15		17
Second Year			
Fall	**Credits**	**Spring**	**Credits**
Gen Ed Social & Behavioral Sci (Category B)	3	STAT 330 (Category R)	3
Discipline 1 class	3	Gen Ed Hum & Fine Arts (Category A)	3
Discipline 2 class	3	Discipline 1 class	3
Discipline 3 class	3	Discipline 2 class	3
Discipline 4 class	3	Discipline 3 class	3
Elective	1	Elective	1
	16		16

Third Year			
Fall	**Credits**	**Spring**	**Credits**
Gen Ed Humanities and Fine Arts and Cultural Diversity (Categories A & D)	3	Upper division Discipline 1 class	3
Gen Ed Upper Division Writing (Category C)	3	Upper division CAFSNR elective	3
PLSC 315 (Category S)	3	Discipline 4 class	3
Discipline 1 class	3	CAFSNR elective	3
Discipline 4 class	3	CAFSNR elective	3
Elective	1	Elective	1
	16		16
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
Upper division Discipline 1 class	3	Capstone class (any CAFSNR prefix) (Course description contains the word "capstone")	3
Upper division Discipline 2 class	3	Upper division Discipline 2 class	3
Upper division Discipline 3 class	3	Electives	10
Discipline 4 class	3		
Upper division CAFSNR elective	3		
Elective	1		
	16		16

Total Credits: 128

CAFSNR - College of Agriculture, Food Systems and Natural Resources - Prefixes include AGEC (Agricultural Economics), ABEN (Agricultural and Biosystems Engineering), ASM (Agricultural Systems Management), AGRI (Agriculture), ANSC (Animal Science), ECON (Economics), ENT (Entomology), SAFE (Food Safety), MICR (Microbiology), PPTH (Plant Pathology), PLSC (Plant Sciences), RNG (Range Science), SOIL (Soil Science), VETS (Veterinary Science).

"Category" refers to the General Education categories (https://bulletin.ndsu.edu/academic-policies/undergraduate-policies/general-education/#genedcoursestext)

"Discipline" refers to the four CAFSNR disciplines which must be included in a General Agriculture curriculum. A discipline may be thought of as a prefix. Some prefixes can be combined to form a discipline. If a student chooses to have Agricultural Education as a second major, one of the disciplines may include the required education courses in the College of Human Development and Education.

Geography

Department Information

- **Department Location:**
  Stevens Hall
- **Department Phone:**
  701-231-8455
- **Department Web Site:**
  www.ndsu.edu/geosci/
- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/geography/

Geography Minor

Emphases in the Geography minor program are:

1. gaining an understanding of the geographic perspective, and
2. acquiring skills in the use of spatial analysis tools (such as geographic information systems (GIS), computer mapping, and other computer applications).

A Geography minor may be taken in conjunction with a variety of majors such as social science and secondary education. Minor requirements are 18 credits selected in consultation with a geography adviser in the Department of Geosciences. Students preparing for teaching geography in the secondary schools should follow the School of Education (https://www.ndsu.edu/education) curricula.

Geology

Department Information

- **Department Location:**
  Stevens Hall
- **Department Phone:**
  701-231-8455
- **Department Web Site:**
  www.ndsu.edu/geosci/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/geology/

Understanding the Earth's dynamics, composition, and environment is accomplished through an interdisciplinary curricula including geology, geography, physics, chemistry, mathematics, and soil science.

Opportunities for careers in the geosciences have never been better. Areas of environmental science, petroleum, mining, water and land resources, volcanology, paleontology, and glacial geology offer rewarding careers with a completed bachelor's degree. Many students continue study at the graduate level.

Geology Major

Curricula requirements include a departmental core of 45 credits, including year-long sequences in calculus, chemistry, and physics, as well as computer science.

A typical first year for all geology majors includes physical geology, the Earth through time, and year-long sequences in English, mathematics, and chemistry.

Geology Minor

A minor in Geology consists of at least 18 credits of geology courses selected in consultation with a Department of Geosciences adviser. Selected geography and soil science courses may be substituted for geology courses.

Environmental Geology Minor

As environmental stewardship becomes an increasingly important aspect of all career paths, the Environmental Geology minor complements and enhances a wide range of majors. Students interested in the Earth and the environment are invited to consider this rewarding and challenging minor. Geology majors may not minor in Environmental Geology.

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
GEOL 105 & 105L (Gen Ed Category S)	4	GEOL 106 & 106L (Gen Ed Category S)	4
MATH 165 (Gen Ed Category R)	4	CHEM 122 or 151 (Gen Ed Category S)	3

CHEM 121 or 150 (Gen Ed Category S)	3	CHEM 122L or 161 (Gen Ed Category S)	1
CHEM 121L or 160 (Gen Ed Category S)	1	MATH 166	4
ENGL 110 (Gen Ed Category C)	4	ENGL 120 (Gen Ed Category C)	3
	16		15

Second Year

Fall	Credits	Spring	Credits
GEOL 410	4	GEOL 422	3
GEOL 420 & GEOL 421	4	GEOL 423	1
GEOG 455	4	GEOL 412	3
Gen Ed Wellness	2	GEOL 350 & GEOL 303	4
		Gen Ed Humanities/Fine Arts and Global Perspectives	3
	14		14

Third Year

Fall	Credits	Spring	Credits
PHYS 211 or 251	3	PHYS 212 or 252	3
PHYS 211L or 251L	1	PHYS 212L or 252L	1
SOIL 444	3	GEOL 491 (Capstone)	2
GEOL 450	3	GEOL 301, 302, or 496	2
GEOL 457	4	Gen Ed Humanities/Fine Arts	3
ENGL 324	3	Gen Ed Social & Behavioral Science and Cultural Diversity	3
	17		14

Fourth Year

Fall	Credits	Spring	Credits
CSCI 122, 160, or 227	3	Electives	13
Gen Ed Social & Behavioral Science	3	College Humanities or Social Sciences	3
College Humanities or Social Sciences	3		
Electives	7		
	16		16

Total Credits: 122

German Studies

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7887
- **Department Email:**
  ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/modernlanguages/

- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/german-studies/

Broader in scope than the traditional minor which emphasizes linguistic competence, the German Studies minor combines systematic language study with courses in geography, history, civilization, and politics to enhance students' understanding of the global context of the language they have chosen to study. A languages studies minor requires 18 approved semester credits, including nine credits of language and culture studies beyond the intermediate level (German 311, 312 and a culture course in the language), a six-credit sequence in history, and an approved three-credit elective in Anthropology, Geography, or Political Science; study abroad is strongly encouraged.

Gerontology

Department Information

- **Department Location:**
  E. Morrow Lebedeff Hall 255
- **Department Phone:**
  701-231-8211
- **Department Web Site:**
  www.ndsu.edu/hde/undergraduate_studies/minors/
- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/gerontology/

A minor in Gerontology is sponsored through the College of Human Development and Education (https://www.ndsu.edu/hde) and the College of Arts, Humanities and Social Sciences (https://www.ndsu.edu/ahss). It provides students with an integrated understanding of the process of aging, aging services, and the aged in America. There are six basic areas of study. Students should follow the directions provided for each of the areas.

Global Business

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-8651
- **Department Web Site:**
  www.ndsu.edu/business/
- **Degrees Offered:**
  Offered as a second major only
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/global-business/

Global business is offered as a second major program of study only. Students may pursue Global Business after declaring and being admitted into one of the College of Business' primary professional programs of Accounting, Business Administration, Finance, Management, Management Information Systems, or Marketing (see admission requirements (http://bulletin.ndsu.edu/colleges/business) for *all* College of Business majors).

This second major combines global business courses with language training and an in-depth study abroad experience to qualify students for management positions in the diverse, multicultural, and global environment they will encounter in the future. It is not enough to simply learn about global business: students must be well-positioned for careers of trust and leadership in the global economy.

Health Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921

- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/health-education/

Health Education Major

The Health Education major emphasizes comprehensive health education and is designed to prepare students for careers in the field of school health education through the development of dispositions, knowledge and skills. Completing the degree requirements for a health education degree in the School of Education (https://www.ndsu.edu/education) certifies a graduate to teach health education at the secondary level. Students may choose to enrich their background by selecting a major in physical education. It is recommended that students apply to the School of Education in the spring semester of their third year in the program.

Double Major

It is strongly recommended that Health Education teaching majors double major in Physical Education.

Physical Education Major: For further information about the physical education teaching option, please refer to the Physical Education curriculum guide (p. 191) or contact the department adviser.

Plan of Study - Health Education

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	COMM 110	3
HNES 110*	3	ENGL 120	3
Humanities/Fine Arts	3	HDFS 135	3
PSYC 111	3	Science/Tech	3
Quantitative Reasoning	3	SOC 110	3
	16		15
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
EDUC 321	3	HNES 200 or 250*	3
EDUC 322	3	HNES 217*	3
Hum/Fine Arts	3	HNES 341	3
Science/Tech w lab	4	PSYC 210	3
Electives	3	PSYC 250 or HDFS 230	3
Complete Praxis Core Academic Skills Exam		Apply to the School of Education	
	16		15
Junior			
Fall	**Credits**	**Spring**	**Credits**
HNES 367*	3	EDUC 489	3
PSYC 212	3	HNES 345*	3
Science/Tech	3	ENGL 358	3
Electives	7	Electives	6
	16		15

Senior			
Fall	**Credits**	**Spring**	**Credits**
EDUC 451	3	EDUC 485	1
EDUC 481 (HE Section)	3	EDUC 487	9
EDUC 486	3	EDUC 488	3
HD&E 320	1		
Electives	5		
Apply for Student Teaching			
Complete Praxis PLT Exam			
Complete Praxis II Content Exam			
	15		13

Total Credits: 121

* Students must earn a "B" or better in all courses identified with an asterisk (*).

** Minimum 133 total credits for double major

*** Global Perspectives and Diversity requirements can be obtained through careful selection of Humanities/Fine Arts and/or Science/Technology categories.

Plan of Study - Health Education & Physical Education Double Major

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	COMM 110	3
HNES 110*	3	ENGL 120	3
Humanities/Fine Arts	3	HDFS 135	3
PSYC 111	3	HNES 255*	3
Quantitative Reasoning	3	Science/Tech w/Lab	4
		SOC 110	3
	16		19
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
EDUC 321	3	HNES 200 or 250*	3
EDUC 322	3	HNES 217*	3
HNES 211	1	HNES 341*	3
HNES 254	3	HNES 257	3
HNES 256	3	PSYC 210	3
Humanities/Fine Arts	3	Science/Tech	3
Science/Tech	3	Apply to the School of Education	
Complete Praxis Core Academic Skills Exam			
	19		18
Junior			
Fall	**Credits**	**Spring**	**Credits**
ENGL 358	3	EDUC 451 (PE Section)	3
HNES 301*	3	EDUC 489	3

HNES 336*	3	HNES 345*	3
HNES 367*	3	HNES 350*	3
PSYC 212	3	HNES 353*	3
	15		15

Senior			
Fall	**Credits**	**Spring**	**Credits**
EDUC 481 (HE Section)	3	EDUC 485	1
EDUC 481 (PE Section)	3	EDUC 487	9
EDUC 486	3	EDUC 488	3
HD&E 320	1		
HNES 461*	3		
PSYC 250 or HDFS 230	3		
Apply for Student Teaching			
Complete Praxis PLT Exam			
Complete Praxis II Content Exam			
	16		13

Total Credits: 131

* Students must earn a "B" or better in all courses identified with an asterisk (*)

** Minimum 133 total credits for double major

*** Global Perspectives and Diversity requirements can be obtained through careful selection of Humanities/Fine Arts and/or Science/Technology categories

History

Department Information

- **Department Location:**
  Minard Hall 422
- **Department Phone:**
  701-231-8654
- **Department Web Site:**
  ndsuhprs.org/ (http://ndsuhprs.org)
- **Degrees Offered:**
  B.A.; B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/history/

History Major

By engaging in the fascinating study of how people in the past understood their worlds, graduates from the Department of History, Philosophy, and Religious Studies will be prepared to comprehend and think critically about the present by understanding how it has been shaped by the past. In their studies they will learn how to evaluate the strengths and weaknesses of alternative explanations for historical events, how to interpret primary and secondary materials to form valid conclusions, how to analyze components of historical events, and how to synthesize and apply their knowledge in an original research project.

The Department of History, Philosophy, and Religious Studies offers both a B.A. and a B.S. degree in History. The B.A. degree requires the completion of two years of a modern language at the college level and is recommended for students desiring a rich liberal arts education or planning for graduate school or law school (see Bachelor of Arts Requirement using a Second Language (p. 855)). The B.S. degree does not have a modern language requirement but, instead, requires an appropriate minor. Students transferring to NDSU must complete at least 50 percent of their history credits at North Dakota State University. A History Education program of study also is offered between the Department of History, Philosophy, and Religious Studies and the School of Education (https://www.ndsu.edu/education).

History majors can prepare themselves for careers in secondary education by completing a double major with either a B.A. or B.S. in History with a second major in History Education. The department advises students to choose History as their primary major.

Lists of approved courses for the distribution and sequence requirements and courses recommended for History Education majors are at the department web site (https://www.ndsu.edu/history).

History Minor

Students who minor in History are required to complete nine credits of 100-200 level History courses and nine credits of 300-400 level History courses.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
HIST 101 or 103	3	HIST 102 or 104	3
ENGL 110	4	COMM 110	3
GE Social/Behavioral Requirement	3	ENGL 120	3
GE Quant. Reasoning	3	AHSS Humanities Requirement	3
GE Wellness	3	GE Science/Technology	3
		GE Science/Technology Lab	1
	16		16
Second Year			
Fall	**Credits**	**Spring**	**Credits**
HIST 135, 259, or 270	3	HIST 254	3
HIST 390	3	HIST 281	3
AHSS Fine Arts Requirement	3	GE Science/Technology	3
GE Science/Technology	3	GE Humanities/Fine Arts Req.	3
GE Social/Behavioral Sciences Req.	3	AHSS Social Sciences Req.	3
	15		15
Third Year			
Fall	**Credits**	**Spring**	**Credits**
HIST 450 (or Any European History Course)	3	HIST 421 (or Any US History Course)	3
HIST 470 (Any World History Course)	3	HIST 440 (or Any European History Course)	3
300-400 History Elective	3	Minor/Foreign Language	3
Minor/Foreign Language	3	Minor/Free Electives	6
Minor/Free Elective	3		
	15		15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
HIST 465 (Or Any European History Course)	3	300-400 Level History Elective	3
HIST 489	3	300-400 Level History Elective	3
Minor/Foreign Language	3	Minor/Foreign Language	3
300-400 Level History Electives	6	Minor/Free Electives	6
	15		15

Total Credits: 122

History Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.A.; B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/history-education/

Add overview info here.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 110	3	ENGL 120	3
ENGL 110	4	Quantitative Reasoning	3
Science & Technology	3	Wellness	2-3
Social/Behavioral Science	3	HIST 100-200 Elective/ Social/ Behavioral Science Gen Ed (HIST 101, 102, 103, 104, 135, 261, 270, or 271)	3
HIST 100-200 Elective/ Social/ Behavioral Science Gen Ed (HIST 101, 102, 103, 104, 135, 261, 270, or 271)	3	POLS/GEOG/ECON/SOC/ANTH/ PSYC Elective	3
	16		14-15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 321	3	EDUC 322	3
Science & Technology	3	Science & Technology w/Lab	4
HIST 100-200 Elective/ Culural Diversity Gen Ed (HIST 135, 261, or 271)	3	Social/Behavioral Science	3
HIST 300-400 Widening Horizons Elective	3	HIST 300-400 Elective/ Global Perspective Gen Ed (HIST 351 or 355)	3
POLS/GEOG/ECON/SOC/ANTH/ PSYC Elective	3	HIST US 300-400 Elective (HIST 415, 420, or 428)	3
Complete Praxis Core Academic Skills Exam		Apply to the School of Education	
	15		16

Third Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 451	3	EDUC 489	3
HIST 300-400 Elective	3	HIST 300-400 Elective	3
Hist European 300-400 Elective	3	HIST European 300-400 Elective	3
HIST US 300-400 Elective (HIST 415, 420, or 428)	3	HIST 390	3
POLS/GEOG/ECON/SOC/ANTH/ PSYC Elective	3	Elective	3
	15		15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 481	3	EDUC 485	1
EDUC 486	3	EDUC 487	9
HIST 300-400 Widening Horizons Elective	3	EDUC 488	3
HIST 489	3		
Elective	4		
Apply for Student Teaching			
Complete Praxis PLT Exam			
Complete Praxis II Content Exam			
	16		13

Total Credits: 120-121

Horticulture

Department Information

- **Department Location:**
  Loftsgard Hall 166
- **Department Phone:**
  701-231-7971
- **Department Email:**
  ndsu.plantsciences@ndsu.edu
- **Department Web Site:**
  www.ag.ndsu.edu/plantsciences/undergraduate/horticulture
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/horticulture/

Horticulture is the science and art of producing, improving, marketing, and using fruits, vegetables, flowers, turf and ornamental plants. Horticulture encompasses the design and planting for landscapes, parks, highways, and public facilities, including interiorscapes, in rural, suburban, and urban areas. It includes skills for management of greenhouse, nursery, garden center, seed, fruit, vegetable, biotechnology, urban forests, golf courses, sports facilities, and specialty crop enterprises, as well as floral design and flower shops. Instruction and study includes culture, propagation, processing, production, marketing, design and management.

The Horticulture major is a four-year curriculum leading to the B.S. degree. Students also may minor in Horticulture. Prospective students should consult with horticulture faculty regarding programs and options so their educational needs may best be fulfilled. Master of Science and Ph.D. degree programs also are available. For more complete details, see the Graduate Bulletin (p. 860).

Curriculum Options

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

- **Horticulture Science:** This option is for students who plan to continue formal graduate school education leading to careers in research, teaching, and extension.
- **Landscape Design:** This option is for students interested in planning, designing, and installing landscape plantings for functional and aesthetic purposes (a 19-credit minor in landscape architecture is required).
- **Landscape Management**: This option is for students interested in management of designed outdoor environments including public parks, private gardens, botanic gardens as well as commercial and residential landscapes.
- **Production-Business:** This option is for students who wish to grow, market, and process horticultural crops, for example, nursery, greenhouse and field production of fruit, vegetable or ornamental crops.
- **Sports and Urban Turfgrass Management**: This option is for students who desire a career in the management of quality turf in such areas as golf courses, sports facilities, parks, as well as commercial and residential lawns.
- **Urban Forestry and Parks:** This option is for students who desire a career in the management of urban forests and park-like areas, including arboreta, botanic gardens as well as commercial and residential properties.

Special Opportunities

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

Horticulture and Forestry Club: The goal of this club is to provide opportunities to enjoy horticulture and forestry at NDSU outside of the classroom. The club organizes field trips to botanical gardens, arboreta, trade shows, parks and other horticultural sites. Other activities include attending regional and national conferences and competitions. Club members have the opportunity to be involved with growing and marketing horticultural plants for their plant sale fundraisers.

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

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
PLSC 189	1	ENGL 120	3
ENGL 110	4	BIOL 151	3
MATH 103	3	SOIL 210	3
BIOL 150	3	CSCI 114	3
Humanities/Fine Arts	3	Humanities/Fine Arts	3
	14		15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
CHEM 121 & 121L	4	CHEM 122	3
PLSC 210	3	ECON 105, 201, or 202	3
PLSC 211	1	Social/Behavioral Science	3
PLSC 355	3	Electives	6
Elective	5		
	16		15

Third Year					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
PLSC 365	2	PPTH 455 or 457	3	PLSC 496 or 494	3
PPTH 324	3	PLSC 323	3		
ENGL 320, 321, or 324	3	PLSC 380	3		
STAT 330	3	Electives	6		
Electives	4				
	15		15		3
Fourth Year					
Fall	**Credits**	**Spring**	**Credits**		
ENT 350	3	PLSC 457	3		
Electives	12	PLSC 491	4		
		Electives	8		
	15		15		

Total Credits: 123

Hospitality and Tourism Management

Department Information

- **Department Location:**
  E. Morrow Lebedeff Hall 178
- **Department Phone:**
  701-231-8604
- **Department Web Site:**
  www.ndsu.edu/adhm/hospitality-tourism/about.html
- **Degrees Offered:**
  B.A.; B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/hospitality-tourism-management/

Hospitality and Tourism Management

Are you a people-person? Are you passionate about customer service and enriching people's experiences? Do you have exceptional work ethic and enjoy a fast-paced environment? If so, Hospitality and Tourism Management (HTM) is a great field for you!

The mission of the HTM program at NDSU is to develop effective and efficient leaders in a very dynamic and exciting field. Our students learn and develop leadership skills by completing coursework that increases knowledge of the industry, develops people management skills, and enhances problem-solving abilities while instilling a sense of responsibility and professionalism.

We are the only four-year HTM program in North Dakota, accredited by the Accreditation Commission for Programs in Hospitality Administration (ACPHA). The program has undergone this process to ensure students receive a quality education. The ACPHA guidelines and standards help us pursue excellence in the area of hospitality administration.

- Our program incorporates a solid foundation of general education courses vital in developing a well-rounded professional.
- All students complete a core of fundamental courses on the management of resources such as people, materials, money, technology and time in a hospitality and tourism setting.
- Upper-division courses concentrate on project-based, critical evaluation and production of quality services in hospitality and tourism operations.
- Students choose professional electives in areas such as food and beverage, casino operations, professional club management, resorts, and convention and meeting planning.
- A 24-credit minor in Business Administration is required with this major. The minor provides a strong business background on which we build depth of knowledge concerning the specifics of marketing and management in the hospitality industry.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman					
Fall	**Credits**	**Spring**	**Credits**		
ADHM 140	3	ACCT 102	3		
CSCI 114 or MIS 116	3	ADHM 141	3		
ENGL 110	4	ENGL 120	3		
Social/Behavioral Science	3	Humanities/Fine Arts	3		
Wellness	2-3	Quantitative Reasoning	3		
	15-16		15		
Sophomore					
Fall	**Credits**	**Spring**	**Credits**		
COMM 110	3	ADHM 360	3		
CHEM 117 or 121	3	ECON 105	3		
ADHM 241	3	HNES 141	1		
HTM Option/Elective	3	Science/Tech w lab	4		
HTM Option/Elective	3	Humanities/Fine Arts	3		
	15		14		
Junior					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
MGMT 320	3	ADHM 381	3	ADHM 496	3
MRKT 320	3	ADHM 435	3		
HD&E 320	1	MGMT 450	3		
HNES 261	3	Upper Div Writing	3		
HNES 261L	2	HTM Op/Elec	3		
Elective	3				
	15		15		3
Senior					
Fall	**Credits**	**Spring**	**Credits**		
ADHM 404	3	ADHM 479	3		
ADHM 404L	2	Business Elective	3		
ADHM 467	3	HTM OP/Elective	3		
Business Elective	3	HTM Op/Elective	1-3		
Business Elective	3	Electives as needed	3		
Elective	3				
	17		13-15		

Total Credits: 122-125

Human Development and Family Science

Department Information

- **Department Location:**
  E. Morrow Lebedeff Hall 283
- **Department Phone:**

701-231-8268

- **Department Web Site:**
  www.ndsu.edu/hdfs/
- **Degrees Offered:**
  B.A.; B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/human-development-family-science/

Human Development and Family Science Major

At the undergraduate level, the department offers a curriculum leading to a Bachelor of Science or Bachelor of Arts degree through three options: adult development and aging; child and adolescent development; and family science. Each of these options can be completed by itself or can be paired with another degree in one of our dual degree programs. Child development can be paired with elementary education, and family science and adult development and aging can be paired with social work. Information on these dual degree programs is on a separate bulletin page. Each of the three options can also be combined with a master's degree program in one of our combined/accelerated master's programs. Child and adolescent development can be combined with the master's program in youth development; family science can be combined with the master's program in family financial planning; and adult development and aging can be combined with the master's program in gerontology. Information on these combined/accelerated degree programs is below and on separate tabs.

Human Development and Family Science majors are prepared to work in a variety of areas related to children, aging adults, and families. Employment opportunities include parent and family life educators, extension agents, child protection service professionals, financial counselors, nursing home activity directors, credit specialists, and directors of child care licensing.

Coursework provides students with an ecological approach to the study of human development and families with emphasis on the interactions of individuals, families, and the broader environmental context. Allowing students to select electives within the department to specialize in careers of interest provides flexibility.

Note: *All credits in Human Development and Family Science must have grades of 'C' or better.*

Adult Development and Aging Option

The Adult Development & Aging option prepares students for careers involving direct and support services for adults of various ages as well as graduate studies. A minor outside the department is required.

Child and Adolescent Development Option

This option prepares students for careers involving direct and support services for children and adolescents as well as graduate studies. A minor outside the department is required.

Family Science Option

This option allows students to take a concentration of courses in family science or family economics in preparation for careers in direct and support services for families as well as graduate studies. A minor outside the department is required.

Accelerated Master's Degree Options

Students with a 3.5 cumulative GPA after 60 credits may apply to enter the Accelerated Master's degree program associated with their undergraduate degree option. Students in this program can complete both the bachelor's and master's degree in HDFS in only 5 years. Students in the Adult Development and Aging option may enter the master's option in Gerontology. Students in the Child and Adolescent Development option may enter the master's option in Youth Development. Students in the Family Science option may enter the master's option in Family Financial Planning. All master's degree courses are taught online, and all are charged tuition at the higher Great Plains IDEA per-credit rate (https://www.ndsu.edu/dce/degrees/great_plains_idea_program_tuition_fees/#gpideatuition). However, under the accelerated program, students pay less tuition overall than they would if they completed each degree in separate programs.

Human Development and Family Science Minor

The Human Development and Family Science minor is especially appropriate for students majoring in the social or behavioral sciences and other students planning careers that involve work with people. The minor requires 18 credits, including HDFS 135 (Family Science), HDFS 230 (Lifespan Development), and 12 credits of HDFS electives. Of the 12 credits of electives, at least nine credits must be upper division (i.e., 300 or 400 level) and no more than three credits may be in field experience (HDFS 496).

Plans of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Human Development and Family Science

Freshman			
Fall	**Credits**	**Spring**	**Credits**
HDFS 135	3	HDFS 230	3
ENGL 110	4	COMM 110	3
HD&E 189	1	ENGL 120	3
PSYC 111	3	Wellness Gen Ed	2
Elective (Math 103)	3	Humanities & Fine Arts Gen Ed	3
	14		14
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
CSCI 114 or MIS 116	3	HDFS 250	3
SOC 110	3	Humanities & Fine Arts Gen Ed	3
Science & Tech Gen Ed w/ Lab	4	Science & Tech Gen Ed	3
Electives	6	STAT 330	3
		Elective	3
	16		15
Junior			
Fall	**Credits**	**Spring**	**Credits**
HDFS Option Course	3	HD&E 320	1
HDFS 300-400 level elective	3	HDFS Option Course	3
HDFS 300-400 level elective	3	HDFS 300-400 level elective	3
Elective for Minor	3	Elective for Minor	3
ENGL 320, 325, 358, or 459	3	Elective (300-400 level)	3
		Elective	3
	15		16
Senior			
Fall	**Credits**	**Spring**	**Credits**
HDFS 475	3	HDFS Option Course	3
HDFS 353	3	HDFS 496	2
HDFS 496	3	Elective for Minor	3
Elective for Minor	3	Elective for Minor	3
Elective for Minor	3	Electives	4
	15		15

Total Credits: 120

HDFS Accelerated Master's Option in Gerontology

Undergraduate students in the Adult Development and Aging option can earn a Master's degree in HDFS in the Gerontology option by completing just one additional year of classes. 15 credits of the undergraduate curriculum are replaced by 15 graduate credits.

Freshman					
Fall	**Credits**	**Spring**	**Credits**		
HDFS 135	3	HDFS 230	3		
ENGL 110	4	COMM 110	3		
HD&E 189	1	ENGL 120	3		
PSYC 111	3	Wellness Gen Ed	2		
Elective (Math 103)	3	Humanities & Fine Arts Gen Ed	3		
	14		14		
Sophomore					
Fall	**Credits**	**Spring**	**Credits**		
CSCI 114 or MIS 116	3	HDFS 250	3		
SOC 110	3	Humanities & Fine Arts Gen Ed	3		
Science & Tech Gen Ed w/ Lab	4	Science & Tech Gen Ed	3		
Electives	6	STAT 330	3		
		Elective	3		
	16		15		
Junior					
Fall	**Credits**	**Spring**	**Credits**		
HDFS 360	3	HD&E 320	1		
ENGL 320, 325, 358, or 459	3	HDFS 480	3		
HDFS 353	3	Elective for Minor	6		
Elective for Minor	6	Elective	6		
	15		16		
Senior					
Fall	**Credits**	**Spring**	**Credits**		
HDFS 475	3	HDFS 721	3		
HDFS 496	2	HDFS 682	3		
HDFS 723	3	HDFS 7XX Elective	3		
Elective for Minor	3	Elective toward Minor	3		
Elective	4				
	15		12		
Fifth Year					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
HNES 652	3	HDFS 794	4	HDFS 729	3
HDFS 760	3	HDFS 722	3		
HDFS 794	2	ADHM 705	3		
HDFS 7XX Elective	3				
	11		10		3

Total Credits: 141

Degree Notes:

- How to Apply to the Program (https://www.ndsu.edu/fileadmin/facultysenate/acadaffairs/accelerated-programs.pdf)
- More Information About the Gerontology Master's Option (https://www.ndsu.edu/dce/degrees/graduate/mshdfs_gerontology)

HDFS Accelerated Master's Option in Family Financial Planning

Undergraduate students in the Family Science option can earn a Master's degree in HDFS in the Family Financial Planning option by completing just one additional year of classes. Fifteen credits of the undergraduate curriculum are replaced by 15 graduate credits.

Freshman					
Fall	**Credits**	**Spring**	**Credits**		
HDFS 135	3	HDFS 230	3		
ENGL 110	4	HDFS 242	3		
HD&E 189	1	COMM 110	3		
PSYC 111	3	ENGL 120	3		
Elective (Math 103)	3	Humanities & Fine Arts Gen Ed	3		
Elective	2				
	16		15		
Sophomore					
Fall	**Credits**	**Spring**	**Credits**		
CSCI 114 or MIS 116	3	HDFS 250	3		
SOC 110	3	Humanities & Fine Arts Gen Ed	3		
Science & Tech Gen Ed w/ Lab	4	Science & Tech Gen Ed	3		
Electives	6	STAT 330	3		
		Elective	3		
	16		15		
Junior					
Fall	**Credits**	**Spring**	**Credits**		
HDFS 357	3	HD&E 320	1		
ENGL 320, 325, 358, or 459	3	HDFS 462	3		
Elective for Minor	9	Elective for Minor	6		
		Elective	5		
	15		15		
Senior					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
HDFS 475	3	HDFS 496	2	HDFS 763	3
HDFS 353	3	HDFS 677	3	HDFS 771	3
HDFS 770	3	HDFS 740	3		
Elective for Minor	3	HDFS 765	3		
Elective	3				
	15		11		6
Fifth Year					
Fall	**Credits**	**Spring**	**Credits**		
HDFS 762	3	HDFS 794	6		
HDFS 741, 767, or 768	3	HDFS 769	3		
HDFS 766	3				
	9		9		

Total Credits: 142

Degree Notes:

- How to Apply to the Program (https://www.ndsu.edu/fileadmin/facultysenate/acadaffairs/accelerated-programs.pdf)
- More Information About the Family Financial Planning Master's Option (https://www.ndsu.edu/dce/degrees/graduate/mshdfs_famfinplanning)

HDFS Accelerated Master's Option in Youth Development

Undergraduate students in the Child and Adolescent Development option can earn a Master's degree in HDFS in the Youth Development option by completing just one additional year of classes. Fifteen credits of the undergraduate curriculum are replaced by 15 graduate credits.

Freshman					
Fall	**Credits**	**Spring**	**Credits**		
HDFS 135	3	HDFS 230	3		
ENGL 110	4	COMM 110	3		
HD&E 189	1	ENGL 120	3		
PSYC 111	3	Wellness Gen Ed	2		
Elective (Math 103)	3	Humanities & Fine Arts Gen Ed	3		
	14		14		
Sophomore					
Fall	**Credits**	**Spring**	**Credits**		
CSCI 114 or MIS 116	3	HDFS 250	3		
SOC 110	3	Humanities & Fine Arts Gen Ed	3		
Science & Tech Gen Ed w/ Lab	4	Science & Tech Gen Ed	3		
Electives	6	STAT 330	3		
		Elective	3		
	16		15		
Junior					
Fall	**Credits**	**Spring**	**Credits**		
HDFS 340	3	HD&E 320	1		
ENGL 320, 325, 358, or 459	3	HDFS 330	3		
Elective for Minor	9	Elective for Minor	6		
		Elective	4		
	15		14		
Senior					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
HDFS 475	3	HDFS 496	2	HDFS 714	3
HDFS 710	1	HDFS 353	3	HDFS 7XX Elective	3
HDFS 713	3	HDFS 711	3		
Elective for Minor	3	HDFS 712	3		
Elective	6	HDFS 715	3		
	16		14		6
Fifth Year					
Fall	**Credits**	**Spring**	**Credits**		
HDFS 716	3	HDFS 717	3		
HDFS 718	3	HDFS 794	5		

HDFS 719	3	
	9	8

Total Credits: 141

Degree Notes:

- How to Apply to the Program (https://www.ndsu.edu/fileadmin/facultysenate/acadaffairs/accelerated-programs.pdf)
- More Information About the Youth Development Master's Option (https://www.ndsu.edu/dce/degrees/graduate/ms_hdfsyouthdev)

Industrial Engineering and Management

Department Information

- **Department Location:**
  Civil & Industrial Engineering 202
- **Department Phone:**
  701-231-9818
- **Department Web Site:**
  www.ndsu.edu/ime/
- **Degrees Offered:**
  B.S.I.E.Mgt.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/industrial-engineering-management/

Industrial Engineering & Management Major

Industrial Engineering and Management (IE&M) provides good employment and growth opportunities for people with the aptitude and interest for careers that blend technology and human resource. First, being an engineering program, it provides a blend with the traditional content of mathematics, sciences, engineering analysis, product/process design, and effective operation/system management. Beyond the basics, this program also challenges students to integrate resources with technology and provide seamless integration and flow of information, money, and knowledge. In addition to scientific principles and technological systems, IE&M students study social systems, cost analysis, facilities and other elements of the business enterprise to understand the impact of these elements on business organization. The "engineering" and "management" pieces are blended and integrated to provide better understanding of managing technical and societal system.

IE&M graduates are in high demand across a wide spectrum of industries and therefore, provide more flexibility and options to choose industry type of their choice to start new career. In recent years, the most active employers have represented manufacturing, healthcare, airline, entertainment industry, transportation, postal, warehousing and distribution, information systems, software, facilities development and consulting industries, as well as many of the production sectors that have been the traditional concentration for industrial engineers. IE&M graduates are sought after for positions in design of products, processes, procedures, facilities, and systems; material handling, distribution, warehousing, and logistics; project and organizational management; financial modeling; and technological training.

Just as the profession requires a blend of scientific, technological and humanistic skills, student learning in IE&M is an integrated process. The discipline-specific courses place the student in position to experience many elements of real situations in industry and commerce. Moreover, the program has been nationally cited for integrating design across all levels, with freshmen and juniors or sophomores and seniors often working together.

The Industrial Engineering and Management program at NDSU is accredited by the Engineering Accreditation Commission of ABET (**www.abet.org**). The curriculum is designed to produce baccalaureate-level graduates who are well prepared to accept engineering positions in industry and government or to pursue advanced degree studies. Graduates of the IE&M program will be able to:

1. Have established successful career in industrial and manufacturing engineering and beyond by demonstrating professionalism and ownership of their work with increasing responsibility and positive impact.
2. Have acquired new knowledge and expertise through professional development opportunities and/or higher education as a part of their life-long learning mission and professional growth.
3. Have demonstrated commitment to uphold higher ethical and professional standards at workplace and appreciate the impact of diverse opinions and solutions in a global/societal context.
4. Be productive citizen by committing to serve their profession and communities at appropriate levels.

Industrial Engineering & Management Areas of Emphasis

Students majoring in Industrial Engineering and Management may prepare for specific career choices by careful use of the technical electives included in the IE&M major. All Industrial Engineering and Management majors choose a minimum of three technical elective courses. It is suggested

that students confer with their academic adviser for assistance in choosing the most appropriate technical elective courses. Particular areas of emphasis may be selected in the following special interests: production and operations management, reliability engineering, quality engineering and management, healthcare engineering and management, advanced manufacturing, supply-chain and logistics management, and lean manufacturing.

These topical areas are also available for post-graduate study, leading to the Master of Science in Industrial Engineering and Management, Master of Science in Manufacturing Engineering, and the Doctor of Philosophy in Industrial and Manufacturing Engineering degrees. For complete details, see the Graduate Bulletin (p. 860) online.

Selective Admission

The Department of Industrial and Manufacturing Engineering has a selective admission policy. To be admitted to the program, freshman applicants must have a minimum high school GPA of 2.5 and a composite ACT score of 21 or higher. Transfer students, whether from another university or from another department at NDSU, must have an institutional grade point average of at least 2.30.

Industrial Engineering and Management Minor

Students majoring in any engineering discipline may elect a minor in Industrial Engineering and Management. These optional studies offer engineering students the opportunity to add important career-enhancing skills to their technological competencies. The elected courses in an IE&M minor add skills for integrating technology and resources within the complex of people, technology, machinery and information that make up the successful modern business enterprise. Students completing this minor will achieve better understanding of organizational and management processes and will be better prepared to work in the multifunctional teams crucial to success in industry.

Minor in IE&M require a minimum of 18 credits. The foundation requirements for the IE&M minor are:

- IME 111 Introduction to Industrial and Manufacturing Engineering
- IME 311 Work/Station Design and Measurement

The remaining 12 credits must be selected from a list of approved IME 300- and 400-level courses for which prerequisites are in place.

Interested students are encouraged to visit the IME Department for advice on course selection to best suit their career interests. Students must complete the graduation requirements for another engineering major before the designation of the IE&M minor will be placed on their transcripts.

Industrial Engineering & Management Sequence for Non-Majors

The practices and procedures learned in the Industrial Engineering & Management major are universally applied in public and private organizations of all kinds. IE&M courses are available as electives for students majoring in other programs including engineering, computer science, mathematics, sciences, business administration, cereal science, and agricultural economics. Courses recommended for non-majors are:

Code	Title	Credits
IME 311	Work/Station Design and Measurement	3
IME 440	Engineering Economy	2-3
IME 450	Systems Engineering and Management	3
IME 451	Logistics Engineering and Management	3
IME 452	Integrated Industrial Information Systems	3
IME 453	Hospital Management Engineering	3
IME 455	Management of People Systems	2
IME 456	Program and Project Management	3
IME 460	Evaluation of Engineering Data	3
IME 461	Quality Assurance and Control	3
IME 462	Total Quality In Industrial Management	3
IME 463	Reliability Engineering	3
IME 470	Operations Research I	3
IME 480	Production and Inventory Control	3
IME 482	Automated Manufacturing Systems	3
IME 485	Industrial and Manufacturing Facility Design	3

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
CHEM 121 & 121L	4	ENGL 120	3
ENGL 110	4	IME 111	3
MATH 165	4	MATH 166	4
COMP SCI ELECTIVE (Select from approved list of computer science electives)	3	ME 212	3
GEN ED Wellness	2	ME 221	3
		CHEM 122	3
	17		19
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
COMM 110	3	IME 311	3
IME 330	3	IME 440	2-4
MATH 129	3	MATH 266	3
MATH 259	3	PHYS 252 & 252L	5
ME 222	3	ENGR SCI ELECTIVE (Select from approved list of electives)	3
GEN ED Humanities/Fine Arts and Global Perspectives	3		
	18		16-18
Junior			
Fall	**Credits**	**Spring**	**Credits**
IME 456	3	IME 461	3-4
IME 460	3	IME 470	3
ENGL 321	3	IME 472	3
ENGR SCI ELECTIVE (Select from approved list of electives)	3	ENGR SCI ELECTIVE (Select from approved list of electives)	3
GEN ED Humanities/Fine Arts	3	GEN ED Social & Behavioral Sci and Cultural Diversity	3
	15		15-16
Senior			
Fall	**Credits**	**Spring**	**Credits**
ENGR 402	1	IME 450	3
IME 480	3	IME 485	3
IME 482	3	IME 489	3
ENGR SCI ELECTIVE (Select from approved list of electives)	3	TECHNICAL ELECTIVE (Select from approved list of electives)	3
GEN ED Social & Behavioral Science	3	TECHNICAL ELECTIVE (Select from approved list of electives)	3
TECHNICAL ELECTIVE (Select from approved list of tech electives)	3		
	16		15

Total Credits: 131-134

Interior Design

Department Information

- **Department Location:**
  E. Morrow Lebedeff Hall 178
- **Department Phone:**
  701-231-8604
- **Department Web Site:**
  www.ndsu.edu/adhm/interior-design/about.html
- **Degrees Offered:**
  B.A.; B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/interior-design/

Interior Design Major

A professional interior designer is one who is qualified by education, examination, and experience to identify, research and creatively solve problems relative to the function and quality of people's interior environments. The course of study in interior design leads to a first professional degree.

Students pursue courses in which creative and technical skills are applied within a structure to achieve the built interior environment. Design solutions are functional, enhance the quality of life of occupants, and are aesthetically pleasing while adhering to code and regulatory information. Design solutions produce, protect, and enhance the health, safety and welfare of the public. Students learn how to approach design problems through a methodology that includes data gathering, product specification, identification of details, contractual documents, and design business procedures.

The first two years of the program introduces the fundamentals of design, visual and technical communication techniques (including drafting, CADD, perspective drawing, model building, 3D modeling, and rendering), and theoretical and practical applications (including anthropometrics, ergonomics, interior design technology, interior materials, and color theory). The interior design profession is exceedingly complex, and collaborating with design professionals and related disciplines in a team approach to problem solving is routine practice. Beginning their first year through their final semester, students interact with professionals during industry tours, critiques, and guest speaking events providing a direct connection to the interior design profession.

Upper-division course work is focused on a series of integrated studio experiences and supports courses including history, professional practice, building information modeling, and interior systems. The studio experience culminates in a capstone project. Studio experiences require that each student be exposed to a variety of projects at several different levels of complexity and different client project goals.

NDSU interior design students are required to complete a field experience between the third and fourth year of the program. Students accept a variety of positions throughout the United States. In the past few years students have completed field experiences in cities such as Los Angeles, Minneapolis, Denver, Florida, New York, Ireland, and Shanghai (China).

Laptop computers are required equipment for all first-year students beginning the spring semester. These computers need to be built to operate industry specific programs. Refer to the interior design program website for computer specifications (https://www.ndsu.edu/adhm/interior-design/equipment.html).

Admission into second-year interior design courses requires a 3.0 institutional minimum cumulative grade-point average and a minimum grade of 'C' in all major core requirements. Admission into the second-year of the interior design program is also based on the review of a completed application and letter of intent that demonstrates professional and academic interest. This is submitted during the spring semester of the student's first year in the interior design program. Students must maintain the 3.0 institutional minimum cumulative GPA and earn a grade of 'C' or better in all major core requirements throughout the remainder of the program. Transfer students entering the interior design program should contact the program coordinator to review previously completed interior design or related course work.

The interior design program at NDSU is accredited by the Council for Interior Design Accreditation and the National Association of Schools of Art and Design.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman					
Fall	**Credits**	**Spring**	**Credits**		
ADHM 151	3	ADHM 162	3		
ADHM 160	1	ADHM 261	3		
ADHM 161	3	COMM 110	3		
ENGL 110	4	ENGL 120	3		
Social/Behavioral Science	3	Quantitative Reasoning	3		
Wellness	2				
	16		15		
Sophomore					
Fall	**Credits**	**Spring**	**Credits**		
ADHM 251	3	ADHM 253	3		
ADHM 264	2	ADHM 363	3		
ADHM 365	3	ADHM 368	2		
ART 111, 210, or 211	3	ADHM 491	1		
Science/Tech w/Lab	4	CSCI 114 or MIS 116	3		
		Science/Tech	3		
	15		15		
Junior					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
ADHM 300	1	ADHM 316	3	ADHM 496	3
ADHM 315	3	ADHM 353	3		
ADHM 351	3	HD&E 320	1		
ADHM 460	3	Social/Behavioral Sci	3		
ADHM 461	3	Minor Course	3		
Minor Course	3	Minor Course	3		
	16		16		3
Senior					
Fall	**Credits**	**Spring**	**Credits**		
ADHM 366 & ADHM 367	4	ADHM 452	6		
ADHM 450	3	ADHM 491	1		
Upper Div Writing	3	Minor Course	3		
Minor Course	3	Minor Course	3		
Minor Course as needed	3	Minor Course as needed	3		
	16		16		

Total Credits: 128

* **Minor Options:** One of the following minors is required: Art; Business; Hospitality and Tourism Management; Apparel, Retail Merchandising and Design; Foreign Language (French, German, Spanish); Communication; History; Gerontology; Emergency Management; Natural Resource Management; other minor options may be approved by interior design faculty.(Total Credits required to complete minors will vary).

International Studies

Department Information

- **Department Location:**
  Minard Hall

- **Department Phone:**
  701-231-8845
- **Department Web Site:**
  https://ndsu-studyabroad.applicationgateway.com/index.cfm?FuseAction=Abroad.ViewLink&Parent_ID=0&Link_ID=84ED8C0B-26B9-564D-D6D3F9968C0D3616
- **Degrees Offered:**
  Offered as a second major only
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/international-studies/

The International Studies major is a secondary major that is offered concurrently with a student's primary program of study. This program provides students with the opportunity to internationalize their major by combining special requirements to obtain the international studies major with their academic field of study. Students complete course work that integrates a senior project, demonstrate proficiency in a foreign language, and participate in an experience abroad to complete a second major in International Studies.

Courses

In addition to the courses required for the primary major, students seeking the International Studies major are required to take courses that have an international focus. These include a 15-credit core and nine credits of electives that will be chosen with the help of the student's adviser. Work or study abroad experience, as well as an integrative senior project that ties international study to the primary degree also are required.

Languages

Knowledge of a foreign language is an important part of the program. At NDSU students may study French, German, and Spanish. Additional language study is available through the Tri-College University in languages such as Japanese, and Chinese. Foreign language proficiency equivalent to completion of two years of college language study is required. This requirement may be met either through appropriate course work or through a testing procedure in the Department of Modern Languages (https://www.ndsu.edu/modernlanguages).

Experience Abroad

An important part of the International Studies major is participation in a study, work, or research experience abroad for at least 10 consecutive weeks in duration. Assistance with finding an overseas study program is available in the Office of International Programs (https://www.ndsu.edu/international).

Selective Admission

To be eligible to participate in the International Studies major, students must have sophomore standing with a minimum grade-point average of 2.50. Eligible students also must have initiated advanced level course work in their academic major and completed the first year or equivalent of their foreign language study. Additional information about the International Studies major and curriculum requirements are available through the department of a student's academic major, the college International Studies adviser, the Department of Modern Languages (https://www.ndsu.edu/modernlanguages), and the Office of International Programs (https://www.ndsu.edu/international).

Journalism

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7705
- **Department Web Site:**
  www.ndsu.edu/communication/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/journalism/

Journalism is a 45-credit major offered by the Department of Communication. Undergraduate majors may choose from professional emphases in print journalism or broadcasting. Students interested in pursuing an undergraduate degree offered by the Department of Communication must first complete all courses and requirements associated with the pre-communication preparation designation. Once all pre-communication preparation courses and requirements are met, the student completes and submits the transition form, available on the department's Blackboard site, to the department's academic advisor. After verification of accuracy, the student is accepted into the professional program and can continue pursuing a degree in the Department of Communication.

Pre-Communication Preparation

Students must complete 19 credits of selected courses with a 3.0 cumulative GPA or above to become a journalism major. The courses are COMM 110; COMM 112; COMM 114; COMM 189; COMM 212; COMM 214; and ENGL 120. Pre-communication preparation courses may be retaken only once.

Journalism Major

Students majoring in journalism may earn a Bachelor of Science degree (includes an approved minor) or a Bachelor of Arts degree (includes a modern language proficiency) upon completion of all pre-communication preparation courses and requirements. Students will select one of two tracks. The print track will orient students to the principles and practices of news reporting and writing as both a practice and field of study. The broadcasting track will introduce students to the principles and practices of TV production and broadcasting.

Journalism Minor

Many other majors offered at North Dakota State University can be greatly enhanced by a journalism minor. The 21-credit minor includes a nine-credit core and 12 credits of communication professional specialization.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 112	3	COMM 110	3
COMM 114	3	ENGL 120	3
COMM 189	1	Global Perspectives GE	3
ENGL 110 (or placement)	4	Humanities/Arts GE	3
Quantitative Reasoning GE	3	Science/Technology GE	3
Wellness GE	2	Science/Technology Lab GE	1
	16		16
Second Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 200	3	COMM 320	3
COMM 212	3	Major Elective	3
COMM 220	3	Minor or Language Coursework	3
Minor or Language Coursework	3	Humanities/Arts GE	3
Science/Technology GE	3	Science/Technology GE	3
	15		15
Third Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 310	3	Major Elective	3
COMM 496	3	Major Elective	3
Major Elective	3	Minor or Language Coursework	3
Minor or Language Coursework	3	Minor or Language Coursework	3
Upper Division Writing	3	AHSS Requirement	3
	15		15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 431	3	COMM 465	3
Major Elective	3	Major Elective	3
Minor or Language Coursework	3	Minor or Language Coursework	3

AHSS Requirement	3	Additional Coursework or Internship	6
Additional Coursework or Internship	3		
	15		15

Total Credits: 122

Landscape Architecture

Department Information

- **Department Location:**
  Renaissance Hall
- **Department Phone:**
  701-231-6151
- **Department Email:**
  ndsu.ala@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/ala/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/landscape-architecture/

The Landscape Architecture program is one of approximately 63 accredited programs in the United States. The curriculum is reviewed periodically by the nationally organized Landscape Architecture Accreditation Board (LAAB) and has been fully accredited since 1991. In 2019 we anticipate having the accreditation visit for our newly formed Master of Landscape Architecture Program. NDSU offers a 5-year first-professional Master of Landscape Architecture degree program housed in Klai Hall in downtown Fargo. Most students entering the graduate program in landscape architecture come directly from the NDSU pre-professional Bachelor of Environmental Design program. The curriculum includes field trips to various domestic destination. Both traditional and digital media are emphasized. An optional semester abroad, plus foreign study tours during summers are offered.
Landscape architects provide a wide variety of professional services for individual clients, organizations, corporations, and government agencies. They are involved at every phase of the development of a site, from the initial discussion of ideas with the client through the supervision of construction for the project.
Master planning of parks, zoos, golf courses, playgrounds, and recreation areas are familiar projects for landscape architects. They may also design multifunctional areas for urban renewal projects, college campuses, industrial parks, new communities, natural areas, reclaimed lands, and wetlands. Besides designing sites, landscape architects often select building locations, prepare cost estimates, initiate long-range planning studies, determine utility corridors, and prepare environmental impact statements for future construction. Whether specializing within a large firm of landscape architects or working in a small professional office, the landscape architect is often collaborating with other professionals, such as engineers, city planners, and architects.
Landscape architects investigates and analyze potential project sites, developing field notes for plan layouts, completing visual surveys, and design research. It is at the computer and drawing board that projects are actually organized and shaped into a creative and imaginative solutions. The work and responsibility of each landscape architect depends principally on individual interests and abilities. Opportunities may range from professional practice on a small scale to administration of governmental programs.
Those who plan careers in landscape architecture should be able to work independently, have a capacity for solving technical problems, be artistically inclined, and be willing to learn computing programs. They should be prepared to work in the competitive environment of the profession, where great value is placed on leadership and the ability to work effectively with others.

Admission Requirements

- Students currently enrolled in the 4-year pre-professional degree at NDSU may apply to the Master of Landscape Architecture program. Transfer students with pre-professional or professional degrees in landscape architecture from another school may be considered for admission into the program, based on test scores, GPA, transfer courses, and portfolio review.
- Candidates must have earned a cumulative grade point average of 3.0 to be considered for full graduate standing.

Special Notice

Students in the second year of the program will be required to purchase a laptop computer. Information on type of computer, software, purchase, and financing arrangements will be distributed to students prior to purchase.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENVD 101	3	ENVD 104	1
ENVD 102	1	ENVD 172	3
ENVD 130	3	ENGL 120	3
ENGL 110	4	COMM 110	3
Gen Ed Science/Tech	3	ANTH 111	3
PSYC 111 or SOC 110	3	Gen Ed Quantitative Reasoning	3
		Gen Ed Wellness	3
	17		19
Second Year			
Fall	**Credits**	**Spring**	**Credits**
LA 271	6	LA 272	6
LA 231	3	LA 232	3
ARCH 321	3	LA 321	4
PLSC 355	3	Gen Ed Science/Tech	3
	15		16
Third Year			
Fall	**Credits**	**Spring**	**Credits**
LA 371	6	LA 372	6
LA 341	4	LA 342	4
LA 331	3	ENGL 326 or 357	3
Gen Ed Science/Tech	3	Elective/Minor	3
Gen Ed Science/Tech Lab	1		
	17		16
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
LA 471	6	LA 472 or ARCH 474	6
LA 722	3	LA 441	4
Elective/Minor	4	LA 590	3
Elective/Minor	3	Elective/Minor	3
	16		16
Fifth Year			
Fall	**Credits**	**Spring**	**Credits**
LA 571	6	LA 572	8
LA 563	3	Elective/Minor	3
LA 581	3	Elective/Minor	3
Elective/Minor	3		
	15		14

Total Credits: 161

Large Animal Veterinary Technology

Department Information

- **Department Location:**
  Hultz Hall
- **Department Phone:**
  701-231-7641
- **Department Email:**
  ndsu.ansc@ndsu.edu
- **Department Web Site:**
  www.ag.ndsu.edu/ansc/
- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/large-animal-veterinary-technology/

Large Animal Veterinary Technology Minor

The minor in Large Animal Veterinary Technology is reserved for Veterinary Technology majors only. Students may earn this minor by completing a minimum of 16 credits. A minimum of eight credits must be completed at NDSU.

Logistics Management

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-8651
- **Department Web Site:**
  www.ndsu.edu/business/departments/mm/
- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/logistics-management/

Logistics Management Minor

Working in conjunction, the College of Business (https://www.ndsu.edu/business), the Upper Great Plains Transportation Institute (http://www.ugpti.org), and the Department of Agribusiness and Applied Economics (http://www.ag.ndsu.edu/agecon) offer a minor in Logistics Management. Companies directly involved with transportation as well as companies in the retail and wholesale sectors increasingly rely on an effective and efficient logistics system to remain competitive. In addition, the public sector also utilizes individuals with logistics and supply chain management skills. Minimum GPA requirements apply to this minor. See Minor Requirements for further information.

Management

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-8651
- **Department Web Site:**
  www.ndsu.edu/business/departments/mm/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/management/

Management Major

The Management major is designed to provide students with the analytical and conceptual background necessary for effective management of businesses and other organizations. Students develop expertise in the major sub-areas of organizational behavior, production and operations management, human resources, and strategy. Students with management majors find employment in all types of profit and non-profit organizations. Students pursuing a Management major may also choose the Human Resource Management track.

Human Resource Management Track

The Human Resource Management track provides students with the knowledge and skills necessary to effectively serve in a Human Resource Management position. Students obtain knowledge in the legal environment of employment, job analysis, recruitment and selection, performance appraisals, compensation, training and labor relations.

Supply Chain Management Track

The Supply Chain Management track provides students with the background necessary to perform well in a wide range of supply chain environments. Students are exposed to areas such as transportation and logistics, supply chain modeling, vendor managed inventory, supplier and customer relationship management, revenue management, purchasing, cost of ownership, and risk assessment.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	COMM 110	3
MATH 144	4	ENGL 120	3
PSYC 111	3	MIS 116	3
ECON 201	3	ECON 202	3
Gen Ed Wellness	2	Non-Major Elective	3
	16		15
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
ACCT 200	3	ACCT 201	3
SOC 110	3	STAT 331	2
PHIL 216	3	Gen Ed Humanities/Fine Arts	3
STAT 330	3	Gen Ed Science & Technology (w/ lab)	4
Gen Ed Science & Technology	3	Non-Major Elective	3
	15		15
Junior			
Fall	**Credits**	**Spring**	**Credits**
ENGL 320	3	BUSN 430	3
FIN 320	3	MGMT 330	3
MGMT 320	3	MGMT 450	3
MRKT 320	3	MIS 320	3
Gen Ed Cultural Diversity	3	300-400 Level Business Elective	3
	15		15
Senior			
Fall	**Credits**	**Spring**	**Credits**
MGMT 360	3	BUSN 489	3

300-400 Level Management Electives (2)	6	300-400 Level Management Electives (2)	6
300-400 Level Business Elective	3	300-400 Level Business Elective	3
Non-Major Elective	2	300-400 Level Elective	3
	14		15

Total Credits: 120

Note: Management majors can pursue a human resource management track and/or a supply chain management track as part of their program, provided that the 300-400 level business, management, and free electives taken meet the track(s) requirements.

Management Communication

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7705
- **Department Web Site:**
  www.ndsu.edu/communication/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/management-communication/

Management communication is a 45-credit major offered by the Department of Communication. This course of study includes organizational communication, risk and crisis communication, the communication principles involved in business, and how to manage problems when they occur.

Students interested in pursuing an undergraduate degree offered by the Department of Communication must first complete all courses and requirements associated with the pre-communication preparation designation. Once all pre-communication preparation courses and requirements are met, the student completes and submits the transition form, available on the department's Blackboard site, to the department's academic advisor. After verification of accuracy, the student is accepted into the professional program and can continue pursuing a degree in the Department of Communication.

Pre-Communication Preparation

Students must complete 19 credits of selected courses with a 3.0 cumulative GPA or higher to become a management communication major. The courses are COMM 110; COMM 112; COMM 114; COMM 189; COMM 212; COMM 214; and ENGL 120. Pre-communication preparation courses may be retaken only once.

Management Communication Major

Students majoring in management communication may earn a Bachelor of Science degree (includes an approved minor) or a Bachelor of Arts degree (includes a modern language proficiency) upon completion of all pre-communication preparation courses and major requirements. A major in management communication trains students to be effective managers and leaders in corporate environments.

Management Communication Minor

Other majors offered at North Dakota State University can be greatly enhanced by a management communication minor. The 21-credit minor includes a nine-credit core and 12 credits of communication professional specialization.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 112	3	COMM 110	3
COMM 114	3	ENGL 120	3

COMM 189	1	Global Perspectives GE	3
ENGL 110 (or placement)	4	Humanities/Arts GE	3
Quantitative Reasoning GE	3	Science/Technology GE	3
Wellness GE	2	Science/Technology Lab GE	1
	16		16

Second Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 212	3	COMM 315	3
COMM 220	3	COMM 320	3
Minor or Language Coursework	3	Major Elective	3
Humanities/Arts GE	3	Minor or Language Coursework	3
Science/Technology GE	3	Science/Technology GE	3
	15		15

Third Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 383	3	COMM 496	3
Major Elective	3	Major Elective	3
Minor or Language Coursework	3	Minor or Language Coursework	6
AHSS Requirement	3	AHSS Requirement	3
Upper Division Writing	3		
	15		15

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 431	3	COMM 483	3
Major Elective	3	Major Elective	3
Major Elective	3	Major Elective	3
Minor or Language Coursework	3	Minor or Language Coursework	3
Additional Coursework or Internship	3	Additional Coursework or Internship	3
	15		15

Total Credits: 122

Management Information Systems

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-8651
- **Department Web Site:**
  www.ndsu.edu/business/departments/afis/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/management-information-systems/

Management Information Systems Major

Management Information Systems concerns the collection, organization, analysis, and dissemination of information for the planning and control of business/organizational operations. The Management Information Systems (MIS) program is designed for students who wish to prepare for

professional careers in information processing or information systems in business and government. The program is designed to develop technical skills and administrative insights required for design, development, implementation, maintenance, and management of organizational information systems.

The MIS program at NDSU is a collaborative effort by the faculty of two disciplines: Management Information Systems and Computer Science. The objective is to provide students with both theoretical knowledge and hands-on experience. In addition to the required courses in management information systems and computer science, majors must complete a practicum in the management information systems area. Students pursuing an MIS major typically earn a Computer Science minor.

The Bachelor of Science (B.S.) degree provides sufficient background and skills to support a successful career in technical computing (for example, programmer, systems analyst, or systems designer), systems or network administration, database administration, information technology management, sales, or technical sales support.

Management Information Systems Minor

The Management Information Systems minor is intended for students who are planning careers that involve more active roles as computer users and evaluators, designers, and/or builders of information systems. The minor will provide exposure to issues relevant to the management of information technologies and the means to achieve organizational goals.

Contact the Department of Accounting, Finance, and Information Systems for specific course and minimum grade point average requirements. A minor approval form is required and can be found on the College of Business (https://www.ndsu.edu/business) website.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman					
Fall	**Credits**	**Spring**	**Credits**		
ENGL 110	4	COMM 110	3		
MIS 116	3	ENGL 120	3		
Gen Ed Cultural Diversity	3	PSYC 111 or SOC 110	3		
Gen Ed Humanities/Fine Arts	3	MATH 144	4		
Non-Major Elective	3	Non-Major Elective	3		
	16		16		
Sophomore					
Fall	**Credits**	**Spring**	**Credits**		
ACCT 200	3	ACCT 201	3		
CSCI 227	3	CSCI 228	3		
ECON 201	3	ECON 202	3		
STAT 330	3	PHIL 216	3		
Gen Ed Science & Tech (w/ lab)	4	STAT 331	2		
		Gen Ed Wellness	2		
	16		16		
Junior					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
MGMT 320	3	BUSN 430	3	MIS 397[1]	3
MRKT 320	3	ENGL 320	3		
MIS 320	3	FIN 320	3		
MIS 315	3	MIS 350	3		

Programming Language Elective	3	MIS 375	3	
	15		15	3
Senior				
Fall	**Credits**	**Spring**	**Credits**	
CSCI 312	3	BUSN 489	3	
CSCI 489	3	MGMT 360	3	
MIS 376	3	MIS 470	3	
Technology Elective I	3	Gen Ed Science & Tech	3	
300-400 Level Business Elective	3	Technology Elective II	3	
	15		15	

Total Credits: 127

[1] Students must complete one of the following options: MIS 397 Cooperative Education, UNIV 492 Study Abroad, MIS 413 Service Internship, CSCI 445 Software Projects Capstone, or AGEC 371 Export Management. Requires MIS 320 as a pre-requisite and faculty advisor's prior approval.

NOTE: This is only a sample curriculum; actual schedules will depend on course availability and individual choices. Students are encouraged to meet with their academic advisor on a regular basis to review their plan of study.

Managerial Psychology

Department Information

- **Department Location:**
  Minard Hall 232
- **Department Phone:**
  701-231-8622
- **Department Web Site:**
  www.ndsu.edu/psychology/
- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/managerial-psychology/

The Department of Psychology offers a managerial psychology minor that fills the need of many students who want essential training in behavior relevant to management in organizations which would help them in their professional careers as well as personal lives. The minor follows a number of themes important for NDSU students' in their future working lives: (1) managerial behavior derived from learning self-management, (2) managerial behavior derived from knowing and understanding others, and their diversity, (3) learning the broad implications of psychology for working with others, (4) recognizing the judgment, problem solving, and decision making foundation of managerial behavior, and (5) developing an understanding of the intrapersonal, interpersonal and organizational contexts of managerial behavior.

Manufacturing Engineering

Department Information

- **Department Location:**
  Civil & Industrial Engineering 202
- **Department Phone:**
  701-231-9818
- **Department Web Site:**
  www.ndsu.edu/ime/
- **Degrees Offered:**
  B.S.Mfg.E.

- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/manufacturing-engineering/

Manufacturing Engineering Major

Manufacturing Engineering is a good choice for people who have both aptitude and interest in working in manufacturing environment and produce physical products for improved living standard for the general populace. This career field is focused on design and production of any type of goods —from automobiles and tractors and airplanes…to electronic products, recreational products, sports equipment, books and toys…to foodstuffs. Manufacturing engineers are employed in every industry that designs and produces goods/services.

These days manufacturing engineers focus on designing seamless integration of different elements of manufacturing processes. They may concentrate on integrating the many different processes and parts necessary to make up finished products—as production engineers. Or, as manufacturing systems engineers, they may take a very wide view of the manufacturing enterprise, including its supply chain, distribution channels, financial structure and resource management. In every particular focus, manufacturing engineers are the people who design the processes through which products are made with the required functionality, to high quality standards, in the quantities needed, available when and where customers prefer, and at the best possible price.

Every day, manufacturing engineers make decisions about technology, machinery, people, and money. The preparation for the excitement and challenge of modern manufacturing requires students to master the mathematics and applied science common to all engineering disciplines. They then will master the fundamentals of process engineering and production engineering so that they may apply these principles to production of any type of goods.

The Manufacturing Engineering program at NDSU is accredited by the Engineering Accreditation Commission of ABET (**www.abet.org**). The curriculum is designed to produce baccalaureate-level graduates who are well prepared to accept engineering positions in industry and government or to pursue advanced degree studies. Graduates of the Manufacturing Engineering program will be able to:

1. Have established successful career in industrial and manufacturing engineering and beyond by demonstrating professionalism and ownership of their work with increasing responsibility and positive impact.
2. Have acquired new knowledge and expertise through professional development opportunities and/or higher education as a part of their life-long learning mission and professional growth.
3. Have demonstrated commitment to uphold higher ethical and professional standards at workplace and appreciate the impact of diverse opinions and solutions in a global/societal context.
4. Be productive citizen by committing to serve their profession and communities at appropriate levels.

Manufacturing Engineering graduates are well positioned to select career employment in any manufacturing industry. Graduates are actively recruited by companies that produce agricultural and construction machinery and vehicles, complex industrial apparatus, recreational vehicles, airplanes, household goods, building products, and both industrial and consumer electronics. Manufacturing Engineering graduates generally begin their careers designing processes and production systems or directly managing some phase of manufacturing. Frequently, they progress to increased responsibilities, with broader scope and yet more opportunity.

Manufacturing Engineering Areas of Emphasis

Students majoring in Manufacturing Engineering may prepare for specific career choices by careful use of the technical electives and the Engineering Science electives included in the Manufacturing Engineering major. It is suggested that students confer with their academic adviser for assistance in choosing the most appropriate optional courses. These topical areas also are available for post-graduate study, leading to Master of Science in Manufacturing Engineering, Master of Science in Industrial Engineering, and Doctor of Philosophy in Industrial and Manufacturing Engineering degrees. For more complete details, see the Graduate Bulletin (p. 860) online.

Selective Admission

The Department of Industrial and Manufacturing Engineering has a selective admission policy. To be admitted to the Manufacturing Engineering program, freshman applicants must have a minimum high school GPA of 2.5 and a composite ACT score of 21 or higher. Transfer students, whether from another university or from another department at NDSU, must have an institutional grade point average of at least 2.30.

Manufacturing Sequences for Non-Majors

Most industrial enterprises engage in the production of some sort of goods in some way and to some degree. Students majoring in other disciplines can enhance their career value by expanding their knowledge of process engineering and production engineering. For students majoring in other engineering disciplines or in the agricultural or physical sciences, the technological foundations of manufacturing can be acquired through IME 330 Manufacturing Processes,IME 380 CAD/CAM for Manufacturing, IME 430 Process Engineering and IME 431 Production Engineering. Also, engineering majors from other disciplines may elect to acquire more depth through advanced manufacturing courses (IME 427 Packaging for Electronics, IME 432 Composite Materials Manufacturing, IME 433 Additive Manufacturing, IME 435 Plastics and Injection Molding Manufacturing, and IME 437 Methods for Precision Manufacturing).

Manufacturing Engineering Minor

Most industrial enterprises engage in the production of some sort of goods in some way and to some degree. Students majoring in other disciplines can enhance their career value by expanding their knowledge of the technologies, processes and systems of manufacturing. A minor in Manufacturing Engineering may be earned by any student in good standing and majoring in any engineering discipline or applicable agricultural or physical sciences. Students electing to pursue this minor will be expected to have achieved the necessary pre-requisite knowledge, consisting of basic calculus, statistics and physical sciences. Students completing a minor in Manufacturing Engineering will gain highly relevant understanding of the technologies, machine tools, fixturing and tooling, and production systems employed in the manufacture of a wide variety of goods used in modern society.

Interested students are encouraged to visit with relevant faculty in the IME Department for advice on course selection to best suit their career interests.

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
CHEM 121 & 121L	4	IME 111	3
ENGL 110	4	MATH 166	4
MATH 165	4	ENGL 120	3
COMP SCI ELECTVE (Select from aproved list of electives)	3	ME 212	3
		ME 221	3
		CHEM 122	3
	15		19
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
COMM 110	3	IME 311	3
IME 330	3	MATH 266	3
MATH 128	1	PHYS 252 & 252L	5
MATH 259	3	ME 331	4
ME 222	3	ENGR SCI ELECTIVE (Select from approved list of electives)	3
ME 223	3		
	16		18
Junior			
Fall	**Credits**	**Spring**	**Credits**
IME 380	3	IME 431	3
IME 430	3	IME 440	3
IME 456	3	IME 461	3
IME 460	3	ENGR SCI ELELCTIVE (Select from approved list of electives)	3
ENGL 321	3	GEN ED HUM/FA and GLOBAL PERSPECTIVES	3
GEN ED WELLNESS	2		
	17		15

Senior			
Fall	**Credits**	**Spring**	**Credits**
ENGR 402	1	IME 489	3
IME 480	3	ENGR SCI ELECTIVE (Select from approved list of electives)	3
IME 482	3	GEN ED SOCIAL& BEHAVIORAL SCI	3
GEN ED SOCIAL & BEHAVIORAL SCI AND CULTURAL DIVERSITY	3	TECHNICAL ELECTIVE (Select from approved list of tech electives)	3
GEN ED HUMANITIES/FINE ARTS	3	TECHNICAL ELECTIVE (Select from approved list of tech electives)	3
TECHNICAL ELECTIVE (Select from approved list of tech electives)	3		
	16		15

Total Credits: 131

Marketing

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-8651
- **Department Web Site:**
  www.ndsu.edu/business/departments/mm/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/marketing/

Marketing Major

The Marketing major is designed for students pursuing careers in one of the subfields of marketing, such as product management, retailing, marketing communication, sales and sales management, distribution, or marketing research. These positions may be as technical specialists or as general marketing managers.

Supply Chain Management Track

The Supply Chain Management track provides students with the background necessary to perform well in a wide range of supply chain environments. Students are exposed to areas such as transportation and logistics, supply chain modeling, vendor managed inventory, supplier and customer relationship management, revenue management, purchasing, cost of ownership, and risk assessment.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	COMM 110	3
MATH 144	4	ENGL 120	3
PSYC 111	3	MIS 116	3
ECON 201	3	ECON 202	3
Gen Ed Wellness	2	Non-Major Elective	3
	16		15

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
ACCT 200	3	ACCT 201	3
SOC 110	3	STAT 331	2
PHIL 216	3	Gen Ed Science & Technology (w/ lab)	4
STAT 330	3	Gen Ed Humanities/Fine Arts	3
Gen Ed Science & Technology	3	Non-Major Elective	3
	15		15
Junior			
Fall	**Credits**	**Spring**	**Credits**
ENGL 320	3	BUSN 430	3
FIN 320	3	MRKT 410	3
MGMT 320	3	MIS 320	3
MRKT 320	3	300-400 Level Marketing Elective	3
Gen Ed Cultural Diversity	3	300-400 Level Business Elective	3
	15		15
Senior			
Fall	**Credits**	**Spring**	**Credits**
MRKT 450	3	BUSN 489	3
300-400 Level Marketing Electives (2)	6	MRKT 460	3
300-400 Level Business Elective	3	300-400 Level Marketing Elective	3
Non-Major Elective	2	300-400 Level Business Elective	3
		300-400 Level Elective	3
	14		15

Total Credits: 120

Note: Marketing majors can pursue a supply chain management track as part of their program, provided that the 300-400 level business, marketing, and free electives taken meet the track requirements.

Mathematics

Department Information

- **Department Location:**
  Minard Hall 408
- **Department Phone:**
  701-231-8171
- **Department Web Site:**
  www.ndsu.edu/math/
- **Degrees Offered:**
  B.A.; B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/mathematics/

Mathematics is the language of science and technology. Its explosive development during the 20th Century and its history as the oldest and most highly developed discipline make math one of the most exciting and rewarding areas of study for the 21st Century.

In the past few years, a tremendous increase has occurred in the need for mathematics and mathematicians. In such fields as actuarial science, computer science, statistics, engineering, economics and commerce, mathematical training is in high demand.

If you enjoy mathematics and are good at it, you will find both challenges and opportunities in the Department of Mathematics at North Dakota State University. Your advisor, a faculty member in the department, will provide you with information concerning courses, curricula and the many exciting and rewarding careers open to mathematics graduates. The Cooperative Education Program offers the possibility of academic credit for on-the-job training. The student mathematics organization, Math Club, brings in both academic and nonacademic speakers who explore career possibilities and fascinating topics in mathematics at club meetings. Opportunities for paper grading and tutoring are available and allow students to deepen their understanding by assisting others in learning mathematics.

Our faculty members contribute research findings in a variety of areas in theoretical and applied mathematics to internationally known journals. This wide variety of areas of specialization and expertise of faculty members in the department means that you will probably find someone both interested and knowledgeable in any area of mathematics that might fascinate you.

The Department of Mathematics offers a broad and balanced curriculum of courses taught by a faculty of 15. A student may choose to major in mathematics or mathematics education. Minors in related areas are encouraged. These choices may be made immediately or deferred until the basic course work is completed. In addition to the Bachelor of Science degree, the department offers master's and doctorate degrees. Our students have been very successful in finding employment. Graduates are working in a wide variety of corporations, agencies, universities and school systems. A number continue on for advanced degrees.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
MATH 165	4	MATH 166	4
MATH 129	3	MATH 329	3
ENGL 110	4	COMM 110	3
Gen Ed Humanities/Fine Arts	3	ENGL 120	3
		Gen Ed Social/Behavioral Sciences	3
	14		16
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
MATH 265	4	MATH 266	3
MATH 270	3	MATH 346	3
Related Required Course (15 credits of a minor or 2nd major or elective with at least two 300+ level courses)	3	Related Required Course (15 credits of a minor or 2nd major or elective with at least two 300+ level courses)	3
Gen Ed Humanities/Fine Arts & Cultural Diversity	6	Gen Ed Social/Behavioral Sciences & Global Perspectives	6
	16		15
Junior			
Fall	**Credits**	**Spring**	**Credits**
MATH 420	3	MATH 452	3
MATH 450	3	MATH 483	3
Gen Ed Upper Level Writing	3	MATH 300-400 Elective	3
Gen Ed Wellness	2	Gen Ed Science & Tech w/lab	4
MATH 300-400 Elective	3	Related Required Course (15 credits of a minor or 2nd major or elective with at least two 300+ level courses)	3
	14		16

Senior			
Fall	**Credits**	**Spring**	**Credits**
MATH 300-400 Electives	4-6	MATH 491	1
Related Required Course (15 credits of a minor or 2nd major or elective with at least two 300+ level courses)	3	MATH 300-400 Electives	6
Gen Ed Science & Tech	3	Related Required Course (15 credits of a minor or 2nd major or elective with at least two 300+ level courses)	3
Electives	3	Gen Ed Science & Tech	3
		Electives	3
	13-15		16

Total Credits: 120-122

Mathematics and Physics

Department Information

- **Department Location:**
  Minard Hall or South Engineering
- **Department Phone:**
  701-231-8171
- **Department Web Site:**
  www.ndsu.edu/math/ or www.ndsu.edu/physics/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/mathematics-physics/

This program is intended for students who desire additional mathematical background and preparation for graduate school or technical careers in the sciences, especially theoretical physics.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
PHYS 171	1	PHYS 251 & 251L	5
MATH 165	4	PHYS 251R	1
CHEM 150 & CHEM 160	4	MATH 166	4
ENGL 110 or 120 (based on placement)	4	COMM 110	3
MATH 129	3	CHEM 151 & CHEM 161	4
	16		17

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
PHYS 252 & 252L	5	PHYS 350	3
PHYS 252R	1	MATH 266	3
MATH 265	4	CSCI 160	4
MATH 270	3	Gen Ed Social/Behavioral Science	3
Gen Ed Humanities/Fine Arts	3	Gen Ed Wellness	2
		MATH 346	3
	16		18
Junior			
Fall	**Credits**	**Spring**	**Credits**
PHYS 360	3	PHYS 361	3
MATH 420	3	PHYS 370	3
PHYS 355	3	ENGL 324	3
MATH 450	3	Gen Ed Social/Behavioral Science	3
Gen Ed Social/Behavioral Science	3	MATH 452 or 483	3
Gen Ed Humanities/Fine Arts	3	MATH 329	3
	18		18
Senior			
Fall	**Credits**	**Spring**	**Credits**
PHYS 462	3	PHYS 486	3
PHYS 485	3	PHYS 489	2
Physics Elective	3	Physics Elective	3
MATH 4XX Math Elective	3	MATH 491	2
PHYS 488	1	Gen Ed Humanities/Fine Arts	3
	13		13

Total Credits: 129

Mathematics Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.A.; B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/mathematics-education/

Add overview content here.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110 or 120	3-4	COMM 110	3
MATH 165	4	Social/Behavioral Science	3
Humanities/Fine Arts	3	MATH 129	3
Science & Technology w/Lab	4	MATH 166	4
Wellness	2-3	PHYS 211	3
		PHYS 211L	1
	16-18		17
Second Year			
Fall	**Credits**	**Spring**	**Credits**
CSCI 160	4	EDUC 322	3
EDUC 321	3	Science & Technology (Geoscience, Chemistry, Physics or Biology)	3
MATH 265	4	MATH 329	3
MATH 270	3	MATH 440	3
STAT 367	3	STAT 368	3
Complete Praxis Core Academic Skills Exam		Apply to the School of Education	
	17		15
Third Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 451	3	EDUC 481	3
EDUC 489	3	Humanities/Fine Arts	3
Social/Behavioral Science	3	Upper Division Writing	3
MATH 346	3	MATH 266	3
MATH 420	3	MATH 478	3
	15		15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 486	3	EDUC 485	1
Elective	3	EDUC 487	9
Elective	3	EDUC 488	3
Elective	3		
MATH 374	1		
MATH 450	3		
Apply for Student Teaching			
Complete Praxis PLT Exam			
Complet Praxis II Content Exam			
	16		13

Total Credits: 124-126

Mechanical Engineering

Department Information

- **Department Location:**
  Dolve Hall 111
- **Department Phone:**
  701-231-8671
- **Department Web Site:**
  www.ndsu.edu/me/
- **Degrees Offered:**
  B.S.M.E.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/mechanical-engineering/

Mechanical Engineering Major

The Mechanical Engineering program at NDSU is accredited by the Engineering Accreditation Commission of ABET (www.abet.org (http://www.abet.org)). The curriculum is designed to produce baccalaureate-level graduates who are well prepared to accept engineering positions in industry and government or to pursue advanced degree studies.

Mission

The Department of Mechanical Engineering at NDSU will contribute to the aspirations of a land-grant university in the three primary components of education, research, and service. In support of these endeavors the mission of the department is to:

- Educate undergraduate and graduate students in the fundamentals of the discipline, prepare graduates to effectively function in society in the field of their choice, and provide the learning skills to adapt to evolving personal and professional goals.
- Develop and maintain high quality research programs in traditional and emerging areas that build on the diverse strengths of the faculty, foster interdisciplinary collaborations, and address national and global needs.
- Serve the needs of the profession, the state of North Dakota, and regional industries to promote and enhance economic development opportunities.

Educational Objectives

Graduates of the Mechanical Engineering Program will:

1. Provide valuable contributions to the engineering profession in the field of their choice.
2. Adapt to emerging technologies through continued professional development.
3. Uphold high ethical and professional standards in the practice of engineering.
4. Effectively function in a team environment and interact with people of diverse backgrounds.
5. Be engaged and conscientious practitioners who understand the context in which their designs are implemented and the corresponding impact of their activities on society.

A complete listing of the student outcomes associated with these objectives can be viewed on the department's web site (https://www.ndsu.edu/me).

Strong program emphasis is placed on engineering science, laboratory, and design. The use of modern computer tools and techniques in engineering practice also is incorporated throughout the curriculum. In addition, liberal arts education is included to prepare graduates for becoming concerned and productive members of society.

Students transferring into mechanical engineering from other departments or institutions are encouraged to do so no later than the beginning of the junior year if they wish to complete the degree requirements within two academic years.

Graduate programs leading to Master of Science and Doctor of Philosophy degrees in Mechanical Engineering are offered by the department. For more complete details, see the Graduate Bulletin (p. 860) online.

Selective Admission

The Department of Mechanical Engineering has a selective admission policy. To be admitted to the basic program (freshman and sophomore level), freshman applicants must either rank in the top one-third of their high school graduating class or have received a score of 26 or higher in the math portion of the ACT (or a score of 590 or higher in the math portion of the SAT). Transfer students, whether from another university or from another department at NDSU, must have an institutional grade point average (GPA) of at least 2.80.

To enter the professional program (junior and senior level), students must complete the basic program with a minimum Engineering GPA of 2.80, a minimum Cumulative GPA of 2.50 and no grades below 'C' in any one of the core courses.

A minimum institutional GPA of 2.50 is required for graduation from Mechanical Engineering. No course grades less than 'C' are acceptable to fulfill a degree requirement.

Curriculum

All Mechanical Engineering majors choose a minimum of five technical elective courses. These courses cover a wide range of topics and students may tailor their choices to reflect their special interests in solid mechanics and design, thermal sciences, energy, materials and nanotechnology, controls and mechatronics, biomedical engineering, aerospace, automotive engineering, or other areas as added in the future. For a complete list of technical electives available in each area, students should consult with their adviser, the department, or the curriculum guide.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
MATH 165	4	MATH 166	4
ENGL 110	4	ENGL 120	3
CHEM 121	3	CHEM 122	3
Humanities and Fine Arts and Cultural Diversity Gen Ed	3	ME 212	3
Social & Behavioral Science and Global Perspectives Gen Ed	3	ME 221	3
		Wellness Gen Ed	2
	17		18
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
MATH 129	3	MATH 266	3
MATH 259	3	COMM 110	3
IME 330	3	PHYS 252 & 252L	5
ME 222	3	ME 213	3
ME 223	3	ME 351	3
Humanities & Fine Arts Gen Ed	3		
	18		17
Junior			
Fall	**Credits**	**Spring**	**Credits**
ECE 301	3	ECE 303	3
ENGL 321	3	ECE 306	1
ME 331	4	ENGR 402	1
ME 352	3	ME 361	1
Technical Elective	3	ME 442	3
		ME 454	3
		Technical Elective	3
	16		15
Senior			
Fall	**Credits**	**Spring**	**Credits**
ME 421	3	ME 412	3
ME 443	3	ME 462	3

ME 457	3	Technical Elective	3
ME 461	3	Technical Elective	3
Technical Elective	3	Social & Behavioral Science Gen Ed	3
	15		15

Total Credits: 131

Degree Notes:

- Total degree credits required to graduate: 129*
- *Total credits listed above may exceed minimum credit requirements for graduation.

Medical Laboratory Science

Department Information

- **Department Location:**
  Sudro Hall
- **Department Phone:**
  701-231-8713
- **Department Web Site:**
  www.ndsu.edu/alliedsciences/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/medical-laboratory-science/

Medical laboratory scientists use analytical procedures and the latest biomedical instruments to perform laboratory tests on blood and body fluids that assist physicians in patient diagnosis and treatment, disease monitoring and prevention. Because the tests performed are so vital in medical treatment, the medical laboratory scientist must know how to perform these tests with scientific precision and accuracy, but also be well educated in the underlying principles and clinical significance of the results. Laboratory work plays a vital role in the daily routine of the medical laboratory scientist and, while usually not having direct contact with patients, the MLS enjoys being a crucial member of the health care team. Clinical chemistry, hematology, microbiology, urinalysis, immunohematology, and immunology are the principle practice areas for an MLS working in a medical laboratory. In addition to laboratory testing and analysis, an MLS may also monitor test quality, supervise personnel, conduct research and develop new tests and methodologies. Certified medical laboratory scientists readily find employment throughout the country in hospitals, medical and diagnostic laboratories, and other healthcare services. According to the U.S. Department of Labor Bureau of Labor Statistics (https://www.bls.gov), employment of medical laboratory workers is expected to grow faster than average for all occupations through 2026. This increase is attributed to an aging population leading to a greater need to diagnose medical conditions, such as cancer or type 2 diabetes, through laboratory procedures.

A Bachelor of Science degree, major in Medical Laboratory Science, includes three years of academic courses on campus followed by an 11-12 month full-time professional-level class and clinical internship in an affiliated school of medical laboratory science. Graduates are eligible to take the national MLS certification exam administered by the American Society for Clinical Pathology Board of Certification (ASCP BOC). NDSU graduates have enjoyed excellent employment opportunities and pass rates on the ASCP BOC exam.

Students interested in pursuing MLS should have an interest and aptitude in the sciences, particularly chemistry and biology. College academic courses include college algebra, biology, microbiology, general and organic chemistry, biochemistry, and statistics, along with general education electives. The full-time professional internship consists of classroom and clinical bench instruction in clinical chemistry, hematology, immunohematology, microscopy/urinalysis, microbiology, serology, phlebotomy, education, management, and research methods.

Students who have completed the prerequisite courses on campus and meet requirements for grades and grade point averages may be eligible to apply for the professional-level internship which occurs onsite within an affiliated hospital-based MLS program. NDSU maintains affiliation with the following hospital-based MLS programs: Sanford Health (Fargo, ND), Mercy Medical Center (Sioux City, IA), Nebraska Methodist Hospital (Omaha, NE), St. Luke's College (Sioux City, IA), St. Luke's Hospital (Cedar Rapids, IA), and the Colorado Center for Medical Laboratory Science (Aurora, CO). All affiliated programs are accredited by the National Accrediting Agency for Clinical Laboratory Science (NAACLS). Application to the internship occurs annually in the fall. Admission to hospital programs is selective. Admission criteria is established by each hospital internship program and generally includes academic performance at the university level, cumulative and science GPAs (a minimum of 2.50-3.00 is required and varies by hospital program), courses completed, references, related experience, an interview, and compliance with criminal background and student conduct requirements. To participate in the MLS internship, students must be able to comply with program-designated essential functions or request reasonable accommodations to meet these. Essential functions include a sound intellect, good motor skills, eye-hand coordination and dexterity, effective communication skills, visual acuity to perform macroscopic and microscopic analyses and read procedures and graphs, and behavioral skills such as organization, time management, and good judgement even in emergency situations.

Information about the profession, curriculum, internship, and advising contacts are available from the Department of Allied Sciences (https://www.ndsu.edu/alliedsciences). It is highly recommended that students interested in MLS meet with the MLS advisor to discuss degree and major requirements, internship admission, and create an individualized plan of study at least one year prior to anticipated internship application.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 150	3	CHEM 122	3
BIOL 150L	1	CHEM 122L	1
CHEM 121	3	COMM 110	3
CHEM 121L	1	CSCI 114	3
CHP 190	2	Global Perspectives (G)	3
ENGL 120*	3	Humanities & Fine Arts (A)	3
MATH 103	3		
	16		16
Second Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 220	3	BIOL 221	3
BIOL 220L	1	BIOL 221L	1
CHEM 341**	3	CHEM 342**	3
CHEM 341L**	1	MICR 460	3
MLS 200	1	MICR 460L	2
MICR 350	3	STAT 330	3
MICR 350L	2		
Wellness (W)	2		
	16		15
Third Year			
Fall	**Credits**	**Spring**	**Credits**
BIOC 460	3	Cultural Diversity (D)	3
BIOC 460L	1	Humanities & Fine Arts (A)	3
BIOL 315	3	MLS 435	2
BIOL 315L	1	MICR 463	2
MICR 470	3	Social & Behavioral Sciences (B)	3
MICR 471	2	Upper Division Writing (C; 300-400 level)	3
Social & Behavioral Sciences (B)	3		
	16		16

Fourth Year					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
MLS 496***	12	MLS 496***	12	MLS 496***	6
	12		12		6

Total Credits: 125

* All students are required to successfully earn credit for Engl 110 and Engl 120. Enrollment is based on English Placement. Upon completion of Engl 120 with a "C" grade or higher, students will be awarded placement credit (4) for Engl 110.

** Students have the option to complete Chem 240, Bioc 460, Bioc 460L, & Bioc 461 in place of Chem 341, Chem 341L, Chem 342, Bioc 460 & Bioc 460L.

*** Credits earned in an affiliated, NAACLS accredited hospital program; one year in length, including one summer session.

Microbiology

Department Information

- **Department Location:**
  Van Es Hall
- **Department Phone:**
  701-231-7667
- **Department Web Site:**
  www.ndsu.edu/micro/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/microbiology/

Microbiology is a fundamental biological science which offers a variety of challenges and opportunities. Microbiologists have made some of the most important scientific discoveries in this century. Since 1910, approximately one-third of the Nobel Prizes in medicine and physiology have been awarded to microbiologists. The discipline covers a wide spectrum of specialized interest areas that illustrate how microbes affect human and animal health, our environment, food safety, food technology, and the biotechnology industry. In recent years, the field of microbiology has had a major impact upon virtually all other scientific disciplines. For this reason, even students who choose to major in other fields may benefit from a minor in microbiology.

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

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
MICR 189	1	BIOL 151	3
CHEM 121	3	BIOL 151L	1
CHEM 121L	1	CHEM 122	3
BIOL 150	3	CHEM 122L	1
BIOL 150L	1	ENGL 120	3
ENGL 110	4	General Education Social and Behavioral/ Global Perspectives	3
MATH 105 MATH 107 or MATH 146 also acceptable	3	General Education Wellness	2
	16		16

Second Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 110	3	MICR 352	3

CHEM 341	3	MICR 352L	2
CHEM 341L	1	PLSC 315	3
STAT 330	3	PLSC 315L	1
MICR 350	3	CHEM 342	3
MICR 350L	2	General Education[Social and Behavioral/ Global Perspectives]	3
	15		15

Third Year

Fall	Credits	Spring	Credits
BIOC 460	3	PHYS 212	3
BIOC 460L	1	PHYS 212L	1
PHYS 211	3	BIOC 461	3
PHYS 211L	1	Microbiology Elective	6
Microbiology Elective	3	General Education[Humanities and Fine Arts/Cultural Diversity]	3
General Education[Humanities and Fine Arts/Cultural Diversity]	3		
	14		16

Fourth Year

Fall	Credits	Spring	Credits
MICR 354	3	MICR 480	3
MICR 482	3	MICR 486	3
Microbiology Elective	9	Microbiology Elective	3
		Free Elective	4
	15		13

Total Credits: 120

Military Science

Department Information

- **Department Location:**
  Bentson Bunker Fieldhouse 103
- **Department Phone:**
  701-231-7575
- **Department Web Site:**
  www.ndsuarmyrotc.com (http://www.ndsuarmyrotc.com)
- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/military-science/

The North Dakota State University Army Reserve Officers' Training Corps (ROTC) program provides college-trained officers for the Army, Army Reserve and Army National Guard. Army ROTC enhances a student's education. It provides unique educational opportunities by combining leadership and management theory with actual hands-on experience. Army ROTC helps the student to develop self-discipline, physical stamina and poise—the qualities basic to success in any worthwhile career.

Career Opportunities

Students who complete the Army ROTC program may pursue careers as officers in the Army National Guard, Army Reserve, or the active Army. Students selected for active duty will receive a generous salary in excess of $45,000 per year, plus housing and medical benefits, and will have opportunities to travel to assignments throughout the world. Students selected for reserve components receive more than $7,700 per year for drills

and annual training while pursuing their civilian careers. More importantly, the professional experience in management and leadership will enhance the student's marketability in any profession, civilian or military.

Program Description

The Army ROTC program consists of a two-year Basic Course and a two-year Advanced Course. The Basic Course is normally taken during the freshman and sophomore years. During these two years there is no military obligation for non-contracted cadets, and a student may withdraw at any time. Students who have taken Junior ROTC, have active duty military experience, or are currently a member of a Reserve/National Guard unit may receive placement credit for the Basic Course.

Music

Department Information

- **Department Location:**
  Reineke Fine Arts Center
- **Department Phone:**
  701-231-7932
- **Department Email:**
  ndsu.performing.arts@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/performingarts/music/
- **Degrees Offered:**
  B.A.; B.S.; B.Mus.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/music/

NDSU Challey School of Music prepares students for careers in teaching, performance, and related liberal studies. It also provides creative opportunities for all talented student musicians regardless of major, and seeks to foster an appreciation of music throughout the greater NDSU community.

NDSU is accredited by the National Association of Schools of Music. Programs of study lead to the Bachelor of Music with options in Performance and Music Education; the Bachelor of Arts or Bachelor of Science in Music; the Master of Music with options in Performance, Conducting, and Music Education; and the Doctor of Musical Arts with options in Performance and Conducting.

Admission to music major or minor programs is arranged through an audition and interview; for information, please contact the Division of Performing Arts (https://www.ndsu.edu/performingarts) office. All undergraduate music majors take private lessons, participate in ensembles, and take a broad range of courses appropriate to their areas of emphasis. All music courses must be passed with a grade of 'C' or better. A performance achievement jury must be passed prior to registration in 300-level applied study.

The Bachelor of Music degree in Performance is for talented vocalists and instrumentalists who wish a career as a professional performer or conductor, and who will likely continue their studies in graduate school. The Bachelor of Music degree with certification in Music Education is for students who wish to teach K-12 music in North Dakota's public schools. Certification requirements for other states varies, but North Dakota licensure is congruent with that of many other states. Experiences in a broad spectrum of music education courses—elementary, instrumental, and voice/choral—results in NDSU's outstanding reputation for producing teachers with excellent and versatile credentials.

Music majors pursuing a Bachelor of Arts or Bachelor of Science degree (without public school teaching certification) are generally interested in a broad liberal arts education with a significant number of electives.

Music majors and minors supplement their course work by attending recitals and concerts. Those in applied study perform for the jury examination at the end of each semester. Students enrolled in private applied study also participate in a related major ensemble; pianists sometimes play with chamber ensembles or accompany large ensembles.

The professional undergraduate degree in music, the B.Mus. in performance is designed for students pursuing careers as performing musicians. Such students often continue advanced study in graduate school. All students audition for the appropriate area of performance with faculty members and demonstrate professional level skills or potential. In addition to college and university requirements, all students take courses in the core requirements section, and then select a specialized curriculum under instrumental, voice or piano. Bachelor of Music students are required to pass all four levels of piano proficiency examinations prior to completion of the degree. Piano credit requirements listed below may be waived in whole or in part upon successful completion of the piano proficiency examinations.

B.A. or B.S. with a Major in Music

Majors interested in a general liberal arts degree pursue either the Bachelor of Arts or the Bachelor of Science degree. The B.A. degree requires a second-year language proficiency at the college level in a language other than English. In addition to the music curriculum, the B.S. degree requires the completion of a minor program of study, a second major, or a second degree.

Music Minor

Two minors are available - one for the general student and one specifically designed for the education major. Music majors cannot declare music minors.

Certification in Music Education

Students must complete the School of Education (https://www.ndsu.edu/education) requirements, complete the common music requirements, complete either the vocal or instrumental emphasis and pass a piano proficiency examination prior to student teaching. Piano credit requirements may be waived in whole or in part upon successful completion of the piano proficiency examinations. Specific general education requirements, School of Education requirements, and other information may be obtained from the Division of Performing Arts (https://www.ndsu.edu/performingarts) office.

Ensembles

The NDSU Challey School of Music sponsors a large variety of ensembles including the NDSU Wind Symphony, Concert Choir, University Symphony Orchestra, Madrigal Singers, two large Jazz Ensembles, Jazz Combos, the Gold Star Marching Band, Brass Ensemble, University Chamber Singers, NDSU Statesmen, Cantemus, University Band, Bison Pep Bands, NDSU Opera Theatre, and chamber ensembles in typical instrumental and vocal combinations. The Concert Choir, Wind Symphony, Jazz Ensemble, Madrigal Singers and several other groups have touring programs, some of which are national or international in scope. Participation in these ensembles is open to all students, some by audition and some as open-enrollment ensembles.

Music Curricula

Requirements are grouped by degree. Please refer also to graduation requirements listed in the Academic Policies (p. 1386) section of this publication. The information in this Bulletin may be superseded by information updated regularly and provided by the Challey School of Music.

Plans of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
MUSC 130	3	MUSC 103[counts as a Humanities and Fine Arts Gen Ed]	3
MUSC 132	1	MUSC 131	3
MUSC 189	1	MUSC 133	1
MUSC 1XX Applied Lessons	1	MUSC 180	0
MUSC 180	0	MUSC 1XX Applied Study	1
ENGL 110	4	ENGL 120	3
COMM 110	3	Quantitative Reasoning Gen Ed course	3
Science & Technology Gen Ed course	3	Minor requirement course	3-0
	16		17-14
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
MUSC 180	0	MUSC 180 Performance Attendance	0
MUSC 230	3	MUSC 2XX Applied Study	1
MUSC 232	1	MUSC 231	3
MUSC 2XX Applied Study	1	MUSC 233	1

MUSC 385	3	MUSC 3XX Major Ensemble	1
Social & Behavioral Science Gen Ed course	3	MUSC 3XX Music Elective	3
MUSC 3XX Major Ensemble	1	Social & Behavioral Sciences/ Cultural Diversity Gen Ed course	3
Course for declared minor	3	Science & Technology Gen Ed course	3
		Science Lab	1
	15		16

Junior

Fall	Credits	Spring	Credits
MUSC 180 Performance Attendance	0	MUSC 341	3
MUSC 340[counts as a Humanities and Fine Arts Gen Ed]	3	MUSC 3XX Applied Study	1
MUSC 3XX Major Ensemble	1	MUSC 3XX Major Ensemble	1
MUSC 3XX Applied Study	1	Minor requirement or Language II	3-4
College Requirement course	3	College Requirement course	3
Minor requirement or Language I	3-4	Music Elective course	3
Upper Division English course	3	Music Elective course	3
	14-15		17-18

Senior

Fall	Credits	Spring	Credits
MUSC 3XX Major Ensemble	1	Capstone Experience	1
MUSC 3XX Music Elective	3	MUSC 3XX Major Ensemble	1
College Requirement course	3	Music Elective	3
Minor requirement or Language III	3-4	Music Elective	3
Science & Technology/Global Perspectives Gen Ed course	3	College Requirement	3
Wellness Gen Ed course	2	Minor requirement or Language IV	3-4
	15-16		14-15

Total Credits: 124-125

Degree Requirements and Notes

- Music majors may not declare a music minor.
- A grade of 'C' or better is required in all MUSC prefix courses.
- Arts, Humanities and Social Sciences College Requirements: An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree
- Bachelor of Science (B.S) Degree - The completion of a minor program of study, a second major, or a second degree is required.
- Bachelor of Arts (B.A.) Degree - Second year language proficiency at college level required.
- MUSC 189 is only required for first-time, first-year students--A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take MUSC 189.
- B.A./B.S. Recital Capstone or Individual Study Capstone is fulfilled by registration in MUSC 380 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)

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STUDENTS ENTERING AS A FRESHMAN IN AN ODD-YEAR FALL

A grade of 'C' or better is required in all MUSC prefix courses.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
FRESHMAN - ODD YEAR - FALL SEMESTER		FRESHMAN - EVEN YEAR - SPRING SEMESTER	
MUSC 130	3	MUSC 103 counts as a Humanities and Fine Arts Gen Ed	3
MUSC 132	1	MUSC 131	3
MUSC 160 (Up to 2 semesters of MUSC 165 with permission)	1	MUSC 133	1
MUSC 1XX Applied Study	1	MUSC 161	1
MUSC 173	1	MUSC 1XX Applied Study	1
MUSC 180	0	MUSC 173	1
MUSC 189	1	MUSC 180	0
MUSC 3XX Major Ensemble	1	MUSC 3XX Major Ensemble	1
ENGL 110	4	MUSC 1XX Minor Ensemble	1
COMM 110	3	ENGL 120	3
	16		15
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
SOPHOMORE - EVEN YEAR - FALL SEMESTER		SOPHOMORE - ODD YEAR - SPRING SEMESTER	
MUSC 180	0	MUSC 180	0
MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 260	1	MUSC 261	1
MUSC 2XX Applied Study	1	MUSC 2XX Applied Study	1
MUSC 273	1	MUSC 273	1
MUSC 3XX Major Ensemble	1	MUSC 3XX Major Ensemble	1
MUSC 1XX Minor Ensemble	1	MUSC 1XX Minor Ensemble	1
MUSC 385	3	Social & Behavioral Sciences/ Cultural Diversity Gen Ed	3
Social & Behavioral Sciences Gen Ed	3	Science & Technology w/ Lab Gen Ed	4
Science & Technology Gen Ed	3		
	18		16

Junior			
Fall	**Credits**	**Spring**	**Credits**
JUNIOR - ODD YEAR - FALL SEMESTER		JUNIOR - EVEN YEAR - SPRING SEMESTER	
MUSC 180	0	MUSC 341	3
MUSC 250	2	MUSC 380	1
MUSC 331	2	MUSC 3XX Major Ensemble	1
MUSC 340 counts as a Humanities and Fine Arts Gen Ed	3	MUSC 1XX Minor Ensemble	1
MUSC 344	2	MUSC 3XX Applied Study	1
MUSC 3XX Major Ensemble	1	MUSC 373 (1 credit of pedagogy)	3
MUSC 3XX Applied Study	1	Jazz Studies	1
MUSC 373 1 credit of pedadogy	3	MUSC 411 need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431	(3)
Jazz Studies	1	ENGL 323 (or any upper division English course approved by advisor)	3
MUSC 441	2		
	17		14

Senior			
Fall	**Credits**	**Spring**	**Credits**
SENIOR - EVEN YEAR - FALL SEMESTER		SENIOR - ODD YEAR - SPRING SEMESTER	
MUSC 3XX Major Ensemble	1	MUSC 3XX Major Ensemble	1
Jazz Studies	1	Jazz Studies	1
MUSC 431 need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431	3	MUSC 430 need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431	3
MUSC 4XX Applied Studies	1	MUSC 4XX Applied Study	1
MUSC 473	3	MUSC 473	3
Science & Technology/Global Perspectives Gen Ed	3	MUSC 480	1
Wellness Gen Ed	2	Quantitative Reasoning Gen Ed	3
	14		13

Total Credits: 123

STUDENTS ENTERING AS A FRESHMAN IN AN EVEN-YEAR FALL

A grade of 'C' or better is required in all MUSC prefix courses.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
FRESHMAN - EVEN YEAR - FALL SEMESTER		MUSC 103 counts as a Humanities and Fine Arts Gen Ed	3
MUSC 130	3	MUSC 131	3
MUSC 132	1	MUSC 133	1
MUSC 160 (Up to 2 semesters of MUSC 165 with permission)	1	MUSC 161	1
MUSC 1XX Applied Study	1	MUSC 1XX Applied Study	1
MUSC 173	1	MUSC 173	1

MUSC 180	0	MUSC 180	0
MUSC 189	1	MUSC 3XX Major Ensemble	1
MUSC 3XX Major Ensemble	1	ENGL 120	3
ENGL 110	4	Science & Technology Gen Ed	3
COMM 110	3		
	16		17

Sophomore

Fall	Credits	Spring	Credits
SOPHOMORE - ODD YEAR - FALL SEMESTER		SOPHOMORE - EVEN YEAR - SPRING SEMESTER	
MUSC 180	0	MUSC 180	0
MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 260	1	MUSC 261	1
MUSC 2XX Applied Study	1	MUSC 2XX Applied Study	1
MUSC 273	1	MUSC 273	1
MUSC 3XX Major Ensemble	1	MUSC 3XX Major Ensemble	1
MUSC 1XX Minor Ensemble	1	MUSC 1XX Minor Ensemble	1
MUSC 385	3	Social & Behavioral Sciences/ Cultural Diversity Gen Ed	3
Social & Behavioral Sciences Gen Ed	3	Science & Technology w/ Lab Gen Ed	4
	15		16

Junior

Fall	Credits	Spring	Credits
JUNIOR - EVEN YEAR - FALL SEMESTER		JUNIOR - ODD YEAR - SPRING SEMESTER	
MUSC 180	0	MUSC 341	3
MUSC 250	2	MUSC 380	1
MUSC 340 counts as a Humanities and Fine Arts Gen Ed	3	MUSC 3XX Applied Study	1
MUSC 3XX Applied Study	1	MUSC 373 (1 credit of pedadogy)	3
MUSC 373 1 credit of pedadogy	3	MUSC 3XX Major Ensemble	1
MUSC 3XX Major Ensemble	1	MUSC 1XX Minor Ensemble	1
MUSC 1XX Minor Ensemble	1	Jazz Studies	1
Jazz Studies	1	MUSC 430 need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431	3
MUSC 431 need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431	(3)	ENGL 323 (or any upper division English course approved by advisor)	3
Wellness Gen Ed	2		
	14		17

Senior

Fall	Credits	Spring	Credits
SENIOR - ODD YEAR - FALL SEMESTER		SENIOR - EVEN YEAR - SPRING SEMESTER	
MUSC 331	2	MUSC 3XX Major Ensemble	1

MUSC 344	2	MUSC 411 need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431	3
MUSC 3XX Major Ensemble	1	MUSC 4XX Applied Study	1
MUSC 441	2	MUSC 473	3
MUSC 4XX Applied Study	1	MUSC 480	1
MUSC 473	3	Jazz Studies	1
Jazz Studies	1	Quantitative Reasoning Gen Ed	3
Science & Technology/Global Perspectives Gen Ed	3		
	15		13

Total Credits: 123

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

STUDENTS ENTERING AS A FRESHMAN IN AN ODD-YEAR FALL

A grade of 'C' or better is required in all MUSC prefix courses.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
FRESHMAN - ODD YEAR - FALL SEMESTER		MUSC 103 counts as a Humanities and Fine Arts Gen Ed	3
MUSC 130	3	MUSC 131	3
MUSC 132	1	MUSC 133	1
MUSC 165	1	MUSC 165	1
MUSC 180	0	MUSC 173	1
MUSC 189[1]	1	MUSC 180	0
ENGL 110	4	ENGL 120	3
COMM 110	3	Quantitative Reasoning Gen Ed	3
Science & Technology Gen Ed	3		
	16		15
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
SOPHOMORE - EVEN YEAR - FALL SEMESTER		SOPHOMORE - ODD YEAR - SPRING SEMESTER	
MUSC 180	0	MUSC 180	0
MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 265	1	MUSC 265	1
MUSC 273	2	MUSC 273	2
MUSC 385	3	MUSC 3XX Major Ensemble	1
MUSC 3XX Major Ensemble	1	MUSC 3XX Minor Ensemble	1
MUSC 3XX Minor Ensemble	1	Social & Behavioral Sciences/ Cultural Diversity Gen Ed	3
Social & Behavioral Sciences Gen Ed	3	Science & Technology w/ Lab Gen Ed	4
	15		16

Junior			
Fall	**Credits**	**Spring**	**Credits**
JUNIOR - ODD YEAR - FALL SEMESTER		JUNIOR - EVEN YEAR - SPRING SEMESTER	
MUSC 180	0	MUSC 341	3
MUSC 250	2	MUSC 365	1
MUSC 340 counts as a Humanities and Fine Arts Gen Ed	3	MUSC 373	2
MUSC 365	1	MUSC 3XX Major Ensemble	1
MUSC 373	2	MUSC 3XX Minor Ensemble	1
MUSC 3XX Major Ensemble	1	MUSC 380	1
MUSC 3XX Minor Ensemble	1	MUSC 423	2
MUSC 443	3	MUSC 411	3
ENGL 323 (or any upper division English course approved by advisor)	3	Jazz Studies	1
	16		15

Senior			
Fall	**Credits**	**Spring**	**Credits**
SENIOR - EVEN YEAR - FALL SEMESTER		SENIOR - ODD YEAR - SPRING SEMESTER	
MUSC 3XX Major Ensemble	1	MUSC 3XX Major Ensemble	1
MUSC 3XX Minor Ensemble	1	MUSC 3XX Minor Ensemble	1
MUSC 431	3	MUSC 424	2
MUSC 442 (or MUSC 344 Wind Band Literature or MUSC 346 Survey/ Vocal Literature or MUSC 441 Symphonic Literature)	2	MUSC 430	3
MUSC 465	1	MUSC 465	1
MUSC 473	3	MUSC 473	3
Science & Technology/Global Perspectives Gen Ed	3	MUSC 480	1
Wellness Gen Ed	2	Jazz Studies	1
	16		13

Total Credits: 122

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* Music majors may not declare a music minor.

STUDENTS ENTERING AS A FRESHMAN IN AN EVEN-YEAR FALL

A grade of 'C' or better is required in all MUSC prefix courses.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
FRESHMAN - EVEN YEAR - FALL SEMESTER		MUSC 103 counts as a Humanities and Fine Arts Gen Ed	3
MUSC 130	3	MUSC 131	3
MUSC 132	1	MUSC 133	1
MUSC 165	1	MUSC 165	1

MUSC 180	0	MUSC 173	1
MUSC 189[1]	1	MUSC 180	0
ENGL 110	4	ENGL 120	3
COMM 110	3	Quantitative Reasoning Gen Ed	3
Science & Technology Gen Ed	3		
	16		15

Sophomore

Fall	Credits	Spring	Credits
SOPHOMORE - ODD YEAR - FALL SEMESTER		SOPHOMORE - EVEN YEAR - SPRING SEMESTER	
MUSC 180	0	MUSC 180	0
MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 265	1	MUSC 265	1
MUSC 273	2	MUSC 273	2
MUSC 3XX Major Ensemble	1	MUSC 3XX Major Ensemble	1
MUSC 3XX Minor Ensemble	1	MUSC 3XX Minor Ensemble	1
MUSC 385	3	MUSC 423	2
Social & Behavioral Sciences Gen Ed	3	Science & Technology w/ Lab Gen Ed	4
	15		15

Junior

Fall	Credits	Spring	Credits
JUNIOR - EVEN YEAR - FALL SEMESTER		JUNIOR - ODD YEAR - SPRING SEMESTER	
MUSC 180	0	MUSC 341	3
MUSC 250	2	MUSC 365	1
MUSC 340 counts as a Humanities and Fine Arts Gen Ed	3	MUSC 373	2
MUSC 365	1	MUSC 380	1
MUSC 373	2	MUSC 3XX Major Ensemble	1
MUSC 3XX Major ensemble	1	MUSC 3XX Minor Ensemble	1
MUSC 3XX Minor Ensemble	1	MUSC 424	2
MUSC 431	3	MUSC 430	3
MUSC 442 (or MUSC 344 Wind Band Literature or MUSC 346 Survey/ Vocal Literature or MUSC 441 Symphonic Literature)	2	Jazz Studies	1
Jazz Studies	1		
	16		15

Senior

Fall	Credits	Spring	Credits
SENIOR - ODD YEAR - FALL SEMESTER		SENIOR - EVEN YEAR - SPRING SEMESTER	
MUSC 3XX Major Ensemble	1	MUSC 411	3
MUSC 3XX Minor Ensemble	1	MUSC 3XX Major Ensemble	1
MUSC 443	3	MUSC 3XX Minor Ensemble	1

MUSC 465	1	MUSC 465	1
MUSC 473	3	MUSC 473	3
ENGL 323 (or any upper division English course approved by advisor)	3	MUSC 480	1
Wellness Gen Ed	2	Social & Behavioral Sciences/ Cultural Diversity Gen Ed	3
Science & Technology/Global Perspectives Gen Ed	3		
	17		13

Total Credits: 122

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* Music majors may not declare a music minor.

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FOR FRESHMAN ENROLLING FOR THE FIRST TIME IN ODD-YEAR FALL

A grade of 'C' or better is required in all MUSC prefix courses.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
FRESHMAN - ODD YEAR - FALL SEMESTER		FRESHMAN - EVEN YEAR - SPRING SEMESTER	
MUSC 130	3	MUSC 103 counts as a Humanities and Fine Arts Gen Ed	3
MUSC 132	1	MUSC 131	3
MUSC 160 (Up to 2 semesters of MUSC 165 with permission)	1	MUSC 133	1
MUSC 167	1	MUSC 161	1
MUSC 174	1	MUSC 167	1
MUSC 180	0	MUSC 173	1
MUSC 189[1]	1	MUSC 175	1
MUSC 3XX Major Ensemble	1	MUSC 180	0
ENGL 110	4	MUSC 3XX Major Ensemble	1
COMM 110	3	ENGL 120	3
		Quantitative Reasoning Gen Ed	3
	16		18

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
SOPHOMORE - EVEN YEAR - FALL SEMESTER		SOPHOMORE - ODD YEAR - SPRING SEMESTER	
MUSC 180	0	MUSC 180	0
MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 260	1	MUSC 261	1
MUSC 267	1	MUSC 267	1

MUSC 273	1	MUSC 273	2
MUSC 385	3	MUSC 3XX Major Ensemble	1
MUSC 3XX Major Ensemble	1	Social & Behavioral Sciences/ Cultural Diversity Gen Ed	3
Social & Behavioral Sciences Gen Ed	3	Science & Technology w/Lab Gen Ed	4
Wellness Gen Ed	2		
	16		16

Junior

Fall	Credits	Spring	Credits
JUNIOR - ODD YEAR - FALL SEMESTER		JUNIOR - EVEN YEAR - SPRING SEMESTER	
MUSC 180	0	MUSC 341	3
MUSC 250	2	MUSC 350	2
MUSC 340 counts as a Humanities and Fine Arts Gen Ed	3	MUSC 367	1
MUSC 349	2	MUSC 373	2
MUSC 367	1	MUSC 3XX Major Ensemble	1
MUSC 373	2	MUSC 3XX Minor Ensemble	1
MUSC 3XX Major Ensemble	1	MUSC 380	1
MUSC 3XX Minor Ensemble	1	MUSC 411 need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431	3
FREN 101 (or German I)	4	FREN 102 (or German II)	4
ENGL 323 (or any upper division English course approved by advisor)	3		
	19		18

Senior

Fall	Credits	Spring	Credits
SENIOR - EVEN YEAR - FALL SEMESTER		SENIOR - ODD YEAR - SPRING SEMESTER	
MUSC 3XX Major Ensemble	1	MUSC 346	2
MUSC 3XX Minor Ensemble	1	MUSC 3XX Major Ensemble	1
MUSC 431 need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431	3	MUSC 3XX Minor Ensemble	1
MUSC 442	2	MUSC 430 need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431	(3)
MUSC 467	1	MUSC 467	1
MUSC 473 (Students may take THEA 268 Acting the Song I instead of 3 credits of Supplementary Applied Study)	3	MUSC 473	3
GERM 101 (or French I)	4	MUSC 480	1
Science & Technology/Global Perspectives Gen Ed	3	GERM 102 (or French II)	4

		Science & Technology Gen Ed	3
	18		16

Total Credits: 137

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* Music majors may not declare a music minor.

FOR FRESHMAN ENROLLING FOR THE FIRST TIME IN AN EVEN-YEAR FALL

A grade of 'C' or better is required in all MUSC prefix courses.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
FRESHMAN - EVEN YEAR - FALL SEMSTER		FRESHAMN - ODD YEAR - SPRING SEMESTER	
MUSC 130	3	MUSC 103	3
MUSC 132	1	MUSC 131	3
MUSC 160	1	MUSC 133	1
MUSC 167	1	MUSC 161	1
MUSC 174	1	MUSC 167	1
MUSC 180	0	MUSC 173	1
MUSC 189	1	MUSC 175	1
MUSC 3XX Major Ensemble	1	MUSC 180	0
ENGL 110	4	MUSC 3XX Major Ensemble	1
COMM 110	3	ENGL 120	3
		Quantitative Reasoning Gen Ed	3
	16		18
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
SOPHOMORE - ODD YEAR - FALL SEMESTER		SOPHOMORE - EVEN YEAR - SPRING SEMESTER	
MUSC 180	0	MUSC 180	0
MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 260	1	MUSC 261	1
MUSC 267	1	MUSC 267	1
MUSC 273	1	MUSC 273	2
MUSC 385	3	MUSC 3XX Major Ensemble	1
MUSC 3XX Major Ensemble	1	Social & Behavioral/Cultural Diversity Gen Ed	3
Social & Behavioral Gen Ed	3	Science & Technology w/ Lab Gen Ed	4
Science & Technology/Global Perspectives Gen Ed	3		
Wellness Gen Ed	2		
	19		16

Junior			
Fall	**Credits**	**Spring**	**Credits**
JUNIOR - EVEN YEAR - FALL SEMESTER		JUNIOR - ODD YEAR - SPRING SEMESTER	
MUSC 180	0	MUSC 341	3
MUSC 250	2	MUSC 346	2
MUSC 340	3	MUSC 367	1
MUSC 367	1	MUSC 373	2
MUSC 373	2	MUSC 3XX Major Ensemble	1
MUSC 3XX Major Ensemble	1	MUSC 3XX Minor Ensemble	1
MUSC 3XX Minor Ensemble	1	MUSC 380	1
MUSC 431	3	MUSC 430	3
MUSC 442	2	FREN 102 (or German II)	4
FREN 101 (or German I)	4		
	19		18
Senior			
Fall	**Credits**	**Spring**	**Credits**
SENIOR - ODD YEAR - FALL SEMESTER		SENIOR - EVEN YEAR - SPRING SEMESTER	
MUSC 349	2	MUSC 350	2
MUSC 3XX Major Ensemble	1	MUSC 3XX Major Ensemble	1
MUSC 3XX Minor Ensemble	1	MUSC 3XX Minor Ensemble	1
MUSC 467	1	MUSC 411	(3)
MUSC 473	3	MUSC 473	3-4
ENGL 323 (or any upper division English course approved by advisor)	3	MUSC 473	3
GERM 101 (or French I)	4	MUSC 480	1
Science & Technology Gen Ed	3	GERM 102	4
	18		15-16

Total Credits: 139-140

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

* Music majors may not declare a music minor.

Music Education

Department Information

- **Department Location:**
  Reineke Fine Arts Center
- **Department Phone:**
  701-231-7932
- **Department Email:**
  ndsu.performing.arts@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/performingarts/music/
- **Degrees Offered:**
  B.Mus.

- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/music-education/

The **Bachelor of Music in Music Education** (B.Mus.) includes certification requirements for students to teach music in North Dakota's public schools. Students may opt for certification in grades K-12 or 7-12. Though the degree contains comprehensive preparation, students generally elect a principal area in either instrumental or voice/choral.

Certification in Music Education

Students must complete the School of Education (https://www.ndsu.edu/education) requirements, complete the common music requirements, complete either the vocal or instrumental emphasis and pass a piano proficiency examination prior to student teaching. Piano credit requirements may be waived in whole or in part upon successful completion of the piano proficiency examinations. Specific general education requirements, School of Education requirements, and other information may be obtained from the Division of Performing Arts (https://www.ndsu.edu/performingarts) office.

Ensembles

The NDSU Challey School of Music sponsors a large variety of ensembles including the NDSU Wind Symphony, Concert Choir, University Symphony Orchestra, Madrigal Singers, two large Jazz Ensembles, Jazz Combos, the Gold Star Marching Band, Brass Ensemble, University Chamber Singers, NDSU Statesmen, Cantemus, University Band, Bison Pep Bands, NDSU Opera Theatre, and chamber ensembles in typical instrumental and vocal combinations. The Concert Choir, Wind Symphony, Jazz Ensemble, Madrigal Singers and several other groups have touring programs, some of which are national or international in scope. Participation in these ensembles is open to all students, some by audition and some as open-enrollment ensembles.

Music Curricula

Requirements are grouped by degree. Please refer also to graduation requirements listed in the Academic Policies (p. 1386) section of this publication. The information in this Bulletin may be superseded by information updated regularly and provided by the Challey School of Music.

instrumental music education

9 Semester Plan of Study for Students entering in EVEN Fall.

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
EVEN YEAR		ODD YEAR	
MUSC 111	1	MUSC 103	3
MUSC 130	3	MUSC 131	3
MUSC 132	1	MUSC 133	1
MUSC 160	1	MUSC 161	1
MUSC 180	0	MUSC 180	0
MUSC 189	1	MUSC 1XX Applied Study	1
MUSC 1XX Applied Study	1	MUSC 1XX Choir	1
MUSC 1XX Choir	1	PSYC 250	3
MUSC 1XX Minor Ens.	1	ENGL 120	3
ENGL 110	4		
PSYC 111	3		
	17		16
Second Year			
Fall	**Credits**	**Spring**	**Credits**
ODD YEAR		EVEN YEAR	
MUSC 111	1	MUSC 163	2
MUSC 180	0	MUSC 180	0
MUSC 230	3	MUSC 231	3

MUSC 232	1	MUSC 233	1
MUSC 260	1	MUSC 261	1
MUSC 2XX Applied Study	1	MUSC 2XX Applied Study	1
EDUC 321	3	MUSC 3XX Band	1
Science & Technology Gen Ed	3	EDUC 322	3
COMM 110	3	Science & Technology w/lab Gen Ed	4
	16		16

Third Year

Fall	Credits	Spring	Credits
EVEN YEAR		ODD YEAR	
MUSC 180	0	MUSC 341	3
MUSC 250	2	MUSC 351	2
MUSC 340	3	MUSC 354	2
MUSC 353	2	MUSC 359	2
MUSC 357	2	MUSC 3XX Applied Study	1
MUSC 482	2	MUSC 3XX Band	1
MUSC 3XX Applied Study	1	MUSC 1XX Minor Ens.	1
MUSC 3XX Band	1	Social & Behavioral Sciences/ Cultural Diversity Gen Ed	3
EDUC 451	3	EDUC 486	3
	16		18

Fourth Year

Fall	Credits	Spring	Credits
ODD YEAR		EVEN YEAR	
MUSC 331	2	MUSC 480	1
MUSC 344	2	MUSC 3XX Band	1
MUSC 349	2	MUSC 483	2
MUSC 352	2	EDUC 489	3
MUSC 355	2	Science & Technology Gen Ed	3
MUSC 385	3	Quantitative Reasoning Gen Ed	3
MUSC 481	2	ENGL 323	3
MUSC 4XX Applied Study	1	Wellness Gen Ed	2
MUSC 3XX Band	1		
	17		18

Fifth Year

Fall	Credits
EVEN YEAR	
EDUC 485	1
EDUC 487	9
EDUC 488	3
	13

Total Credits: 147

9 Semester Plan of Study for Students entering in ODD Fall.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ODD YEAR		EVEN YEAR	
MUSC 111	1	MUSC 103	3
MUSC 130	3	MUSC 131	3
MUSC 132	1	MUSC 133	1
MUSC 160	1	MUSC 161	1
MUSC 180	0	MUSC 180	0
MUSC 189	1	MUSC 1XX Applied Study	1
MUSC 1XX Applied Study	1	MUSC 1XX Choir	1
MUSC 1XX Choir	1	PSYC 250	3
MUSC 1XX Minor Ens.	1	ENGL 120	3
ENGL 110	4		
PSYC 111	3		
	17		16
Second Year			
Fall	**Credits**	**Spring**	**Credits**
MUSC 111	1	MUSC 163	2
MUSC 180	0	MUSC 180	0
MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 260	1	MUSC 261	1
MUSC 2XX Applied Study	1	MUSC 2XX Applied Study	1
Science & Technology Gen Ed	3	MUSC 3XX Band	1
COMM 110	3	EDUC 322	3
EDUC 321	3	Science & Technology w/lab Gen Ed	4
	16		16
Third Year			
Fall	**Credits**	**Spring**	**Credits**
ODD YEAR		EVEN YEAR	
MUSC 180	0	MUSC 341	3
MUSC 250	2	MUSC 351	2
MUSC 331	2	MUSC 354	2
MUSC 340	3	MUSC 359	2
MUSC 344	2	MUSC 3XX Applied Study	1
MUSC 353	2	MUSC 3XX Band	1
MUSC 482	2	MUSC 1XX Minor Ens.	1
MUSC 3XX Applied Study	1	Social & Behavioral Science/Cultural Diversity Gen Ed	3
MUSC 3XX Band	1	EDUC 486	3
EDUC 451	3		
	18		18
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
ODD YEAR		EVEN YEAR	

MUSC 349	2	MUSC 480	1
MUSC 352	2	MUSC 3XX Band	1
MUSC 355	2	MUSC 483	2
MUSC 357	2	EDUC 489	3
MUSC 385	3	Science & Technology Gen Ed	3
MUSC 482	2	Quantitative Reasoning Gen Ed	3
MUSC 4XX Applied Study	1	ENGL 323	3
MUSC 3XX Band	1		
Wellness Gen Ed	2		
	17		16

Fifth Year			
Fall	**Credits**		
EVEN YEAR			
EDUC 485	1		
EDUC 487	9		
EDUC 488	3		
	13		

Total Credits: 147

vocal music education

9 Semester Plan of Study for Students entering in ODD Fall.

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ODD YEAR		EVEN YEAR	
MUSC 112 or 111	1	MUSC 103	3
MUSC 130	3	MUSC 131	3
MUSC 132	1	MUSC 133	1
MUSC 160	1	MUSC 161	1
MUSC 167	1	MUSC 167	1
MUSC 174	1	MUSC 175	1
MUSC 180	0	MUSC 180	0
MUSC 189	1	MUSC 1XX Choir	1
MUSC 1XX Choir	1	ENGL 120	3
ENGL 110	4	Wellness Gen Ed	2
COMM 110	3		
	17		16

Sophomore			
Fall	**Credits**	**Spring**	**Credits**
EVEN YEAR		ODD YEAR	
MUSC 180	0	MUSC 112 or 111	1
MUSC 230	3	MUSC 180	0
MUSC 232	1	MUSC 231	3

MUSC 260	1	MUSC 233	1
MUSC 267	1	MUSC 261	1
MUSC 3XX Choir	1	MUSC 267	1
MUSC 353	2	MUSC 3XX Choir	1
EDUC 321	3	MUSC 1XX Minor Ensemble	1
PSYC 111	3	EDUC 322	3
		Science & Technology w/Lab Gen Ed	4
	15		16

Junior

Fall	**Credits**	**Spring**	**Credits**
ODD YEAR		EVEN YEAR	
MUSC 180	0	MUSC 341	3
MUSC 250	2	MUSC 350	2
MUSC 340	3	MUSC 351	2
MUSC 349	2	MUSC 367	1
MUSC 367	1	MUSC 3XX Choir	1
MUSC 3XX Choir	1	MUSC 3XX Minor Ensemble	1
MUSC 481	2	EDUC 486	3
EDUC 451	3	PSYC 250	3
Science & Technology Gen Ed	3		
	17		16

Senior

Fall	**Credits**	**Spring**	**Credits**
EVEN YEAR		ODD YEAR	
MUSC 332	2	MUSC 359	2
MUSC 352	2	MUSC 480	1
MUSC 355	2	MUSC 483	2
MUSC 385	3	EDUC 489	3
MUSC 467	1	Social & Behavioral Science/Cultural Diversity Gen Ed	3
MUSC 482	2	Quantitative Reasoning Gen Ed	3
MUSC 3XX Choir	1	Science & Technology Gen Ed	3
ENGL 323	3		
	16		17

Fifth Year

Fall	**Credits**
ODD YEAR	
EDUC 485	1
EDUC 487	9
EDUC 488	3
	13

Total Credits: 143

9 Semester Plan of Study for Students entering in EVEN Fall.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
EVEN YEAR		ODD YEAR	
MUSC 112	1	MUSC 103	3
MUSC 130	3	MUSC 131	3
MUSC 132	1	MUSC 133	1
MUSC 160	1	MUSC 161	1
MUSC 167	1	MUSC 167	1
MUSC 174	1	MUSC 175	1
MUSC 180	0	MUSC 180	0
MUSC 189	1	MUSC 3XX Choir	1
MUSC 3XX Choir	1	ENGL 120	3
ENGL 110	4	Wellness Gen Ed	2
COMM 110	3		
	17		16
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
ODD YEAR		EVEN YEAR	
MUSC 180	0	MUSC 112 or 111	1
MUSC 230	3	MUSC 180	0
MUSC 232	1	MUSC 231	3
MUSC 260	1	MUSC 233	1
MUSC 267	1	MUSC 261	1
MUSC 3XX Choir	1	MUSC 267	1
MUSC 353	2	MUSC 3XX Choir	1
EDUC 321	3	MUSC 1XX Minor Ensemble	1
PSYC 111	3	EDUC 322	3
		Science & Technology w/lab Gen Ed	4
	15		16
Junior			
Fall	**Credits**	**Spring**	**Credits**
EVEN YEAR		ODD YEAR	
MUSC 180	0	MUSC 341	3
MUSC 250	2	MUSC 351	2
MUSC 340	3	MUSC 367	1
MUSC 367	1	MUSC 3XX Choir	1
MUSC 385	3	MUSC 3XX Minor Ensemble	1
MUSC 3XX Choir	1	EDUC 486	3
MUSC 481	2	EDUC 489	3
EDUC 451	3	PSYC 250	3
Science & Technology Gen Ed	3		
	18		17
Senior			
Fall	**Credits**	**Spring**	**Credits**
ODD YEAR		EVEN YEAR	

MUSC 332	2	MUSC 350	2
MUSC 349	2	MUSC 359	2
MUSC 352	2	MUSC 480	1
MUSC 355	2	MUSC 483	2
MUSC 467	1	Cultural Diversity Gen Ed	3
MUSC 482	2	Quantitative Reasoning Gen Ed	3
MUSC 3XX Choir	1	Science & Technology Gen Ed	3
ENGL 323	3		
	15		16

Fifth Year	
Fall	**Credits**
EVEN YEAR	
EDUC 485	1
EDUC 487	9
EDUC 488	3
	13

Total Credits: 143

Natural Resources Management

Department Information

- **Department Location:**
  Morrill Hall 307A
- **Department Phone:**
  701-231-8180
- **Department Web Site:**
  www.ndsu.edu/nrm/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/natural-resources-management/

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

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

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

- **Biotic Resources Science:** deals with basic scientific principles that govern the interrelationship between biotic (e.g., plants, animals) and abiotic factors (e.g., climate, soils) in major ecosystems and the use of these principles for environmentally sound management of both natural and agro-ecosystems.
- **Environmental Communication:** is designed for environmentally oriented students preparing for careers in communication fields such as journalism, public relations, broadcast media and the internet.
- **Natural Resources Economics:** prepares students for management, administrative, regulatory, and policy positions that require a broad understanding of natural resources management and allocation.

- **Physical/Earth Resources Science:** leads to an understanding of the physical and chemical aspects of ecosystems. Topics of study include hydrology, water management and quality, waste management, soil properties, energy resources and land-use management.
- **Pollution Control:** focuses on the principles and practices of managing natural resources for pollution control. Topics include the technical aspects of pollution as they relate to water, air/solids, earth/soils, and the impact of environmental pollution on biotic factors. Students interested in this emphasis are strongly urged to complete College Algebra before entering the NRM program.
- **Social Sciences:** concentrates on human factors (social, political, anthropological) in environmental management and environmental disaster management, while recognizing constraints and opportunities presented by physical and biological factors.
- **Sustainability and Resiliency:** focuses on how to build capacity to deal with change; prepares students through system, strategic, and anticipatory thinking.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 150 & 150L	4	BIOL 151 & 151L	4
MATH 103	3	ENGL 120	3
NRM 225	3	Humanities & Fine Arts Gen Ed	6
NRM 150	1	Wellness Gen Ed	2
ENGL 110	4		
	15		15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 110	3	CHEM 121 & 121L	4
ECON 201	3	NRM 264	3
GEOL 105	3	SOIL 210	3
SOC 110 or EMGT 101	3	STAT 330	3
POLS 115 or 215	3	Decide on Emphasis area - see below	
Decide on Emphasis area - see below		Elective	3
	15		16
Third Year			
Fall	**Credits**	**Spring**	**Credits**
ECON 481	3	HIST 434 or 435	3
NRM 431	3	RNG 452	3
Upper level Sociology, EMGT, POLS	3	Emphasis core	8
Upper level ENGL Gen Ed	3	Elective	3
Emphasis core	3		
Elective	3		
	18		17
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
Emphasis core	15	NRM 462	3
		Emphasis core	12

	Elective	3
	15	18

Total Credits: 129

Natural Resources Management Emphasis Areas

Biotic Resources Science

Code	Title	Credits
Choose One Tract - Required 6 credits		6
CHEM TRACT		
CHEM 122	General Chemistry II	
CHEM 240	Survey of Organic Chemistry	
MANAGEMENT TRACT		
RNG 453/453	Rangeland Resources Watershed Management	
RNG 136	Introduction to Range Management	
Required 32 additional elective credits		32
Total Credits		38

Sustainability

Code	Title	Credits
Required 12 credits		
NRM 420	Sustainable Scenarios in Natural Resources Management	3
NRM 401	Urban-Ecosystem Management	3
SOC 431	Environmental Sociology	3
or SOC 404	Community Assessment	
or POLS 442	Global Policy Issues	
or POLS 453	Environmental Policy and Politics	
NRM 454	Wetland Resources Management	3
or NRM 402	River and Stream Resource Management	
or SOIL 410	Soils and Land Use	
or BIOL 475	Conservation Biology	
Required 26 additional elective credits		26
Total Credits		38

Physical/Earth Resources Science

Code	Title	Credits
Required 13 credits		
CHEM 122	General Chemistry II	3
CHEM 122L	General Chemistry II Laboratory	1
GEOL 300	Environmental Geology	3
or GEOG 412	Geomorphology	
SOIL 322	Soil Fertility and Fertilizers	3
or SOIL 351	Soil Ecology	
SOIL 410	Soils and Land Use	3
or SOIL 444	Soil Genesis and Survey	
Required 25 additional elective credits		25
Total Credits		38

Social Sciences

Code	Title	Credits
Required 10 credits		
SOC 340	Social Research Methods	3

SOC 341	Social Research Methods Laboratory	1
SOC 404	Community Assessment	3
SOC 405	Community Development	3
Required 28 additional elective credits		28
Total Credits		38

Pollution Control

Code	Title	Credits
Required 23 credits		
MATH 165	Calculus I	4
CHEM 122	General Chemistry II	3
CHEM 122L	General Chemistry II Laboratory	1
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
CE 309	Fluid Mechanics	3
CE 370	Introduction to Environmental Engineering	3
CE 408	Water Resources and Supply	3
Required 15 additional elective credits		15
Total Credits		38

Environmental Communication

Code	Title	Credits
Required 16 credits		
COMM 112	Understanding Media and Social Change	3
COMM 200	Introduction to Media Writing	3
NRM 421	Environmental Outreach Methods	3
COMM 485	Risk and Crisis Communication	3
COMM 325	Applied Research Methods	4
or SOC 340 & SOC 341	Social Research Methods and Social Research Methods Laboratory	
Required 22 additional elective credits		22
Total Credits		38

Natural Resources Economics

Code	Title	Credits
Required 9 credits		
MATH 144	Mathematics for Business	4
ECON 341	Intermediate Microeconomics	3
STAT 331	Regression Analysis	2
Required 29 additional elective credits		29
Total Credits		38

Neuroscience

Department Information

- **Department Location:**
  Minard Hall 232
- **Department Phone:**
  701-231-8622
- **Department Web Site:**
  www.ndsu.edu/psychology/
- **Degrees Offered:**
  Minor

- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/neuroscience/

Neuroscience is a rapidly expanding field and an undergraduate minor will benefit students studying in many scientific disciplines (e.g., biology; zoology; psychology; chemistry), pre-professional and professional areas (e.g., exercise science; nursing; pharmacy), as well as in the humanities and social sciences. Students learn how the brain and nervous system receives and processes a variety of external and internal information to generate a variety of conscious and unconscious behaviors. Moreover, with an inherent emphasis on critical thinking, a neuroscience minor provides a valuable check on magical or mystical thinking about the human condition. The neuroscience minor may increase students' opportunities either to attend graduate school or to find positions in their professional field.

Courses taken for a Psychology major cannot be used toward a Neuroscience minor. Be sure to officially declare your minor with the Office of Registration and Records (https://www.ndsu.edu/registrar) by completing the Undergraduate Major, Minor, Certificate, or Adviser Change Form (https://www.ndsu.edu/registrar/forms/majorchange) which is found online.

Nursing

Department Information

- **Department Location:**
  SGC D102
- **Department Phone:**
  701-231-7395
- **Department Web Site:**
  www.ndsu.edu/nursing/
- **Degrees Offered:**
  B.S.N.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/nursing/

All undergraduate tracks in the School of Nursing lead to a Bachelor of Science in Nursing (BSN) degree. Graduates of the pre-licensure BSN and LPN to BSN tracks are eligible to apply for the national council licensure examination (NCLEX) to become a registered nurse (RN). Students in the RN to BSN track are already licensed as a RN.

Pre-Licensure BSN:

The pre-licensure BSN program is the largest program in the School of Nursing. This professional program consists of one year of pre-requisite courses and three years of additional non-nursing and professional nursing courses. Students in the professional program complete practicum experiences in a variety of clinical settings including acute and long term adult health care, pediatrics, public health, emergency department, critical care, labor and delivery as well as mental health.

LPN to BSN:

The LPN to BSN program is designed for a licensed practical nurse (LPN) who wants to obtain a Bachelor of Science in Nursing to become a RN. Coursework in the professional program is completed on a part-time basis (5-6 nursing credits a semester) over the length of two years (including summers). Courses are delivered online with clinical work completed in a variety of Fargo locations during the summer semesters. The curriculum builds on students' prior knowledge to develop critical thinking, theoretical knowledge, leadership and growth in the RN professional role.

RN to BSN:

The RN to BSN program is designed for registered nurses who want to advance to a Bachelor of Science in Nursing. The two year program is geared for part-time students. Coursework focuses on the current health care system/environment, quality and safety, evidence-based practice, population-focused nursing, leadership and chronic health issues. The program is intended to educate nurses to practice with a transformed perspective, having a better understanding of themselves and the complex environment in which nurses work.

Plans of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Plan of Study: Pre-Licensure Fall Start Professional Program

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	ENGL 120	3
CHEM 117	3	BIOC 260	4
CHEM 117L	1	COMM 110	3
SOC 110 or ANTH 111	3	PSYC 111	3
CHP 190	2	MICR 202	2
Quantitative Reasoning	3	MICR 202L	1
	16		16
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
BIOL 220	3	BIOL 221	3
BIOL 220L	1	BIOL 221L	1
NURS 210	2	HNES 250	3
NURS 250	2	NURS 251	2
HDFS 230 or PSYC 250	3	NURS 252	2
Cultural Diveristy (D) Elective	3	NURS 360	4
	14		15
Junior			
Fall	**Credits**	**Spring**	**Credits**
ENGL 325	3	NURS 352	4
NURS 341	3	NURS 362	4
NURS 342	5	NURS 382	1
NURS 300	3	CHP 400	3
		Global Persepective (G)	3
	14		15
Senior			
Fall	**Credits**	**Spring**	**Credits**
NURS 402	4	NURS 404	4
NURS 403	5	NURS 406	4
NURS 410	2	NURS 450	4
NURS 460	3	Humanities & Fine Arts (A)	3
Humanities & Fine Arts (A)	3		
	17		15

Total Credits: 122

Pre-Licensure Spring Start Professional Program

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	ENGL 120	3
CHEM 117	3	COMM 110	3
CHEM 117L	1	MICR 202	2
SOC 110 or ANTH 111	3	MICR 202L	1
Quantitative Reasoning	3	PSYC 111	3

CHP 190	2	BIOC 260	4
	16		16
Second Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 220	3	NURS 210	2
BIOL 220L	1	NURS 250	2
PSYC 250 or HDFS 230	3	BIOL 221	3
Elective	3	BIOL 221L	1
Cultural Diversity (D)	3	HNES 250	3
		Humanities & Fine Arts (A)	3
	13		14
Third Year			
Fall	**Credits**	**Spring**	**Credits**
NURS 251	2	ENGL 325	3
NURS 252	2	NURS 341	3
NURS 360	4	NURS 342	5
Humanities & Fine Arts (A)	3	NURS 300	3
Global Perspective (G)	3		
	14		14
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
NURS 352	4	NURS 402	4
NURS 362	4	NURS 403	5
NURS 382	1	NURS 410	2
NURS 460	3	CHP 400	3
	12		14
Fifth Year			
Fall	**Credits**		
NURS 404	4		
NURS 406	4		
NURS 450	4		
	12		

Total Credits: 125

LPN to BSN Program

- PN Program Transfer Credits = 40-60 credits
- Total Credits for a degree must = 122
- Nursing Validation (18 credits): NURS 362 Family Nursing II, NURS 352 Family Nursing I, NURS 402 Mental Health Nursing, NURS 403 Adult Health Nursing II

Third Year					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
CHEM 117	3	NURS 289	2	NURS 406	4
CHEM 117L	1	NURS 360	4	ENGL 325	3
		BIOC 260	4	NURS 420	3
	4		10		10

Fourth Year					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
NURS 372	3	NURS 407	3	NURS 407L	3
NURS 405	2	NURS 460	3	CHP 400	3
PSYC 111	3			Global Perspective (G)	
	8		6		6
Fifth Year					
Fall	**Credits**				
NURS 450	4				
	4				

Total Credits: 48

RN to BSN Program

Total Credits for a degree must = 122

First Year					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
NURS 326	1	NURS 346	1	NURS 366	3
NURS 356	3	NURS 386	3		
NURS 420	3	NURS 388	3		
	7		7		3
Second Year					
Fall	**Credits**	**Spring**	**Credits**		
NURS 426	1	NURS 456	1		
NURS 436	3	NURS 462	3		
NURS 446	3	NURS 462L	1		
NURS 446L	2	NURS 478	2		
	9		7		

Total Credits: 33

Pharmacy

Department Information

- **Department Location:**
  Sudro Hall
- **Department Phone:**
  701-231-7456
- **Department Web Site:**
  www.ndsu.edu/pharmacy/
- **Degrees Offered:**
  Pharm.D.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/pharmacy/

The Pharmacy program encompasses both the basic and clinical sciences and is designed to provide students with the knowledge, skills, and attitudes essential to the practice of pharmacy. Pharmacists work in concert with the patient and other health care providers to promote health and prevent diseases. This is achieved by assessing, monitoring, initiating and modifying patients' medication therapy to achieve optimal therapeutic outcomes.

Selective Admission

To enroll as a freshman in the College of Health Professions (pre-pharmacy), you should have taken the ACT or SAT and have graduated from high school with a minimum of 17 academic units, at least four units of English and three units of mathematics. You should complete course work in physical and biological sciences. Upon successfully being accepted to NDSU, transfer students may be admitted to the College of Health Professions and declare a pre-professional major at any time, so long as they are in good academic and professional standing.

Admission to the professional pharmacy program is competitive and limited to 85 students each year. Students are selected based upon successful prior academic performance at the time of admission. There are two paths to gain admission into the pharmacy program.

The first is our "early admission" path. This path is designed for high achieving high school students who seek an expedited path to the professional program. Students are selected for this path based on their academic credentials (including high school grade point averages and ACT or SAT scores) at the time they apply to NDSU. Preference is given to North Dakota residents. Students are evaluated during the summer before they enroll at NDSU as first year students, and will be offered admission to this path on or before July 15 of that year. Once accepted on this admission path, students must attend NDSU for the entire six-year program. The first year entails standard pre-professional studies. At the conclusion of the first year, students who maintain academic and professional requirements transition into a five-year professional program. During the first year in the professional program, students complete all remaining pre-professional requirements, including an expedited set of courses that prepare them for the final four years of the professional program. Students also complete the Pharmacy College Admissions Test (PCAT) and an on-site interview. Transition into the final four years of the professional program is guaranteed as long as students meet all academic and professional requirements. Students accepted into the "early admissions" path, but who fail to meet all academic and professional requirements, are encouraged to apply to the professional program through the second path described below.

The second path is our "traditional" path. Prepharmacy students (including transfer students) typically apply for admission to the four-year professional program during the second (or in some cases the third) pre-pharmacy year. Admission to the professional pharmacy program is competitive and limited to the difference between the number of available seats (85) and the number of "early admission" students entering the final four years of the professional program each year. Students are selected based upon successful pre-pharmacy academic performance. Preference is given to North Dakota residents and students who attend NDSU. A cumulative grade point average of 3.0 (4.0 = A) or above is required before an applicant will be evaluated for admission to the professional program. The actual admission cutoff is much higher. The Pharmacy College Admission Test (PCAT) is an admission requirement. Students must take the PCAT during the July or September testing dates. An on-site interview is part of the admission process for the professional program. Supplemental applications are due on or before December 31 for subsequent fall semester admission. Supplemental applications are submitted online directly to the Pharmacy Admissions Committee. A nonrefundable $100.00 application fee must accompany the supplemental application.

Differential Tuition

Students in the pharmacy professional program (i.e., the final five years of study for students on the "early admissions" path, and the final four years for students on the "traditional" admissions path) are assessed a different tuition rate. This differential tuition is assessed to cover the higher costs associated with the program.

Current Curriculum

The curriculum leading to the Pharm.D. degree requires a minimum of six years of study. Approximately 77 semester hours are required in the pre-professional curriculum. The vast majority of required pre-professional courses (listed by name and number) must be completed by the end of spring term prior to admission to the professional program (for "traditional" path students), or for "early admissions" students, the final four years of the professional program. A maximum of six elective credits may be taken during the summer prior to entrance in the professional program.

The current entry-level Pharm.D. curriculum is designed to produce graduates with the professional competencies necessary to enter pharmacy practice in any setting to ensure optimal medication therapy outcomes and patient safety, and to satisfy the educational requirements for licensure as a pharmacist. The Pharm.D. degree prepares the student to accept positions in community, hospital, managed care, clinical, and industrial pharmacy. Other potential opportunities include administrative positions in pharmaceutical companies and associations. Teaching and research positions in universities and the pharmaceutical industry are excellent opportunities for those with advanced training in pharmacy.

The college is a member of the American Association of Colleges of Pharmacy, and is accredited by the Accreditation Council for Pharmacy Education (ACPE).

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

PRE-PHARMACY PROGRAM REQUIREMENTS

First Year					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
BIOL 150 & 150L	4	BIOL 151 & 151L	4	CHEM 341 & 341L	4

CHEM 121 & 121L	4	CHEM 122 & 122L	4	CHEM 342	3
ENGL 110	4	COMM 110	3		
MATH 146	4	ENGL 120	3		
CHP 190	2	ECON 201	3		
Wellness Gen Ed	2	STAT 330	3		
	20		20		7

Second Year					
Fall	**Credits**	**Spring**	**Credits**		
BIOC 460	3	BIOC 461	3		
BIOL 220 & 220L	4	BIOL 221 & 221L	4		
COMM 216	3	ENGL 324 or 325	3		
MICR 350 or 202	3	MICR 460	3		
MICR 350L or 202L	2	PHYS 211	3		
Humanities/Fine Arts Gen Ed	3	Humanities/Fine Arts Gen Ed	3		
	18		19		

Total Credits: 84

Philosophy/Humanities

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-8654
- **Department Web Site:**
  ndsuhprs.org/ (http://ndsuhprs.org)
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/philosophy-humanities/

Through interdisciplinary study, students develop an awareness and understanding of the major events and ideas that have shaped the civilization in which they live.

Philosophy-Humanities Major

People have always had questions about the world in which they live. Whether these questions are about truth, beauty, and goodness, or about whether life has any meaning, people find questions to ask. Over the centuries, many minds have addressed these questions. By means of dialogue, intuition, logic, and critical thought, philosophers have created pathways to wisdom and an understanding of the human condition.

North Dakota State University offers students a Philosophy curriculum that may be approached either as a Philosophy-Humanities major or minor.

The Philosophy-Humanities major consists of 32 semester credits. Of these, 21 credits must be taken from the required courses. Eleven elective credits, which can be independent studies, complete the major. Each degree has additional university and College of Arts, Humanities and Social Sciences requirements that must be fulfilled.

Philosophy-Humanities Minor

The Philosophy-Humanities minor consists of 21 semester credits: the minor required courses plus six elective credits from the elective philosophy courses, including independent studies.

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	ENGL 120	3
PHIL 101	3	PHIL 210 or 215	3
PHIL 257	3	GE Quantitative Reasoning	3
GE Science and Technology	3	GE Science and Technology	3
GE Social and Behavioral Science	3	GE Social and Behavioral Science	3
	16		15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 110	3	PHIL 323 or 324	3
PHIL 321 or 322	3	GE Wellness	2
GE Humanities Req.	3	AHSS Social and Behavioral Science	3
GE Science and Technology w/ Lab	4	GE Fine Arts Req.	3
Minor/Free Elective	3	Free Electives	6
	16		17
Third Year			
Fall	**Credits**	**Spring**	**Credits**
PHIL 450 or 486	3	PHIL 451	3
AHSS Humanities Req.	3	AHSS Fine Arts Req.	3
Minor or Foreign Language	3	Minor or Foreign Language	3
Minor or Free Electives	6	Minor or Free Electives	6
	15		15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
PHIL/HUM Electives	6	PHIL/HUM Electives	5
Minor or Foreign Language	3	Minor or Foreign Language	3
Minor or Free Electives	6	Minor or Free Electives	6
	15		14

Total Credits: 123

Physical Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/physical-education/

The Physical Education Teacher Education (PETE) program provides opportunities for students to become critical thinkers, creative planners, and effective practitioners.

To be successful in the field, a physical education student must like to work with people, be adequately skilled in physical activities, have a commitment to fitness, and be interested in the physical, biological and social sciences.

The PETE program emphasizes teaching and provides students with skills and techniques necessary to begin a successful career in K-12 physical education. The program is aligned with the Society of Health and Physical Educators (SHAPE America) PETE Standards. The courses are strategically structured to be sequential in nature.

Students initially take courses through the Department of Health, Nutrition, and Exercise Sciences (HNES) and complete their degree requirements through the School of Education (https://www.ndsu.edu/education). Application to the School of Education will occur during the student's sophomore year. Completion of the degree requirements for a physical education major in the School of Education certifies a graduate to teach physical education from kindergarten through grade 12 (K-12).

Students majoring in Physical Education will be studying the art and science of human movement, which includes classes in elementary, middle, and high school activities; motor learning, physiology and psychology of human movement; the art of teaching and motivating students; and performance-based assessment.

Students must earn a grade of 'B' or better in all core physical education courses and must maintain a minimum 2.75 cumulative grade-point average to stay in full standing in the program.

Graduates leave prepared to teach in a professional manner, while demonstrating exemplary ethical behavior and displaying current "best practices". Graduates are expected to be positive role models for K-12 students in the area of physical education, physical activity, and sports.

Double Major

It is recommended that physical education majors obtain a degree enhancement through licensing, certification or a double major. The physical education curriculum has been structured to allow PETE students to obtain a health education (p. 118) major during the same four year time frame. The acquisition of additional credentials helps to prepare future professionals, giving them a broader area of expertise and making them more marketable

Plans of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

PHYSICAL EDUCATION TEACHING MAJOR

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	ENGL 120	3
HNES 110*	3	COMM 110	3
Humanities/Fine Arts	3	HNES 255*	3
PSYC 111	3	Science/Technology w/Lab	4
Quantitative Reasoning	3	SOC 110	3
	16		16
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
EDUC 321	3	EDUC 322	3
HNES 100, 111, or 217*	2-3	PSYC 250 or HDFS 230	3
HNES 211	1	HNES 257	3
HNES 254*	3	Science/Technology	3
HNES 256*	3	Elective	3
Science/Technology	3	Apply to the School of Education	
Complete Praxis Core Academic Skills Exam			
	15-16		15

Junior			
Fall	**Credits**	**Spring**	**Credits**
ENGL 358	3	EDUC 451 (PE Section)	3
HNES 301*	3	EDUC 489	3
HNES 336*	3	HNES 350*	3
HNES 367*	3	Humanities/Fine Arts	3
Elective	3	Elective	3
	15		15
Senior			
Fall	**Credits**	**Spring**	**Credits**
EDUC 481 (PE)	3	EDUC 485	1
EDUC 486	3	EDUC 487	9
HD&E 320	1	EDUC 488	3
HNES 461*	3		
Elective - As needed to reach 122 credits.	7		
Apply for Student Teaching			
Complete Praxis PLT Exam			
Complete Praxis II Content Exam			
	17		13

Total Credits: 122-123

* Students must earn a "B" or better in all courses identified with an asterisk (*).

** Global Perspectives and Diversity requirements can be obtained through careful selection of electives, Humanities/Fine Arts, and/or Science/Technology categories

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Physical Education/Health Education Double Major

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	COMM 110	3
HNES 110*	3	ENGL 120	3
Humanities/Fine Arts	3	HDFS 135	3
PSYC 111	3	HNES 255*	3
Quantitative Reasoning	3	Science/Tech w/Lab	4
		SOC 110	3
	16		19
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
EDUC 321	3	HNES 200 or 250*	3
EDUC 322	3	HNES 217*	3
HNES 211	1	HNES 341*	3
HNES 254*	3	HNES 257	3
HNES 256*	3	PSYC 210	3
Humanities/Fine Arts	3	Science/Tech	3

Science/Tech	3	Apply to the School of Education	
Complete Praxis Core Academic Skills Exam			
	19		18
Junior			
Fall	**Credits**	**Spring**	**Credits**
ENGL 358	3	EDUC 451 (PE Section)	3
HNES 301*	3	EDUC 489	3
HNES 336*	3	HNES 345*	3
HNES 367*	3	HNES 350*	3
PSYC 212	3	HNES 353*	3
	15		15
Senior			
Fall	**Credits**	**Spring**	**Credits**
EDUC 481 (HE Section)	3	EDUC 485	1
EDUC 481 (PE Section)	3	EDUC 487	9
EDUC 486	3	EDUC 488	3
HD&E 320	1		
HNES 461*	3		
PSYC 250 or HDFS 230	3		
Apply for Student Teaching			
Complete Praxis PLT Exam			
Complete Praxis II Content Exam			
	16		13

Total Credits: 131

* Students must earn a "B" or better in all courses identified with an asterisk (*).

** Minimum 133 total credits for double major

*** Global Perspectives and Diversity requirements can be obtained through careful selection of Humanities/Fine Arts, and/or Science/Technology categories.

Physics

Department Information

- **Department Location:**
  South Engineering
- **Department Phone:**
  701-231-8974
- **Department Web Site:**
  www.ndsu.edu/physics/contact_information/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/physics/

Physics Major

Students who complete a major in Physics are prepared for careers in industrial and governmental research and development and for graduate study in physics, astronomy, engineering, medicine, materials science, and environmental science. In-depth preparation is also provided for teaching in secondary schools.

Students interested in Physics Education are encouraged to declare a double major in their discipline and in education (i.e., Physics Education (p. 196) and Physics). Such double majors may be earned by the successful completion of a few additional credits. Students should contact their adviser, the School of Education (https://www.ndsu.edu/education), or the Office of Registration and Records (https://www.ndsu.edu/registrar) for details and are encouraged to declare their primary and secondary majors with the Office of Registration and Records, Ceres Hall 110.

Optical Science and Engineering Option

This option includes an interdisciplinary optics/photonics sequence of courses taught by the Departments of Physics (https://www.ndsu.edu/physics) and the Department of Electrical and Computer Engineering (https://www.ndsu.edu/ece) using a state-of-the-art optics teaching laboratory. This is the only regional program of its type. Optics and lasers are enabling technologies and are applied in most high-tech experiments, communications, devices, medical diagnostics, media, etc. There are more than 5,000 optics-related companies in the United States alone, but even more important, photonics provides the technical foundation for many more. Optical science and engineering has exploded to encompass nearly all fields of science and technology with a consequent shortage of individuals trained in the field. The optical science and engineering option will enhance any job search.

Physics Minor

A Physics minor consists of 19 credits, of which at least eight credits must be completed at NDSU.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
PHYS 171	1	PHYS 251 & 251L	5
MATH 165	4	PHYS 251R	1
CHEM 150 & CHEM 160	4	MATH 129 or 329	3
ENGL 110 or 120 (based on placement)	4	MATH 166	4
Wellness Gen Ed	2	CHEM 151 & CHEM 161	4
	15		17
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
PHYS 252 & 252L	5	CSCI 161	4
PHYS 252R	1	PHYS 350	3
MATH 265	4	MATH 266	3
CSCI 160	4	COMM 110	3
Humanities/Fine Arts Gen Ed	3	Humanities/Fine Arts & Global Perspectives Gen Ed	3
	17		16
Junior			
Fall	**Credits**	**Spring**	**Credits**
PHYS 355	3	PHYS 370	3
PHYS 360	3	ENGL 324	3
MATH 4XX Math Elective	3	PHYS 361	3
Free elective	3	MATH 4XX Math Elective	3
Free Elective	3	Free Elective	2
	15		14

Senior			
Fall	**Credits**	**Spring**	**Credits**
PHYS 462	3	PHYS 489	2
PHYS 485	3	PHYS 481	3
PHYS 411 & 411L	4	PHYS 486	3
PHYS 488	1	Physics Elective	3
Social and Behavioral Science Gen Ed	3	Social and Behavioral Science & Cultural Diversity Gen Ed	3
	14		14

Total Credits: 122

Physics Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/physics-education/

Physics is the most fundamental and exact of the physical sciences. Its laws are basic to deep understanding in all of technology, and in many fields of study, such as astronomy, chemistry, engineering, materials science, photonics, biology, medicine, geology, and environmental science. Physicists often end up in a wide range of leadership positions. Notable examples include Jimmy Carter, Elon Musk, Steven Wolfram, Douglas Hofstadter, and Angela Merkel.

The Department of Physics has growing undergraduate and graduate programs. Yet, its size remains comparatively small, allowing personalized interactions between students with all of its 12 faculty members. Not only do students participate in research projects early on, they often become authors in peer-reviewed publications and present their results in the regional and national conferences and workshops. In addition, our students are highly engaged; they regularly participate successfully in the University Physics Competition and contribute actively to various outreach activities.

The Department of Physics has a strong research focus on three fields: materials (especially soft materials), computational physics, and physics education research. While this represents only a small subset of all existing physics fields, our focus makes us competitive and successful on the national level and beyond. Students can choose among a number of curricular options that prepare them for industrial, governmental, and academic careers. The Fargo/Moorhead urban area contains three colleges with a physics program. Courses can be taken in each college through the Tri-College University. This increases the number of available courses to a level typical for large universities only.

A prospective physics major is generally expected to have taken physics, chemistry, and mathematics courses. Computer courses can also be useful. Incoming students should normally be ready to start learning calculus. Some of our incoming students have already taken AP courses in physics or mathematics. Note, however, that deficiencies in any of these subjects may be remedied in the freshman or later years at the University.

The most popular curricular option in the Department of Physics is the standard physics major. Also popular are our two double major programs in Physics and Mathematics as well as in Physics and Computer Science. Starting in fall 2017 we offer a new double major in Electrical and Computer Engineering and Physics. All these programs allow well-prepared students to complete the requirements for both majors in four years by taking advantage of the close connections between physics, mathematics, computer science, and engineering. In addition, we offer a physics major with a focus on optical science and engineering. The optical science and engineering option, which is the only regional program of this type, includes an interdisciplinary optics/photonics sequence of courses taught by the Department of Physics and the Department of Electrical and Computer Engineering using a state-of-the-art optics teaching laboratory. Finally, highly qualified students can earn both a Bachelor's and Master's degree in physics by enrolling into the Accelerated Masters program in their junior year.

All of our physics majors (including the double majors and physics majors with the optical science and engineering option) take introductory courses in classical mechanics, computational physics, electricity and magnetism, optics, thermodynamics, quantum mechanics, and modern physics, as well as selected specialized courses such as photonics, lasers, or condensed matter physics. In addition, all physics majors get involved in research

projects with faculty, typically in fields like materials (including bio- and polymer physics), computational physics, and physics education research. Two dedicated courses allow students to receive credit for their research efforts. Any of our curriculum options prepares students for graduate work in physics or related fields and subsequent employment in industry, government, or academia. Physics graduates have excellent job perspectives because they are widely valued as creative and persistent problem solvers who are often able to step into leadership positions.

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
CHEM 121 & 121L (or CHEM 150 & 160)	4	CHEM 122 & 122L (or CHEM 151 & 161)	4
ENGL 110	4	EDUC 321	3
GEOL 105 & 105L	4	ENGL 120	3
MATH 165	4	GEOL 106 & 106L (Meets Global Perspectives Gen Ed requirement)	4
PHYS 110	3	MATH 166	4
PHYS 171	1	Complete Praxis Core Academic Skills Exam	
	20		18
Second Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 150 & 150L	4	CSCI 114 or MIS 116	3
COMM 110	3	PHYS 252 & 252L	5
EDUC 322	3	PHYS 252R	1
PHYS 215	1	PHYS 350	3
PHYS 251 & 251L	5	STAT 330	3
PHYS 251R	1	Humanities & Fine Arts Gen Ed	3
MATH 129	3	Wellness Gen Ed	2
Apply to the School of Education			
	20		20
Third Year			
Fall	**Credits**	**Spring**	**Credits**
BIOL 124 & 124L	4	EDUC 481	3
EDUC 451	3	EDUC 486	3
EDUC 489	3	MATH 128 (Co-Requisite of Math 266)	1
MATH 265	4	MATH 266	3
PHYS 360	3	PHYS 361	3
Social & Behavioral Science Gen Ed	3	PHYS 300-400 Elective	3
		Social & Behavioral Science Gen Ed	3
	20		19

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
CHEM Elective w/Lab	4	EDUC 485	1
ENGL 324	3	EDUC 487	9
PHYS 355	3	EDUC 488	3
PHYS 411 & 411L	4		
PHYS 462	3		
Humanities& Fine Arts/Cultural Diversity Gen Ed	3		
Apply for Student Teaching			
Complete Praxis PLT Exam			
Complete Praxis II Content Exam			
	20		13

Total Credits: 150

Political Science

Department Information

- **Department Location:**
  Putnam Hall
- **Department Phone:**
  701-231-8567
- **Department Web Site:**
  www.ndsu.edu/cjps/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/political-science/

Political Science Major

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

A total of 40 credits of major coursework is required for Political Science. All students are required to complete POLS 110 Introduction to Political Science or POLS 115 American Government, STAT 330 Introductory Statistics, POLS 325 Applied Research Methods, POLS 240 Political Ideologies, POLS 220 International Politics or POLS 225 Comparative Politics, and POLS 489 Senior Seminar. In addition, four 400-level classes must be taken; one from each of these areas: American government/political behavior (Area 1), law (Area 2), international relations (Area 3), and comparative politics (Area 4). The remaining nine credits of the major will consist of political science electives.

Political Science Minor

The minor in Political Science requires a minimum of 21 credits, including POLS 110 Introduction to Political Science or POLS 115 American Government, POLS 220 International Politics or POLS 225 Comparative Politics, and POLS 240 Political Ideologies. The remaining 12 credits for the minor, which are Political Science electives, must include at least 6 credits at the 400-level from Areas 1 through 4.

Pre-Law Option

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

Public Service Option

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

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
POLS 110 or 115	3	POLS 220 or 225	3
MATH 104 or 103	3	Humanities / Fine Arts Gen Ed	3
ENGL 110	4	ENGL 120	3
Humanities / Fine Arts Gen Ed	3	Science/Tech Gen Ed	3
COMM 110	3	Minor	3
	16		15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
POLS 240	3	POLS 325 or CJ 325	4
POLS 200-300 level elective	3	AHSS Requirement	3
STAT 330	3	Wellness Gen Ed	3
Science w/ Lab Gen Ed	4	Minor	3
Minor	3	General Elective	3
	16		16
Third Year			
Fall	**Credits**	**Spring**	**Credits**
POLS Area 1	3	POLS Area 2	3
POLS Area 3	3	POLS Area 4	3
ENGL 320 or 358	3	Science / Tech Gen Ed	3
Minor	3	AHSS Requirement	3
AHSS Requirement	3	Minor	3
	15		15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
POLS elective	3	POLS 489	3
POLS elective	3	Minor	3
Minor	3	Minor	3
300-400 level general elective	3	300-400 level general elective[Cultural Diversity Gen Ed if needed]	3
300-400 level general elective[Global Perspectives Gen Ed if needed]	3		
	15		12

Total Credits: 120

Professional Selling

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-8651
- **Department Web Site:**
  www.ndsu.edu/business/departments/mm/
- **Degrees Offered:**
  Certificate
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/professional-selling/

Certificate in Professional Selling

The Certificate in Professional Selling develops student knowledge and competencies related to the sales profession, with particular emphasis on key interpersonal and selling skills. The program focuses on concepts and tools that are consistent with current professional practice.

Prospective students are subject to the university's admission policies and procedures. Certificates must be declared within and approved by the College of Business. Declare your certificate by completing the Certificate in Professional Selling form online at: https://www.ndsu.edu/business/programs/sales/salesapp. Please do so *before or when* taking MRKT 430 Sales and Personal Selling.

Psychology

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-8622
- **Department Web Site:**
  www.ndsu.edu/psychology/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/psychology/

Whether you're interested in psychology as a helping profession or as the science of mind and behavior, the Department of Psychology at North Dakota State University is an exciting place to be. For the last several years, our programs have grown to build on our strengths in health psychology and cognitive neuroscience. Our expanded faculty and graduate programs mean that our undergraduate majors have ample opportunities for participating in cutting-edge research and course work.

Psychologists study a broad range of thought and behavior, from normal to abnormal, in both individuals and social groups. What distinguishes psychology from other fields is its strong research orientation. Because psychology is relevant to virtually all professions, students who plan to enter professions such as medicine, law, business management, social work, education or counseling often elect to major or minor in psychology.

Most professional positions for psychologists require a master's or doctoral degree. In addition to pursuing graduate work in psychology, recent graduates have entered professional programs in medicine, counseling and guidance, business, special education, social work, law, dentistry, ministry and optometry.

Many of our students seek employment immediately after completing their bachelor's degree. Employers seek out psychology majors for their combination of people and research skills. Some of our graduates have entered positions directly related to psychological services (e.g., mental health aide, psychological testing technician, behavior analyst, or medical research assistant). Others have taken positions not directly concerned with psychological services but related to psychology (e.g., sales, management, law enforcement, corrections, advertising, market research and statistical consulting).

Alumni surveys by the NDSU Career Center have consistently shown that our graduates are very successful in obtaining good jobs or going on to graduate or professional school.

Undergraduate students can either major or minor in psychology at NDSU. Students majoring in psychology may pursue either a Bachelor of Arts (B.A.) or a Bachelor of Science (B.S.). The primary difference between the two degree programs is that the B.A. degree requires competency at the second-year level of a foreign language while the B.S. requires an approved minor or additional course work in either the natural sciences or the social sciences instead of a language. Both the major and minor requirements within psychology allow each student to select the courses most relevant to his or her own interests.

Psychology Minor

A minor in Psychology offers students electing majors in other disciplines the opportunity to complement their studies with a coherent set of psychology courses. Different courses are compatible with interests and career goals of students in major areas such as business, child development and family science, and computer science. Students planning a Psychology minor should consult with a faculty adviser from the Department of Psychology (https://www.ndsu.edu/psychology).

Students selecting a minor in Psychology must complete 18 credits in psychology (excluding PSYC 493 Undergraduate Research, PSYC 494 Individual Study or PSYC 496 Field Experience). These 18 semester credits may not be taken pass/fail and must include at least one 3-credit 300- or 400-level course. A minimum of eight credits must be taken at NDSU.

Plans of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	ENGL 120	3
MATH 103 or 104 (R) or Higher	3	Humanities & Fine Arts Gen Ed	3
PSYC 111	3	Any 200 level PSYC class	3
Science & Technology Gen Ed	3	Science & Technology w/Lab Gen Ed	4
Social & Behavioral Sciences Gen Ed	3	Social & Behavioral Science/Global Perspective Gen Ed	3
PSYC 189	1		
	17		16
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
STAT 330	3	PSYC 351	3
200 level PSYC	3	COMM 110	3
PSYC 350	3	Humanities & Fine Arts/Cultural Diversity Gen Ed	3
Science & Technology Gen Ed	3	Supporting track or minor	3
Wellness Gen Ed	2	Elective	3
	14		15
Junior			
Fall	**Credits**	**Spring**	**Credits**
Elective	3	400 level PSYC class	3
PSYC Elective	3	400 level PSYC class	3
Supporting track or minor	3	Supporting track or minor	3
Supporting track or minor	3	Supporting track or minor	3
ENGL 324, 325, or 459	3	Elective	3
	15		15
Senior			
Fall	**Credits**	**Spring**	**Credits**
400 level PSYC class	3	400 level PSYC	3

400 level PSYC class	3	PSYC 480 or 489 (Capstone Experience)	3
Supporting track or minor	3	Supporting track or minor	3
Elective	3	Elective	4
Elective	3		
	15		13

Total Credits: 120

Degree Notes:

- Students earning a Bachelor of Science degree must select one of the three tracks (Natural Science, Social Science or Minor Program of Study) in consultation with an adviser (14 credit minimum).

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	ENGL 120	3
MATH 103 or 104 (R) or Higher	3	Humanities & Fine Arts Gen Ed	3
PSYC 111	3	Any 200 level PSYC class	3
Science & Technology Gen Ed	3	Science & Technology w/Lab Gen Ed	4
Social & Behavioral Sciences/Global Perspectives Gen Ed	3	Social & Behavioral Sciences Gen Ed	3
PSYC 189	1		
	17		16
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
STAT 330	3	PSYC 351	3
200 level PSYC	3	COMM 110	3
PSYC 350	3	Humanities & Fine Arts/Cultural Diversity Gen Ed	3
Science & Technology Gen Ed	3	Modern Language 102	4
Modern Language 101	4		
	16		13
Junior			
Fall	**Credits**	**Spring**	**Credits**
Elective	3	400 level PSYC class	3
PSYC Elective	3	400 level PSYC class	3
Wellness Gen Ed	2	Modern Language 202	3
Modern Language 201	3	Elective	3
ENGL 324, 325, or 459	3	Elective	3
	14		15
Senior			
Fall	**Credits**	**Spring**	**Credits**
400 level PSYC class	3	400 level PSYC	3
400 level PSYC class	3	PSYC 480 or 489 (Capstone Experience)	3

Elective	3	Elective	3
Elective	3	Elective	3
Elective	3	Elective	2
	15		14

Total Credits: 120

Degree Notes:

- Students earning a Bachelor of Arts degree must complete the Modern Foreign Language proficiency (3-14 credits).

Public History

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-8654
- **Department Web Site:**
  www.ndsuhprs.org/ (http://www.ndsuhprs.org)
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/public-history/

The major requires 51 credits in selected history courses, including a nine-credit internship. The Public History program prepares students for employment in fields such as archives and museums, historic preservation, and the National Park Service. For more details regarding the courses available, refer to the Department of History, Philosophy, and Religious Studies (http://ndsuhprs.org) web site.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
HIST 101 or 103	3	COMM 110	3
ENGL 120	3	HIST 102 or 104	3
GE Social Science Req.	3	GE Social Science Req.	3
GE Science/Technology Req.	3	GE Science/Technology	3
Minor/Elective	3	GE Science/Technology Lab	1
		Minor or Free Elective	3
	15		16
Second Year			
Fall	**Credits**	**Spring**	**Credits**
HIST 251	3	HIST 252 or 352	3
GE Science/Technology	3	AHSS Fine Arts Req.	3
AHSS Social Science Req.	3	US or Non-US History Req.	3
GE Wellness Req.	2-3	GE Quantitative Reasoning Req.	3
Minor/Elective	3	Minor/Foreign Language/Elective	3
	14-15		15

Third Year			
Fall	**Credits**	**Spring**	**Credits**
HIST 390	3	HIST 352 or 252	3
HIST 401	3	HIST 403	3
HIST 404	3	HIST 415	3
US or Non-US History Requirement	3	HIST 496	3
Minor/Foreign Language Req.	3	Minor/Foreign Language/Elective	3
	15		15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
HIST 489	3	HIST 496	3
HIST 496	3	US or Non-US History Requirement	3
US or Non-US History Req.	3	Minor/Elective	3
Minor/ Foreign Language/Elective	3	Minor/Elective	3
Minor/Elective	3	Minor/Elective	3
	15		15

Total Credits: 120-121

Radiologic Sciences

Department Information

- **Department Location:**
  Sudro Hall
- **Department Phone:**
  701-231-8713
- **Department Web Site:**
  www.ndsu.edu/alliedsciences/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/radiologic-sciences/

A Bachelor of Science degree, major in Radiologic Sciences (RS), at North Dakota State University, combines foundational sciences, math, and general education courses on campus with applied imaging classroom, lab and clinical experience during a two-year, full-time internship within an affiliated hospital. Three unique and specialized internships available to RS majors at NDSU are **radiography, diagnostic medical sonography,** and **echocardiography**.

RS students complete two or more years of rigorous college courses on campus followed by a two-year, full-time professional-level internship within a hospital-based program affiliated with NDSU. RS students must have an interest and aptitude in the sciences and math and a strong desire to work directly with patients. Students pursuing any one of the three RS specializations will complete the same pre-radiologic sciences college courses. These courses include chemistry, physics, anatomy and physiology, microbiology, trigonometry, psychology, computer science, and statistics, in addition to general education courses. During the final year of pre-RS courses on campus, qualified students will apply for the two-year internship. College courses and the internship classes, lab, and clinical education constitute the four-year degree awarded by NDSU.

The internship application process begins annually in the fall. Admission into the internship is competitive. Specific admission criteria is established in collaboration with each affiliated hospital program and generally includes successful completion of pre-requisite college courses with a minimum grade of C, grade point averages (a minimum of 2.50-3.00 is required and varies by hospital program), references, related experience, an interview, and compliance with criminal background and student conduct requirements. Students admitted into the internship must possess the ability to meet program-designated technical standards or request reasonable accommodations to execute these skills. Technical standards include a sound intellect and emotional health to exercise good judgement even in emergencies, visual and hearing acuity, physical ability to lift and position patients, pull, push, and carry equipment, enter data, stand and walk for extended periods of time, and communicate effectively. The internship focuses on didactic and clinical education that prepares the graduate to work in their respective discipline of radiography, diagnostic medical sonography, or echocardiography.

Radiography

Radiographers, also known as radiologic technologists, perform diagnostic imaging examinations, accurately position patients, obtain quality diagnostic images, and adhere to radiation protection regulations for themselves, their patients, and coworkers. They work closely with radiologists, the physicians who interpret medical images, to diagnose or rule out disease or injury. Radiologic technologists work in hospitals, physician offices and clinics, and diagnostic imaging centers. With experience and additional training, general radiographers may specialize in CT, mammography, magnetic resonance imaging, or interventional radiography, or advance into management and education. According to the U.S. Department of Labor Bureau of Labor Statistics (http://www.bls.gov), employment of radiologic technologists is expected to grow faster than average for all occupations through 2026.

RS students who apply and are accepted into the two-year radiography internship will complete their applied classroom and clinical education in one of the hospital-based radiologic technology programs with which the Department of Allied Sciences affiliates. These hospital-based programs are: Avera McKennan Hospital (Sioux Falls, SD), Mercy/St. Luke's Hospitals (Cedar Rapids, IA), Sanford Health (Bismarck and Fargo, ND, Sioux Falls, SD), St. Cloud Hospital (St. Cloud, MN), St. Luke's College (Sioux City, IA), UnityPoint Health (Des Moines, IA), and the Veteran Affairs Medical Center (Minneapolis, MN). Affiliated hospital programs maintain programmatic accreditation through the Joint Review Committee on Education in Radiologic Technology (JRCERT). The internship classes and clinical education will focus on patient care, anatomy and physiology, patient positioning, imaging principles, and radiation safety and protection. Graduates are eligible to take the national certifying exam administered by the American Registry of Radiologic Technologists (ARRT). NDSU graduates have enjoyed excellent pass rates on the ARRT exam.

Sonography

Sonographers use special equipment and high frequency sounds waves (ultrasound) to obtain images of internal body structures and organs. They have a high level of patient interaction and play a vital role in providing the physician with diagnostic images to interpret and assess medical conditions or conduct surgical procedures. Sonographers work in hospitals, physician offices, and medical and diagnostic labs. Currently, there are job opportunities throughout the region and country. According to the U.S. Department of Labor Bureau of Labor Statistics (https://www.bls.gov), demand for sonographers continues to grow faster than average for all occupations through 2026. Two options for NDSU students interested in sonography are **echocardiography** and **diagnostic medical sonography.**

Echocardiography

Echocardiographers, also known as cardiac sonographers, evaluate the anatomy and hemodynamics (blood flow) of the heart, its chambers and valves, and related blood vessels. RS students who apply and are accepted into the echocardiography specialization will complete their applied education during a 21-month internship offered through Sanford Health, Fargo, ND. Internship classes, scanning labs, and clinical experience will focus on anatomy and pathophysiology, examination techniques, equipment operation and protocols, and patient care and safety in adult echocardiography with rotations in pediatric and stress echo.

Diagnostic Medical Sonographers

Diagnostic medical sonographers evaluate abdominal structures like the kidney, liver, and spleen, breast tissue, the reproductive system, blood vessels, fetal development, and musculoskeletal structures like tendons and joints. RS students who apply and are accepted into the diagnostic medical sonography specialization will complete their applied education during a 21-month internship offered through Sanford Health, Fargo, ND. Internship classes, scanning labs, and clinical experience will focus on anatomy and pathophysiology, examination techniques, equipment operation and protocols, and patient care and safety in the diagnostic imaging of abdomen, OB/GYN, small parts, and vascular sonography.

Information about the RS profession and specializations, curriculum, internship, and advising contacts are available from the Department of Allied Sciences (https://www.ndsu.edu/alliedsciences). It is highly recommended that students interested in the Radiologic Sciences major meet with the RS advisor at least one year prior to anticipated internship application to discuss degree requirements, RS specialization, internship admission, and create an individualized plan of study for successful completion of degree requirements.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
CHEM 117	3	BIOC 260	4
CHEM 117L	1	COMM 110	3
CHP 190	2	Humanities & Fine Arts (A)/ Cultural Diversity (D)	3
CSCI 114	3	MICR 202	2
ENGL 120*	3	MICR 202L	1

MATH 105	3	PSYC 111	3
		Wellness (W)	2
	15		18

Second Year

Fall	Credits	Spring	Credits
BIOL 220	3	BIOL 221	3
BIOL 220L	1	BIOL 221L	1
Humanities & Fine Arts (A)	3	CHP 125	1
PHYS 211	3	PHRM 170	2
PHYS 211L	1	PHYS 212	3
RS 200	1	PHYS 212L	1
Social & Behavioral Sciences (B)/Global Perspectives (G)	3	Special Elective (dept. approved)	3
STAT 330	3	Special Elective (dept. approved)	3
	18		17

Third Year

Fall	Credits	Spring	Credits	Summer	Credits
RS 496**	12-13	RS 496**	12-14	RS 496**	6-11
				Upper Division Writing (C; 300-400 level)	3
	12-13		12-14		9-14

Fourth Year

Fall	Credits	Spring	Credits	Summer	Credits
RS 496**	12	RS 496**	12	RS 496**	1-6
	12		12		1-6

Total Credits: 126-139

* All students are required to successfully earn credit for Engl 110 and Engl 120. Enrollment is based on English Placement. Upon completion of Engl 120 with a "C" grade or higher, students will be awarded placement credit (4) for Engl 110.

** RS 496 classroom, lab, and clinical education (internship) takes place within an affiliated hospital. The internship is full-time for 21-24 months, including summer. RS 496 courses and credits vary by radiography, echocardiography, or diagnostic medical sonography specialization.

Range Science

Department Information

- **Department Location:**
  Morrill Hall
- **Department Phone:**
  701-231-7582
- **Department Web Site:**
  www.ndsu.edu/range/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/range-science/

Range Science is a unique program that blends ecology and management for the purpose of sustaining rangelands. Rangelands are important for the diverse array of products and services they provide, including livestock production, wildlife habitat, clean air and water, and recreation to name a few.

Rangeland ecosystems comprise over 40% of the earth's land and include grasslands, savannahs, shrublands, deserts, alpine meadows, marshes and wetlands. Rangelands are comprised mainly of native grasses, forbs, and shrubs which are extremely productive and rich in biodiversity.

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

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
BIOL 150	3	CHEM 122 (Category S)	3
BIOL 150L	1	COMM 110 (Category C)	3
CHEM 121 (Category S)	3	ENGL 120	3
CHEM 121L (Category S)	1	SOIL 210 (Category S)	3
ENGL 110	4	Wellness Gen Ed	2
MATH 103 (or placement)	3		
RNG 136	3		
	18		14
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
ANSC 114	3	SOIL 217	3
RNG 213	3	STAT 330 (Category R)	3
ECON 201 (Gen Ed Category B & G)	3	RNG 450	3
Humanities & Social Science Gen Ed	3	RNG 452	3
		Social & Behavioral Science Gen Ed	3
	12		15
Junior			
Fall	**Credits**	**Spring**	**Credits**
BIOL 456	3	ENGL 321, 324, or 459 (Category C)	3
RNG 456	3	PLSC 380	3
BIOL 364	3	PLSC 315 & 315L	4
SOIL 351, 410, or 444	3	Elective	6
Upper Division Writing	3		
	15		16
Senior			
Fall	**Credits**	**Spring**	**Credits**
RNG 458	3	RNG 462	3
RNG 460	3	RNG 451	3
BIOL 475 or 476	3	RNG 453 or 454	3

BIOL 458	3	Humanities & Fine Arts/Cultural Diversity Gen Ed	3
BIOL 452 or 454	3	Elective	3
	15		15

Total Credits: 120

Respiratory Care

Department Information

- **Department Location:**
  Sudro Hall
- **Department Phone:**
  701-231-8713
- **Department Web Site:**
  www.ndsu.edu/alliedsciences/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/respiratory-care/

Respiratory Care (RC) is an allied health profession that involves the evaluation, treatment, and education of patients with cardiopulmonary (heart-lung) disorders. Respiratory therapists (RTs) work closely with patients, physicians, nurses, and other health care professionals in critical care, emergency rooms, newborn nurseries and pediatrics, medical units, and home care. RTs administer a variety of treatments, gases, and medications to alleviate a patient's breathing problems, manage mechanical ventilators and life support equipment, direct pulmonary rehabilitation activities, perform diagnostic tests that assist physicians to diagnose and monitor lung disease and sleep disorders, and educate patients and their families about their disease process, therapy and wellness. Graduates readily find employment in hospital, clinic, and home care settings throughout the country. Additional career opportunities exist in management, education, sleep centers, research, sales, and public health. According to the U.S. Department of Labor Bureau of Labor Statistics (https://www.bls.gov), employment of respiratory therapists is expected to grow faster than the average for all occupations through the year 2026. This increase is attributed to a substantial growth in number of the middle-aged and elderly populations that will increase the incidence of respiratory conditions like chronic obstructive pulmonary disease (COPD) and pneumonia.

A Bachelor of Science degree, Respiratory Care major, from North Dakota State University, includes two to three years of academic courses on campus and a 15-month full-time professional-level internship in the Respiratory Care Department at Sanford Medical Center, Fargo, North Dakota. The NDSU/Sanford Respiratory Care Program is accredited by the Commission on Accreditation for Respiratory Care (CoArc). Graduates are eligible to write the national certifying examinations administered by the National Board of Respiratory Care (NBRC) that lead to the Registered Respiratory Therapist (RRT) credential. NDSU graduates have enjoyed excellent employment opportunities and pass rates on the certifying exams.

Academic courses include chemistry, physics, anatomy and physiology, microbiology, college algebra, psychology, and computer science, in addition to general education courses. The full-time professional internship at Sanford Medical Center Fargo consists of lecture, laboratory, and clinical education onsite at the hospital that prepares the student to enter the profession of respiratory care. Near the end of the internship, students choose a specialty area for a focused clinical experience (RC 494 Individual Study). Common specialty areas include neonatal/pediatric general and intensive care, adult general and intensive care, diagnostics, pulmonary rehabilitation, home care, education, and management.

Qualified students apply for the professional internship during the spring of the academic year they will complete all prerequisite college courses. Applications are available from the Department of Allied Sciences. The application deadline is March 1 annually. Admission is selective and based upon successful completion of all prerequisite courses with a minimum grade of C, cumulative and "core" course grade point averages (a minimum of 2.50 is required; a maximum of core course attempts is two), references, related experience, interview, and compliance with criminal background and student conduct requirements. An admission committee selects the interns. Students admitted to the Respiratory Care internship must possess the ability to complete the entire curriculum which requires the student to meet designated technical standards, or request accommodations to execute these skills. Technical standards include cognitive, physical, motor and tactile abilities, visual acuity, and speaking, hearing, and interactive requirements.

It is highly recommended that students interested in Respiratory Care meet with the RC advisor to discuss degree requirements and internship admission, and create an individualized plan of study at least one year prior to anticipated internship application. Information about the profession, curriculum, internship, technical standards, and advising contacts are available from the Department of Allied Sciences (https://www.ndsu.edu/alliedsciences).

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year					
Fall	**Credits**	**Spring**	**Credits**		
CHEM 121†	3	CHEM 122†	3		
CHEM 121L†	1	CHEM 122L†	1		
CHP 190	2	MICR 202†	2		
CSCI 114	3	MICR 202L†	1		
ENGL 120*	3	COMM 110	3		
MATH 103†	3	PSYC 111	3		
		Humanities & Fine Arts (A)/ Cultural Diversity (D)	3		
	15		16		
Second Year					
Fall	**Credits**	**Spring**	**Credits**		
BIOL 220†	3	BIOC 260†	4		
BIOL 220L†	1	BIOL 221†	3		
CHEM 240†	3	BIOL 221L†	1		
RC 200	1	CHP 125†	1		
Social & Behavioral Sciences (B)/Global Perspectives (G)	3	Humanities & Fine Arts (A)	3		
STAT 330	3	PHYS 120†	3		
Wellness (W)	2	Special Elective (dept. approved)	3		
	16		18		
Third Year					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
RC 496**	15	RC 496**	15	RC 496**	13
	15		15		13
Fourth Year					
Fall	**Credits**				
RC 496**	8				
RC 494**	4				
Upper Division Writing (C; 300-400)	3				
Special Elective (dept. approved)	3				
	18				

Total Credits: 126

* All students are required to successfully earn credit for Engl 110 and Engl 120. Enrollment is based on English Placement. Upon completion of Engl 120 with a "C" grade or higher, students will be awarded placement credit (4) for Engl 110.

** Credits earned while participating in the Sanford Medical Center Fargo RC internship. The internship is 15 months, including one summer session.

† Indicates "core" course. A minimum "core" course GPA of 2.50 is required. "Core" courses must be completed with a grade of "C" within two attempts.

Social Science Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/social-science-education/

Social science involves the study of people and their interactions with each other, with their social and political institutions and with their environments. Accordingly, the social science education major includes a broad range of courses and subjects. Students are expected to demonstrate both breadth and depth of understanding in the academic disciplines that make up the social sciences. Candidates in the social science education major are prepared to teach a diverse curriculum to a diverse student population. The major consists of groups of courses and experiences in a variety of social science disciplines.

The social science education student should work closely with an advisor to be sure that the general education courses taken will provide a strong foundation for the advanced courses in the major. Students may enroll in the 300-level professional education courses before being formally admitted to the School of Education (SOE). Prior to enrolling in the 400-level courses, students must complete the application for admission to the SOE, attain a minimum of a 2.75 grade point average overall in their course work, in education courses, in teaching specialty courses, and pass the PRAXIS I test. Requirements for admission to the SOE are available at www.ndsu.edu/ted.

Student teaching is the culmination of the teaching program. Students have the opportunity to apply skills acquired in college courses under the supervision of an experienced social science educator. Upon completing this program, students are eligible for certification to teach social science in most states. The program is accredited by the National Council for Accreditation of Teacher Education.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ANTH 111, SOC 110, or PSYC 111	3	ENGL 120	3
COMM 110	3	Quantitative Reasoning	3
ENGL 110	4	Wellness	2
Science & Technology	3	GEOL 106	3
HIST 101	3	GEOL 106L	1
		HIST 102	3
	16		15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 321	3	EDUC 322	3
GEOG/ECON/POLS Elective	3	GEOG/ECON/POLS Elective	3
Science & Technology	3	HIST 104	3
HIST 103	3	HIST Elective (recommended but not required: HIST 135, 261 or 271)	3
PSYC 250 (or ANTH/SOC Elective)	3	PSYC/ANTH/SOC 300-400 Elective	3

Complete Praxis Core Academic Skills Exam		Elective	1-3
		Apply to the School of Education	
	15		16-18
Third Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 451	3	EDUC 489	3
GEOG/ECON/POLS Elective	3	GEOG/ECON/POLS Elective	3
GEOG/ECON/POLS Elective	3	GEOG/ECON/POLS Elective	3
HIST Non-US 300-400 Elective	3	HIST Non-US 300-400 Elective	3
HIST US 300-400 Elective	3	HIST US 300-400 Elective	3
	15		15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 481	3	EDUC 485	1
EDUC 486	3	EDUC 487	9
HIST 390	3	EDUC 488	3
GEOG/ECON/POLS Elective	3		
GEOG/ECON/POLS Elective	3		
Apply for Student Teaching			
Complete Praxis PLT Exam			
Complete Praxis II Content Exam			
	15		13

Total Credits: 120-122

Social Work & Human Development and Family Science

Department Information

- **Department Location:**
  E. Morrow Lebedeff Hall
- **Department Phone:**
  701-231-9792
- **Department Web Site:**
  www.ndsu.edu/hdfs/undergraduate_studies/prospective_majors/social_work/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/social-work-human-development-family-science/

The dual-degree program in Social Work and Human Development/Family Science is a collaborative effort between NDSU and Minot State University (https://www.minotstateu.edu). Under a cooperative agreement, students remain on the NDSU campus to complete all coursework, with Minot State University courses that are specific to the social work major offered on the NDSU campus by Minot State University faculty or offered through interactive video. The culmination of these requirements leads to a bachelor's degree from NDSU with a major in Human Development and Family Science (Family Science option or Adult Development and Aging option), as well as a bachelor of Social Work degree from Minot State University, with graduates eligible for North Dakota licensure as social workers. The curriculum combines coursework in human development and family process with coursework in social work to offer students an integrated knowledge of children, adolescents, adults, and families across the lifespan that will equip them for careers in the helping professions as well as to address the needs and aspirations of people living in a changing world.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
HD&E 189	1	COMM 110	3
ENGL 110	4	ENGL 120	3
PSYC 111	3	POLS 115 or 215	3
MATH*	3	SOC 110	3
Science & Technology Gen Ed	3	HDFS 230	3
HDFS 135	3		
	17		15
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
BIOL 126, 111, 150, or 220	3	ECON 105, 201, or 202	3
BIOL 126L, 111L, 150L, or 220L	1	PHIL 215 or 101	3
PSYC 212	3	HDFS 250	3
HDFS Option Course**	3	HDFS option course**	3
SWK 250: Interpersonal Skills	3	SWK 330: Human Behavior	3
SWK 256: Development of Social Welfare	3	SWK 335: Methods I - Individuals	3
	16		18
Junior			
Fall	**Credits**	**Spring**	**Credits**
PSYC 270	3	HD&E 320	1
CSCI 114	3	STAT 330	3
HDFS 300-400 level elective	3	Wellness	3
Humanities/Fine Arts	3	HDFS option course**	3
SWK 331: Family Dynamics	3	HDFS Elective	3
SWK 430: Diversity, Oppression & Social Change	3	SWK 426: Methods II - Groups	3
		SWK Elective	3
	18		19
Senior			
Fall	**Credits**	**Spring**	**Credits**
Additional Cultural Diverse Gen Ed	3	SWK 490 & 491: Field Education and Senior Seminar	15
ENGL 320, 325, 358, or 459	3		
HDFS 353	3		
HDFS 475	3		
SWK 427: Methods III - Organizations	3		

SWK 428 Crisis Intervention	3	
	18	15

Total Credits: 136

* In accordance with North Dakota University System Policy 402.1.2 and Procedure 402.1.2, ACT or SAT Mathematics sub-test scores, as well as COMPASS Mathematics scores and the NDSU Math Placement Test are used to determine placement of students into entry-level Mathematics courses.

** Adult Development & Aging option courses are HDFS 360, 480, 482; Family Science option courses are HDFS 242, 357, 462 (HDFS 242 also satisfies the Wellness course requirement)

Sociology

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-8657
- **Department Email:**
  ndsu.soc.anth@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/socanth/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/sociology/

Sociology is the scientific study of social structure, social inequality, social change, and social interaction that comprise societies. The sociological perspective examines the broad social context in which people live. This context shapes our beliefs and attitudes and sets guidelines for what we do.

The curriculum is structured to introduce majors to the sociology discipline and provide them with conceptual and practical tools to understand social behavior and societies. Areas of study include small groups, populations, inequality, diversity, gender, social change, families, community development, organizations, medical sociology, aging, and the environment.

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ANTH 111	3	SOC 115 or 116	3
SOC 110	3	COMM 110	3
ENGL 110	4	ENGL 120	3
Science/Technology	3	Humanities/Fine Arts	3
Wellness	2-3	MATH 104	3
	15-16		15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
SOC 214	3	SOC 233	3
STAT 330	3	SOC 235	3
AHSS Requirement	3	Science/Technology with lab	4
Science/Technology	3	Language/Minor	3
Language/Minor	3	Humanities/Fine Arts	3
	15		16

Third Year			
Fall	**Credits**	**Spring**	**Credits**
SOC 340	3	SOC 422	3
SOC 341	1	Sociology electives	6
Upper Level Writing	3	Language or minor	3
Language or Minor	3	Internship or additional course	3
Sociology Elective	3		
Global Perspective	3		
	16		15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
SOC 489	1	Electives @ 300-400 level	6
Electives @ 300-400 level	9	AHSS requirement	3
Electives or minor	6	Elective or minor	6
	16		15

Total Credits: 123-124

Soil Science

Department Information

- **Department Location:**
  Walster Hall
- **Department Phone:**
  701-231-8901
- **Department Web Site:**
  www.ndsu.edu/soils/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/soil-science/

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

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
AGRI 189	1	SOIL 217	3
AGRI 150	1	ENGL 120	3
ENGL 110	4	MATH 105	3
BIOL 150	3	GEOL 105	3
BIOL 150L	1	GEOL 105L	1

MATH 103	3	Wellness Gen Ed	2
Humanities & Fine Arts Gen Ed	3		
	16		15
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
SOIL 210	3	SOIL 264	3
PHYS 211	3	SOIL 322	3
PHYS 211L	1	BIOL 151 or PHYS 212	3
CHEM 121	3	BIOL 151L or PHYS 212L	1
CHEM 121L	1	COMM 110	3
MATH 146 or 165	4	Ag Science Elective	3
	15		16
Junior			
Fall	**Credits**	**Spring**	**Credits**
SOIL 351	3	SOIL 410	3
PLSC 110	3	PLSC 225 or RNG 136	3
CHEM 240 (or BIOC 260; or MICR 202 & MICR 202L; or MICR 350 & MICR 350L)	3-5	PLSC 380	3
ENGL 321, 324, or 459	3	CHEM 122	3
GEOG 455 or RNG 452	4	CHEM 122L	1
		Humanities & Fine Arts Gen Ed/ Cultural Diversity	3
	16-18		16
Senior			
Fall	**Credits**	**Spring**	**Credits**
SOIL 433	3	SOIL 462	3
SOIL 444	3	STAT 330	3
Ag Science Elective	3	Ag Science Elective	3
Social & Behavioral Science Gen Ed/ Global Perspective	3	Social and Behavioral Sciences	3
Elective	2		
	14		12

Total Credits: 120-122

Spanish

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7887
- **Department Email:**
  ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/modernlanguages/
- **Degrees Offered:**
  B.S.; B.A.

- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/spanish/

Today's interconnected world generates the need to be able to communicate in more than one language. As networks of international cooperation and exchange grow in complexity, particularly among governments and businesses, those who possess foreign language competence become increasingly valuable. Moreover, it has been shown that learning a second language can improve one's overall writing and speaking ability.

Career Directions

Experience has shown that many students, with or without declared modern language majors or minors, find a second language background especially useful when combined with preparation in another professional field. Examples include public relations, journalism, TV and radio broadcasting, hotel management, publishing and editing, government service, banking, and management.

One of the more promising occupational fields for language students has been international business. Individuals with foreign language skills are finding increased opportunities with multinational corporations, especially in management and marketing. Many companies with international ties recruit candidates possessing linguistic training because they recognize its correlation with effective verbal and written communication. Regardless of their specific majors, students are encouraged to contact the department for information and advice on career application of foreign language skills.

Students wishing to prepare for high school teaching should make this intention known to the School of Education and to the Department of Modern Languages to make certain that the requirements for state certification are met. Competitiveness and flexibility in the job market tend to be greater if certification can be obtained in two or more different areas.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	SPAN 202 or 312	3
Gen Ed Quantitative Reasoning	3	ENGL 120	3
Gen Ed Social and Behavioral Sciences	3	Gen Ed Humanities/Fine Arts	3
Gen Ed Science/Tech	3	Gen Ed Wellness	2
SPAN 201 or 311	3	AHSS College Requirement	3
	16		14
Second Year			
Fall	**Credits**	**Spring**	**Credits**
SPAN 330 or 331 (Civilization)	3	COMM 110	3
One year of a Second Language Course	3-4	One year of a Second Language Course	3-4
AHSS College Requirement	3	Gen Ed Humanities/Fine Arts and Global Perspectives	3
Gen Ed Social and Behavioral Sci and Cultural Diversity	3	Elective or Minor Course	3
Minor Course or Elective	3	SPAN 401 or 402 (Advanced Language)	3
	15-16		15-16
Third Year			
Fall	**Credits**	**Spring**	**Credits**
SPAN 492 (Study Abroad (14+ weeks))	15	Additional SPAN Course	3
		SPAN 450, 451, 452, or 453 (Peninsular Literature)	3
		Gen Ed Science/Tech	3

		Gen Ed Upper Division Writing	3
		Minor Course or Elective	3
	15		15

Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
SPAN 440, 441, 442, or 443 (Spanish American Literature)	3	SPAN 489 (Senior Thesis)*	1
Gen Ed Science/Tech with Lab	4	Additional SPAN Course	3
AHSS College Requirement	3	Minor Course or Electives	10
Additional SPAN Course	3		
Minor Course or Elective	3		
	16		14

Total Credits: 120-122

* SPAN 489: Senior Thesis must be completed after the study abroad experience.

Spanish Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/spanish-education/

Add overview content here.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	COMM 110	3
SPAN 201	3	EDUC 321	3
Science & Technology Gen Ed	3	ENGL 120	3
Social & Behavioral Science Gen Ed	3	SPAN 202	3
Quantitative Reasoning Gen Ed	3	Science & Technology Gen Ed	3
		Social & Behavioral Science Gen Ed	3
		Complete Praxis Core Academic Skills Exam	
	16		18

Second Year			
Fall	**Credits**	**Spring**	**Credits**
EDUC 322	3	EDUC 451	3

SPAN 311	3	SPAN 312	3
SPAN 330 or 331	3	Peninsular Literature Elective	3
Wellness Gen Ed	2	SPAN Elective	3
Science & Technology w/lab Gen Ed	4	Other Foreign Language	3
Apply to the School of Education			
	15		15

Third Year

Fall	Credits	Spring	Credits
SPAN 402 or 402 (Gen Ed Category C)	3	Semester Abroad (5 upper division Spanish credits approved by advisor)	15
EDUC 481	2-3		
EDUC 489	3		
Other Foreign Language	3		
Spanish-American Literature Elective	3		
Elective	4		
	18-19		15

Fourth Year

Fall	Credits	Spring	Credits
EDUC 486	3	EDUC 485	1
SPAN 489	1	EDUC 487	9
SPAN Elective	3	EDUC 488	3
SPAN Elective	3		
Spanish Special Methods (completed through Tri-College at MSUM or Concordia)			
Apply for Student Teaching			
Complete Praxis PLT Exam			
Complete Praxis II Content Exam			
	10		13

Total Credits: 120-121

Spanish Studies

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7887
- **Department Email:**
  ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/modernlanguages/
- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/spanish-studies/

Broader in scope than the traditional minor which emphasizes linguistic competence, the Spanish Studies minor combines systematic language study with courses in geography, history, civilization, and politics to enhance students' understanding of the global context of the language they have chosen to study. A languages studies minor requires 18 approved semester credits, including nine credits of language and civilization study beyond the intermediate level (SPAN 311, SPAN 312 and a civilization course in the language), a six-credit sequence in history, and an approved three-credit elective in Anthropology, Geography, or Political Science; study abroad is strongly encouraged.

Sport Management

Department Information

- **Department Location:**
  Bentson Bunker Fieldhouse
- **Department Phone:**
  701-231-7474
- **Department Web Site:**
  www.ndsu.edu/hnes/undergraduate_programs/sport_management/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/sport-management/

Sport Management Major

The Sport Management major is designed to prepare students for careers in sport and recreation organizations. The capstone experience is a 15 credit internship that may be completed during the junior or senior year or variable credit experiences taken throughout the program at approved local, state, regional, national or international organizations. To enhance employment prospects, undergraduate candidates in the Sport Management major are required to complete a Business Administration minor.

Students are also encouraged to participate in the Sport Management Association. This student organization meets regularly to organize and conduct professional and service events.

Pre-Professional/Professional Emphasis

Students are admitted to the Pre-Professional emphasis in Sport Management when declaring the major. The Pre-Professional emphasis encompasses the freshman year; transfer students are also placed in the Pre-Professional emphasis upon acceptance to the university. Entrance into the Professional Emphasis occurs for sophomores during the third semester of attendance; for transfer students, application occurs during the first semester of attendance.

The following requirements must be met before beginning the professional emphasis (sophomore, junior and senior level courses with prefix HNES) of study:

1. Successful completion of HNES 190 Introduction to Sport Management with a grade of 'B' or better
2. Successful completion of 30 approved credits
3. Minimum NDSU GPA of 2.75 or higher

Application guidelines are provided during HNES 190 and during advising sessions with freshmen.

Retention Standards

Students must meet the following retention standards (per semester) in order to maintain their status in the Sport Management professional program:

- Maintain a "C" or higher in all HNES courses required for the major.
- Maintain an NDSU cumulative GPA of 2.75 or higher on a 4.00 scale.
- Maintain GPA requirements for the Business Administration Minor.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	COMM 110	3
HNES 100	2	COMM 112	3
HNES 190	3	CSCI 114 or MIS 116	3
PSYC 111	3	ENGL 120	3
Quantitative Reasoning	3	Humanities/Fine Arts	3
	15		15
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
ACCT 102 (Busn Minor)	3	COMM 375	3
COMM 200	3	ECON 105 (Busn Minor)	3
Humanities/Fine Arts-Diversity	3	HNES 226	3
SOC 110	3	Science/Tech w Lab	4
Science/Tech	3	HNES 224	3
	15		16
Junior			
Fall	**Credits**	**Spring**	**Credits**
ENGL 320	3	HNES 431	3
HNES 485*	4	HNES 436	3
MGMT 320	3	HNES 485*	4
MRKT 320	3	Business Compentency or Elective	3
HNES 304	3		
	16		13
Senior			
Fall	**Credits**	**Spring**	**Credits**
HNES 426	3	HNES 485*	3
HNES 485*	4	Business Minor	3
Business Minor	3	Business Minor	3
Business Minor	3	Business Compentency or Elective	3
Business Compentency or Elective	3	Elective	2
	16		14

Total Credits: 120

* **HNES 485 Internship** can be taken for variable credit (depending on hours) throughout various terms, including summer, to reach a total 15 credits.

Statistics

Department Information

- **Department Location:**
  Morrill Hall
- **Department Phone:**
  701-231-7532
- **Department Email:**
  ndsu.stats@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/academics/programs/
- **Degrees Offered:**

B.S.; B.A.

- **Official Program Curriculum:** bulletin.ndsu.edu/undergraduate/program-curriculum/statistics/

Statistics Major

The Department of Statistics offers a major leading to a B.S., B.A., M.S., or Ph.D. degree, as well as minors in Statistics for both undergraduate and graduate students. The program is flexible enough to be individually planned around prior experience and in accord with professional goals. The program emphasis is on applied statistics, consulting, and computational methods.

Statistics Minors

Two different tracks within the Statistics minor are offered. A Department of Statistics (Morrill 221 (https://www.ndsu.edu/alphaindex/buildings/Building::382)) adviser for minors must approve the program.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	ENGL 120	3
COMM 110	3	MATH 129	3
MATH 165	4	MATH 166	4
STAT 330	3	CSCI 114	3
Wellness Gen Ed	2	Social & Behavioral Sciences Gen Ed (Global Perspectives or Cultural Diversity)	3
	16		16
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
STAT 367	3	STAT 368	3
STAT 461	3	CSCI 160	4
MATH 265	4	Minor Requirement	3
Humanities & Fine Arts Gen Ed (Global Perspectives or Cultural Diversity)	3	Humanities and Fine Arts Gen Ed	3
Science and Tech Gen Ed w/Lab	4	Science and Technology Gen Ed	3
	17		16
Junior			
Fall	**Credits**	**Spring**	**Credits**
Statistics Elective	6	STAT Elective	3
Minor Requirement	3	Minor Requirement	3
Social and Behavioral Sciences Gen Ed	3	Upper Division Writing Gen Ed	3
CSCI 222 or MATH 270	3	Humanities/Social Sciences Gen Ed	3
	15		12
Senior			
Fall	**Credits**	**Spring**	**Credits**
STAT Elective	3	STAT 462	3
Minor Requirement	3	STAT Elective	3

Humanities/Social Sciences Gen Ed	3	Minor Requirement	4
Electives	6	Electives	3-6
	15		13-16

Total Credits: 120-123

Strategic Communication

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7705
- **Department Web Site:**
  www.ndsu.edu/communication/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/strategic-communication/

The Strategic Communication program prepares students to conduct research and design messages to communicate effectively with various publics. Student can specialize in advertising or public relations.

Students majoring in Strategic Communication must complete at least 3 credits of field experience and a capstone course as part of their degree.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 112	3	COMM 110	3
COMM 114	3	ENGL 120	3
COMM 189	1	Global Perspectives GE	3
ENGL 110 (or placement)	4	Humanities/Arts GE	3
Quantitative Reasoning GE	3	Science/Technology GE	3
Wellness GE	2	Science/Technology Lab GE	1
	16		16
Second Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 200	3	COMM 320	3
COMM 212	3	Major Elective	3
COMM 220	3	Minor or Language Coursework	3
Minor or Language Coursework	3	Humanities/Arts GE	3
Science/Technology GE	3	Science/Technology GE	3
	15		15
Third Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 375	3	COMM 425	3
Major Elective	3	COMM 496	3
Minor or Language Coursework	3	Major Elective	3

AHSS Requirement	3	Minor or Language Coursework	3
Upper Division Writing	3	AHSS Requirement	3
	15		15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 377	3	COMM 472 or 476	3
COMM 431	3	Major Elective	3
Major Elective	3	Major Elective	3
Minor or Language Coursework	3	Minor or Language Coursework	3
Additional Coursework or Internship	3	Additional Coursework or Internship	3
	15		15

Total Credits: 122

Theatre Arts

Department Information

- **Department Location:**
  Reineke Fine Arts Center
- **Department Phone:**
  701-231-7932
- **Department Email:**
  ndsu.performing.arts@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/performingarts/theatre/
- **Degrees Offered:**
  B.A.; B.S.; B.F.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/theatre-arts/

There are three undergraduate degree programs in theatre. Each is flexible and can be designed to fit the individual student's career goals:

The Bachelor of Arts in theatre arts is a general baccalaureate degree built around a traditional liberal arts curriculum. Within the major field itself, courses are required in technical theatre, performing, and directing, as well as in literature and theatre history. The BA program requires two years' study of a modern language.

The Bachelor of Science degree is an alternative to the Bachelor of Arts. The program for the BS is identical to that for the BA, except that the BS requires a minor in an approved field, in place of study of a modern language.

The Bachelor of Fine Arts is a professionally-oriented undergraduate degree track which places primary emphasis on performance and studio activity, while also requiring a high level of involvement in the academic curriculum. It can be entered only by faculty permission. This degree track broadens the student's exposure to his/her field--Performance, Design & Tech, Musical Theatre--and considerable study is made of related fine arts fields as well. Admission to the BFA degree program requires consistent involvement in Theatre NDSU productions and projects and demands a high level of commitment on the part of the student.

The Department of Theatre Arts is fully accredited by the National Association of Schools of Theatre (NAST). The department currently has 52 majors and 14 minors and is continuing to grow.

Plans of Study

B.F.A. Design & Tech

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	ENGL 120	3
THEA 150	1	THEA 161	3
THEA 180	3	THEA 181	3
THEA 220 or 221	1	THEA 220 or 221	1
THEA 270 or 271	3	THEA 223 or 224	1
THEA 272 or 279	3	THEA 270 or 271	3
Quantitative Reasoning Gen Ed	3	THEA 276 or 277	3
	18		17
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
THEA 210 or 211	1-2	ART 131	3
THEA 222	1	THEA 210 or 211	1-2
THEA 272 or 279	3	THEA 224 or 223	1
THEA 275	3	THEA 276 or 277	3
THEA 278	3	THEA 280	3
Science & Technology Gen Ed	3	THEA 370	1-3
		THEA 376	3
	14-15		15-18
Junior			
Fall	**Credits**	**Spring**	**Credits**
THEA 210 or 211	1-2	THEA 210 or 211	1-2
THEA 370	1-3	THEA 377	3
THEA 486 or 487	3	ART 111	3
COMM 110	3	ENGL 380	3
Science & Technology w/Lab Gen Ed	4	Upper Level Writing Gen Ed	3
Elective (if needed)	1	Social & Behavorial Sciences/Global Perspectives Gen Ed	3
	13-16		16-17
Senior			
Fall	**Credits**	**Spring**	**Credits**
THEA 365	3	THEA 210 or 211	1-2
THEA 450	3	THEA 481	3
THEA 480	3	MUSC 100 or 103	3
THEA 486 or 487	3	Social & Behavioral Science/Cultural Diversity Gen Ed	3
Science & Technology Gen Ed	3	Wellness Gen Ed	2
	15		12-13

Total Credits: 120-129

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

B.F.A. Musical Theatre

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	ENGL 120	3
MUSC 101	3	MUSC 160	1
MUSC 167	1	MUSC 167	1
THEA 150	1	THEA 210, 220, or 221	1-2
THEA 161	3	THEA 263	2
THEA 180	3	THEA 266	3
THEA 270	3	THEA 270 or 271	3
THEA 220	1	Quantitative Reasoning Gen Ed	3
THEA 362	2		
	21		17-18
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
MUSC 100 or 103	3	ART 111	3
MUSC 130	3	COMM 110	3
MUSC 132	1	MUSC 267	1
MUSC 267	1	THEA 210, 223, or 224	1-2
THEA 210 or 222	1-2	THEA 263	2
THEA 278	3	THEA 280	3
THEA 362	1	THEA 468	3
		Social & Behavioral Science/Cultural Diversity Gen Ed	3
	13-14		19-20
Junior			
Fall	**Credits**	**Spring**	**Credits**
MUSC 367	1	MUSC 367	1
THEA 210	1-2	THEA 210	1-2
THEA 275	3	THEA 228	3
THEA 365	3	THEA 263	2
THEA 368	3	THEA 466 or 467	3
Science & Technology w/Lab Gen Ed	4	ENGL 380	3
		Science & Technology Gen Ed	3
		Wellness Gen Ed	2
	15-16		18-19
Senior			
Fall	**Credits**	**Spring**	**Credits**
MUSC 467	1	THEA 210, 223, or 224	1-2
THEA 450	3	THEA 276 or 277	3
THEA 480	3	THEA 466 or 467	3
Upper Level Writing Gen Ed	3	THEA 481	3

Science & Technology Gen Ed	3	Social & Behavioral Science/Global Perspectives Gen Ed	3
	13		13-14

Total Credits: 129-135

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

B.F.A. Performance

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	ENGL 120	3
THEA 150	1	THEA 181	3
THEA 161	3	THEA 266	3
THEA 180	3	THEA 271	3
THEA 262	1	THEA 221	1
THEA 270	3	Social and Behavioral Science/ Global Perspectives Gen Ed	3
THEA 220	1		
	16		16
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
MUSC 100 or 103	3	COMM 110	3
MUSC 162	1	ART 111	3
THEA 210	1	THEA 210, 222, or 223	1-2
THEA 275	3	THEA 263	2
THEA 278	3	THEA 276	3
THEA 222	1	THEA 280	3
Science & Technology w/Lab Gen Ed	4		
	16		15-16
Junior			
Fall	**Credits**	**Spring**	**Credits**
THEA 210	2	THEA 210	2
THEA 361	3	THEA 228 or 267	3
THEA 365	3	THEA 263	2
THEA 462	3	THEA 466	3
Social & Behavorial Science/Cultural Diversity Gen Ed	3	ENGL 380	3
		Quantitative Reasoning Gen Ed	3
	14		16
Senior			
Fall	**Credits**	**Spring**	**Credits**
THEA 368	3	THEA 210	2
THEA 450	3	THEA 263	2
THEA 461	3	THEA 481	3
THEA 480	3	THEA 467	3

Science & Technology Gen Ed	3	Upper Level Writing Gen Ed	3
Wellness Gen Ed	2	Science & Technology Gen Ed	3
	17		16

Total Credits: 126-127

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

B.A./B.S.

Freshman			
Fall	**Credits**	**Spring**	**Credits**
ENGL 110	4	ENGL 120	3
THEA 150	1	THEA 181	3
THEA 161	3	THEA 271	3
THEA 180	3	Wellness Gen Ed	2
THEA 270	3	Social & Behavioral Science for BS(Foreign Language for BA)	3
THEA 220	1		
Quantitative Reasoning for BS(Foreign Language for BA)	3		
	18		14
Sophomore			
Fall	**Credits**	**Spring**	**Credits**
MUSC 100 or 103	3	ART 111	3
THEA 210	2	THEA 210	1
THEA 275 or 279	3	THEA 276, 277, or 278(THEA 277, THEA 278 can fill this requirement if offered)	3
Theatre Elective	3	THEA 224, 223, or 222(THEA 223, THEA 222 should be taken with corresponding class)	1
AHSS Requirement	3	THEA 280	3
Minor Requirement for BS(Foreign Language for BA)	3	Science & Technology Requirement	3
		Minor Requirement for BS(Foreign Language for BA)	3
	17		17
Junior			
Fall	**Credits**	**Spring**	**Credits**
THEA 210	2	COMM 110	3
THEA 365	3	THEA 210	2
Upper Level Writing Gen Ed	3	ENGL 380	3
Science & Technology w/ Lab	4	Theatre Elective	3
Social & Behavioral Sciences	3	Minor Requirement for BS(AHSS Elective for BA)	3
	15		14
Senior			
Fall	**Credits**	**Spring**	**Credits**
THEA 450	3	THEA 210	2

THEA 480	3	THEA 481	3
AHSS Requirement	6	AHSS Requirement	3
Minor Requirement for BS	3	Minor Requirement for BS	3
		Science and Technology	3
	15		14

Total Credits: 124

University Studies

Department Information

- **Department Location:**
  Morrill Hall
- **Department Phone:**
  701-231-7014
- **Department Email:**
  ndsu.arc@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/advising_resource_center/
- **Degrees Offered:**
  B.U.S.

https://www.ndsu.edu/advising_resource_center/about_the_bus_degree/

The Bachelor of University Studies (B.U.S.) degree is a baccalaureate degree program offered through the College of Arts, Humanities and Social Sciences, and is advised through the Advising Resource Center. The B.U.S. degree is a flexible degree option for students who are seeking a non-traditional, interdisciplinary education and wishing to tailor their own degree. Each degree plan is designed by the student with assistance from an academic advisor and is later approved by a committee composed of campus-wide representation.

Degree Plan Proposal

Students seeking the B.U.S. degree usually begin by visiting the Advising Resource Center and talking with an adviser about their educational, personal, and professional goals. The adviser will work with the student in preparing what is called a Bachelor of University Studies proposal, which includes a statement of goals, a summary of previous education and experience, and a proposed plan of study (i.e., remaining coursework) for the degree. After both have signed the proposal, it is forwarded to the Bachelor of University Studies Program Review Committee for approval. If the proposal is approved by the committee, it becomes the student's requirements for graduation. Each plan of study must meet the general education requirements (p. 823) (including the Capstone Experience, Cultural Diversity and Global Perspectives categories) and the graduation requirements (https://bulletin.ndsu.edu/academic-policies/undergraduate-policies/degree-and-graduation) of the university. The B.U.S. degree does not allow a designated major, instead a student will create an area or areas of emphasis that will help him or her attain post-graduation goals. Each area of emphasis must include a minimum of 12 credits of study with at least 6 of those credits being upper division credits. In addition to the emphasis area a student may choose to declare an academic minor that they feel will strengthen their plan of study. No fewer than 15 credits must be proposed (remain to be taken after approval) and included in the proposal.

The degree plan proposal must be submitted to the B.U.S Program Review Committee by guideline due dates (October 1 for spring or summer graduation; February 1 for fall graduation).

The general education requirements (p. 820) will have as a minimum the following:

Code	Title	Credits
Requirements		Credits
Communications (C)		12
Quantitative Reasoning (R)		3
Science & Technology (S) (A laboratory course is included in this requirement.)		10
Humanities & Fine Arts (A)		6
Social & Behavioral Sciences (B)		6
Wellness (W)		2
Capstone		3
Total Credits		42

Approval of a student's proposal means that the committee believes that the approved plan is the best educational program available to that student and that it is a baccalaureate-level program.

It is the policy of the College of Arts, Humanities and Social Sciences that students seeking a B.U.S. degree will, following approval of the B.U.S Proposal, be expected to make continual progress toward completion of their degree. Discontinuing enrollment for a period of two continuous academic years or more indicates lack of progress. The approved proposals of students who lack progress will no longer be considered valid for graduation with a B.U.S. degree. If these students choose to continue to seek a B.U.S. degree, it will be necessary to submit a new proposal for consideration by the committee.

In addition to the Bachelor of University Studies' continual progress policy, NDSU requires that any student who discontinues enrollment for more than one year is subject to completing the General Education requirements in effect at the time of re-entry. B.U.S. proposals are subject to the NDSU baccalaureate degree requirements.

For further information, contact:

Advising Resource Center
112 Morrill Hall
NDSU Dept. 2800, P.O. Box 6050
North Dakota State University
Fargo, ND 58108-6050
Telephone: 701-231-7014
ndsu.arc@ndsu.edu

Veterinary Technology

Department Information

- **Department Location:**
  Robinson Hall
- **Department Web Site:**
  www.ag.ndsu.edu/vettech/
- **Degrees Offered:**
  B.S.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/veterinary-technology/

Veterinary Technology Major

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

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

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

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
ANSC 114	3	ANSC 223	2
ENGL 110 (C)	4	BIOL 111 (S)	3
VETS 135	3	COMM 110 (C)	3
VETS 136	1	ENGL 120 (C)	3
VETS 150	1	VETS 115	1

Gen Ed Quantitative Reasoning (R)	3	VETS 125	2
		Elective	3
	15		17
Second Year			
Fall	**Credits**	**Spring**	**Credits**
ANSC 370	3	ANSC 371	3
CSCI 114 or MIS 116 (S)	3	VETS 249	2
VETS 256	4	VETS 255	2
VETS 481	1	VETS 255L	1
VETS 483	1	VETS 385	3
Gen Ed Humanities & Fine Arts (A)	3	VETS 481	1
		VETS 483	1
		Gen Ed Social and Behavioral Sciences (B)	3
	15		16
Third Year			
Fall	**Credits**	**Spring**	**Credits**
VETS 386	3	VETS 387	3
VETS 457	2	VETS 461	2
VETS 481	1	VETS 461L	1
VETS 483	1	VETS 481	1
Gen Ed Social & Behavioral Sciences and Cult Diversity(B and D)	3	VETS 482	2
Elective	6	VETS 483	1
		Gen Ed Humanities & Fine Arts and Global Perspectives (A and G)	3
		Elective	3
	16		16
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
VETS 485	6	CHEM 117 or 121 (S)	3
Electives	6	MICR 202 & 202L	3
		Gen Ed Upper Level Writing (C)	3
		Gen Ed Wellness (W)	2
		Elective	3
	12		14

Total Credits: 121

Web Design

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7705
- **Department Web Site:**
  www.ndsu.edu/communication/

- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/web-design/

The New Media and Web Design minor is an interdisciplinary program of study through the Department of Communication (https://www.ndsu.edu/communication).

Wellness

Department Information

- **Department Location:**
  E. Morrow Lebedeff Hall
- **Department Phone:**
  701-231-8211
- **Department Web Site:**
  www.ndsu.edu/hde/undergraduate_studies/minors/
- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/wellness/

Wellness Minor

A minor in wellness will promote wellness as an alternative to traditional treatment perspectives. Wellness is a critical issue in our society. The costs for physical and mental health continue to increase. However, the cost of problems in these areas expands far beyond the costs of treatment. The impact of wellness problems in the workplace, the effects of family relationship problems on children and the social costs of wellness problems are well documented. A strong focus on wellness can contribute to prevention of many of these problems and their considerable social costs.

This minor provides individuals with a multi-system and interdisciplinary approach to wellness. Students from a variety of fields will gain a broader understanding of the role of wellness in their professional and personal lives.

The wellness minor will enhance students' skills in their major field by providing a focus on prevention and wellness applications. Students gain knowledge and skills in a number of wellness areas, including stress management, fitness, financial wellness, family enrichment, nutritional well-being and environmental wellness. This minor can be a good addition to any major because wellness is an important part of life and has been shown to impact professional success.

The wellness minor consists of a minimum of 18 credits. Students choose credits from the listed courses. A minimum of eight credits must be taken at North Dakota State University for the minor to be awarded.

Women and Gender Studies

Department Information

- **Department Location:**
  Morrill Hall
- **Department Phone:**
  701-231-7290
- **Department Web Site:**
  www.ndsu.edu/wgs/
- **Degrees Offered:**
  B.S.; B.A.
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/women-gender-studies/

Women and Gender Studies examines the contributions of all genders to aspects of society; explores the intersections of race, class, sexual orientation, age, and physical ability with gender both globally and nationally; and provides a newer and broader understanding of gender in all fields. It may be a major that you discover after taking a WGS introductory, general education class that inspires you to learn more. Dual majors are common, as WGS shares commonalities with areas such as business, communication, human development, and sociology, for example.

Both the WGS major and minor provide the benefits of a liberal arts education with an emphasis on critical thinking, writing, organizational skills, and oral presentations. The Women and Gender Studies graduate is a well-rounded individual who is prepared for leadership in areas such as the workplace, politics, health care, sport, families, education, and law.

Women and Gender Studies Major

The Women and Gender Studies major consists of 36 credits, including a 21 credit core and 15 hours of elective classes.

Women and Gender Studies Minor

The Women and Gender Studies minor is an interdisciplinary program appropriate as a complement to various majors. This minor is particularly useful in acquiring perspectives that supplement traditional studies for developing leadership roles or for pursuing careers that involve concerns about gender.

Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

First Year			
Fall	**Credits**	**Spring**	**Credits**
COMM 110	3	ENGL 120	3
ENGL 110	4	Humanities and Fine Arts Gen Ed	3
Humanities and Fine Arts Gen Ed	3	Science and Technology Gen Ed	3
Social/Behavioral Science Gen Ed	3	Social/Behavioral Science & Global Perspective Gen Ed	3
Science/Technology Gen Ed	3	Quantitative Reasoning Gen Ed	3
	16		15
Second Year			
Fall	**Credits**	**Spring**	**Credits**
WGS 110	3	WGS 112	3
WGS elective	3	WGS elective	3
AHSS Req 1	3	AHSS Req 2	3
Science/Technology w/ Lab Gen Ed	4	Wellness Gen Ed	2
Second major or minor	3	Second major or minor	3
		Second major or minor	3
	16		17
Third Year			
Fall	**Credits**	**Spring**	**Credits**
WGS 340	3	WGS 370	3
WGS elective	3	WGS elective	3
AHSS Req 3	3	Upper division writing	3
Second major or minor	3	Second major or minor	3
Second major or minor	3	Second major or minor	3
	15		15
Fourth Year			
Fall	**Credits**	**Spring**	**Credits**
SOC 424	3	WGS 350	3
WGS elective	3	WGS 489	3
WGS elective	3	Second major or minor	
Second major or minor	3	Second major or minor	3

Second major or minor	3	Second major or minor	3
	15		12

Total Credits: 121

Zoology

Department Information

- **Department Location:**
  Stevens Hall
- **Department Phone:**
  701-231-7087
- **Department Web Site:**
  www.ndsu.edu/biology/
- **Degrees Offered:**
  Minor
- **Official Program Curriculum:**
  bulletin.ndsu.edu/undergraduate/program-curriculum/zoology/

Zoology, the study of animals, is a diverse field with specialties that range from cells (cytologists, molecular biologists, geneticists), to organisms (anatomists, physiologists, entomologists, mammalogists, ornithologists), to populations and their relation to each other and to their environment (ethologists, ecologists).

Graduate Programs

Doctoral

History (p. 360)

Industrial & Manufacturing Engineering (p. 367)

Materials & Nanotechnology (p. 376)

Mathematics (p. 381)

Mechanical Engineering (p. 384)

Molecular Pathogenesis (p. 391)

Music (DMA) (p. 393)

- Performance
- Conducting

Natural Resources Management (p. 402)

Nursing (DNP) (p. 405)

Pharmaceutical Sciences (p. 407)

Physics (p. 409)

Plant Pathology (p. 412)

Plant Sciences (p. 414)

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Psychology (p. 422)

Range Science (p. 429)

STEM Education (p. 445)

Software Engineering (p. 435)

Soil Science (p. 439)

Statistics (p. 442)

Transportation & Logistics (p. 451)

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Masters

Accountancy (p. 238)

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Agribusiness and Applied Economics (p. 243)

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Animal Sciences (p. 250)

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Architecture (http://bulletin.ndsu.edu/graduate/programs/architecture)

Athletic Traning (M.A.Trg.) (p. 374)

Biochemistry (p. 254)

Food Safety (p. 349)

Genomics & Bioinformatics (p. 350)

Health Nutrition and Exercise Science (p. 355)

- Dietetics*
- Exercise /Nutrition Science
- Leadership, Physical Education and Sport

History (p. 360)

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Human Development and Family Science (p. 363)

- Family Financial Planning *
- Gerontology*
- Youth Development*

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International Agribusiness (p. 369)

Managerial Logistics* (p. 372)

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Mass Communication (p. 288)

Materials & Nanotechnology (p. 376)

Mathematics (p. 381)

Mechanical Engineering (p. 384)

Merchandising (p. 387)*

Microbiology (p. 388)

Music (p. 393)

- Conducting
- Education
- Performance

Natural Resources Management (p. 402)

Physics (p. 409)

Plant Pathology (p. 412)

Plant Sciences (p. 414)

Public Health (p. 426)

Range Science (p. 429)

Sociology (p. 433)

Software Engineering (p. 435)

Soil Science (p. 439)

Speech Communication (p. 288)

Statistics (p. 442)

Transportation and Urban Systems* (p. 454)

Certificates

College Teaching (p. 287)

Construction Management (p. 297)

Family Financial Planning * (p. 363)

Gerontology* (p. 363)

Merchandising (p. 387)*

Public Health (p. 426)

Software Engineering (p. 435)

Statistics (p. 442)

Transportation and Urban Systems* (p. 454)

Youth Development* (p. 363)

Youth Program Management and Evaluation (p. 363)*

* Progam Available Online

Accountancy

Department Information

- **Program Coordinator:**
  Jill M. Zuber, Ph.D., CPA
- **Phone:**
  Barry Hall 200B
- **Email:**
  jill.zuber@ndsu.edu
- **Department Phone:**
  (701) 231-6651
- **Department Web Site:**
  www.ndsu.edu/business/graduate/macc/
- **Application Deadline:**
  Applications are reviewed on a rolling schedule.
- **Degrees Offered:**
  M.Acc.
- **Test Requirement:**
  GMAT 550 or GRE
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5

Program Description

The Master of Accountancy (M.Acc.) program at North Dakota State University is a non-thesis, professional program structured to advance the knowledge of qualified students with an undergraduate accounting degree. In addition, this program will enable students without an undergraduate accounting degree to prepare for a challenging but richly rewarding career in accounting. The accounting prerequisites for the program may be met with graduate courses, some of which are newly designed and online.

The Master of Accountancy (M.Acc.) program at NDSU is designed to have students complete graduate studies needed to advance their careers in public accounting, corporate accounting, or government accounting and to prepare them for the Certified Public Accountant (CPA) exam or Certified Management Accountant (CMA). Our approach to learning involves creating a collaborative environment in which students can develop analytical skills and gain in-depth accounting knowledge. Students will be prepared to identify accounting problems, research the problem and possible solutions

through the use of on-line databases, and present a recommended action. The learning environment also provides students with the opportunity to draw from the experiences of fellow students from diverse backgrounds.

Through the College of Business, North Dakota State University's M.Acc program is fully accredited by AACSB International (http://aacsb.edu), the premier accrediting agency in business administration and accounting.

A. **Admission requirements for NDSU accounting majors**

1. The applicant's overall undergraduate GPA should be at least 3.0 on a 4.0 scale.

2. The applicant's GPA for upper-division accounting courses should be at least 3.0 on a 4.0 scale.

3. The applicant does not have to complete the GMAT, if the student meets the minimum GPA requirements (requirements A.1. and A.2.).

4. If the applicant's GPA is below the 3.0 standards (requirements A.1. and A.2.), conditional admission to the program *may* be allowed under the following conditions:

    4.1. The student has significant post-graduation work experience OR
    4.2. The student takes the Graduate Management Admissions Test (GMAT) with an expectation that the student earn a score of at least 550.

5. Students must also submit a letter stating reasons for wanting a Master of Accountancy degree. Names of two NDSU accounting professors must be entered on the application, but no references are required.

6. If the above requirements are not met, the applicant *may* be granted conditional admission.

7. Conditional admission is granted solely at the discretion of the program coordinator and/or admissions committee.

B. **Admission Requirements for Students Graduating with Accounting Major from Tri-College Schools, North Dakota four-year not-for-profit schools and AACSB accredited Schools**

1. The student's overall GPA should be at least 3.0 on a 4.0 scale.

2. The student's GPA for upper-division accounting courses should be at least 3.0 on a 4.0 scale.

3. Applicants do not have to complete the GMAT, if the student meets the minimum GPA requirements (Requirements B.1. and B.2.).

4. If the student's GPA is below the 3.0 standards (Requirements B.1. and B.2.), conditional admission to the program *may* be allowed under the following conditions:

    4.1. The student has significant post-graduation work experience OR
    4.2. The student takes the Graduate Management Admissions Test (GMAT) with an expectation that the student earn a score of at least 550.

5. Students must also submit a letter stating reasons for wanting a Master of Accountancy degree and two letters of recommendation.

6. If the above requirements are not met, the student *may* be granted conditional admission.

7. Conditional admission is granted solely at the discretion of the program coordinator and/or admissions committee.

C. **Admission Requirements for All Others**

1. The student has an undergraduate degree from a regionally accredited school.

2. The student's overall GPA should be at least 3.0 on a 4.0 scale.

3. The student's GPA for upper-division accounting courses should be at least 3.0 on a 4.0 scale.

4. The student takes the Graduate Management Admissions Test (GMAT) with an expectation that the student earn a score of at least 550.

5. If the student has not completed all of the following core courses or their equivalent in their undergraduate program, the student *may* be conditionally admitted to the program.

    5.1. **Core courses**

        5.1.1. ACCT 311 (Intermediate Accounting I)
        5.1.2. ACCT 312 (Intermediate Accounting II)
        5.1.3. ACCT 320 (Cost Accounting)
        5.1.4. ACCT 418 (Tax I)

5.1.5. ACCT 421 (Audit I)
5.2. The student will be expected to complete any missing core courses within the first two semesters of the program.
5.3. Students must meet the minimum GPA standard of 3.0 for all of the core courses for final acceptance into the program.

6. If the student's undergraduate GPA is below the 3.0 standards (Requirements C.2. and C.3.), conditional admission to the program *may* be allowed under the following conditions:

6.1. The student has significant post-graduation work experience OR
6.2. The student takes the Graduate Management Admissions Test (GMAT) with an expectation that the student earn a score of at least 550.

7. Students must also submit a letter stating reasons for wanting a Master of Accountancy degree and two letters of recommendation.

8. If the above requirements are not met, the student *may* be granted conditional admission.

9. Conditional admission is granted solely at the discretion of the program coordinator and/or admissions committee.

D. **Conditional status expires and regular admission is granted if the applicant meets the terms of their conditional admission. See sections A.6., A.7., B.6., B.7., C.8. and C.9. above**.

E. **A student who attended a university outside of the United States must submit a course-by-course transcript evaluation from World Education Services (WES). See www.wes.org.**

Financial Assistance

A limited number of graduate assistantships are available each semester through the Master of Accountancy program. The program coordinator will send an application for the assistantship to all eligible students who have applied to the program by the application deadlines.

The total course requirements necessary to complete the M.Acc. degree will vary depending on the background of the student. Students without an undergraduate accounting degree will be required to take a core of undergraduate accounting courses in addition to the graduate courses required for the degree. See para. C.5. of the Admission Requirements. A student with an academic background in accounting will need to take 10 graduate-level courses (30 semester credit hours) and generally complete the degree in two or three semesters depending on the number of courses a student desires to take in a semester. Students are welcome to pursue the degree on a part-time or a full-time basis.

The graduate course work for the M.Acc. degree includes four required courses in accounting theory, applied professional research, legal aspects of business, and information resource management. In addition, the student must take five accounting electives from a list of courses that includes fraud examination, taxes, cost management, auditing, international financial reporting standards, and advanced financial accounting. Finally, the student must take one non-accounting elective from a list that includes courses on human resource management, international management, and organizational communication.

Code	Title	Credits
MIS 770	Information Resources Management	
ACCT 730	Legal Aspects of Business	
ACCT 735	Applied Professional Research	
ACCT 750	Accounting Theory	
Total Required Credit Hours		12
Select 5 of the following:		15
ACCT 610	Fraud Examination [1]	
ACCT 611	Advanced Fraud Examination [1]	
ACCT 615	Advanced Accounting [1]	
ACCT 619	Tax Accounting II [1]	
ACCT 620	Accounting Information Systems [1]	
ACCT 625	Government and Not-for-Profit Accounting [1]	
ACCT 640	Management Control Systems [1]	
ACCT 722	Auditing II	
ACCT 725	International Financial Reporting Standards	
ACCT 755	Financial Statement Analysis	
Select one of the of the following:		3
COMM 783	Advanced Organizational Communication I	
MGMT 640	International Management	
MGMT 650	Human Resource Management	

MGMT 651	Negotiation and Alternative Dispute Resolution	
MGMT 671	Leading the Nonprofit Organization	
MGMT 750	Advanced Organizational Behavior	
Total Credits		30

[1] Students cannot take the 600-level course if they took the 400-level course

NOTES

- Students must complete a minimum of 15 credits at the 700-level.
- Summer courses are offered if sufficient students register to take the class.

You must have completed the following undergraduate courses or their equivalent.

Code	Title	Credits
ACCT 311	Intermediate Accounting I	4
ACCT 312	Intermediate Accounting II	4
ACCT 320	Cost Management Systems	3
ACCT 418	Tax Accounting I	3
ACCT 421	Auditing I	3

Margaret (Peggy) Andersen, Ph.D.
Professor
Speciality: Accounting, Cost Management, and Theory

James W. Clifton, M.Acc., CPA
Assistant Professor of Accounting Practice
Speciality: Accounting, Fraud, and Taxation

Thomas D. Dowdell, Ph.D.
Professor
Speciality: Accounting and Auditing

Nancy J. Emerson, MAS, CPA, CFE
Senior Lecturer
Speciality: Accounting and Government/Nonprofit Accounting

Yongtao "David" Hong, Ph.D.
Associate Professor
Speciality: Advanced Accounting and International Standards

Bonnie Klamm, Ph.D., CPA
Professor
Speciality: Accounting Information Systems

Michael J. Peterson, Ph.D.
Associate Professor
Speciality: Accounting and Cost Management

Herbert Snyder, Ph.D.
Professor
Speciality: Auditing, Forensic Accounting

Limin Zhang, Ph.D.
Associate Professor
Speciality: Management Information Systems

Jill Zuber, Ph.D., CPA
Associate Professor
Speciality: Accounting and Taxation

Advanced Athletic Training

Department Information

- **Department Head:**
  Yeong Rhee, Ph.D.
- **Program Coordinator:**
  Kara Gange, Ph.D.
- **Department Location:**
  Bentson Bunker Fieldhouse
- **Department Phone:**
  (701) 231-5777
- **Department Web Site:**
  www.ndsu.edu/hnes/graduate_programs/advanced_athletic_training_post_professional/
- **Application Deadline:**
  Rolling application process starting December 1 for fall start
- **Degrees Offered:**
  M.S.
- **Test Requirement:**
  TOEFL iBT 100; IELTS 7; PTE Academic 68

Program Description

The Department of Health, Nutrition and Exercise Sciences (HNES) offers graduate study leading to the Master of Science (M.S.) in Advanced Athletic Training and a Master of Athletic Training (MATrg) degree. The HNES department also offers a Master of Science (M.S.) degree in HNES with options in Exercise/Nutrition Science and Dietetics (on line).

The Master of Science in Advanced Athletic Training is a post-professional degree consisting of 34 credits. The mission of post-professional graduate athletic training education is to expand the depth and breadth of applied and experiential knowledge and skills of the entry-level athletic trainer, to expand the athletic training body of knowledge, and to disseminate new knowledge in the discipline. At NDSU, the M.S. in Advanced Athletic Training program prepares the student with the increased depth and breadth in the following areas: Diagnostic Ultrasound, Therapeutic Modalities, Orthopedic Appliances, Emergency Care Techniques, Kinesio Tape® and Manual Therapies. The combination of research and clinical practice is emphasized in preparing the post-professional student for future employment.

1. Minimum overall GPA of 3.0 on a 4.0 scale.
2. Must be a BOC AT or eligible for the BOC exam and have graduated from a CAATE accredited professional (entry-level) graduate or undergraduate athletic training program.
3. Skype or interview with Athletic Training Faculty.

Admission Acceptance/Denial into the M.S.:

The M.S. application process is a very competitive process. The Application Committee reviews the graduate school and program application and determines if a student is granted an interview. The committee will set up a time with the student to complete the interview process. Criterion that is evaluated includes: overall GPA, certification status, quality of writing sample, quality of career goal statement, interview, and letters of reference. Exceptions to the requirements can be made upon recommendations from the Application Committee. Acceptance is *not* guaranteed simply upon satisfactory completion of the requirements. Once the Athletic Training Application Committee agrees to accept the student, the program director notifies the HNES Graduate Administrative Assistant, who notifies the NDSU Graduate School. Students are notified by the NDSU Graduate School of acceptance in the program. This letter should be received approximately 2 weeks after the Graduate School receives notification.

Code	Title	Credits
Required Courses		
HNES 702	Introduction to Advanced AT and Professionalism	
HNES 710	Introduction to Research Design and Methods in HNES	
HNES 720	Advanced Emergency Care	
HNES 722	Evidence Based Orthopedic Evaluation	
HNES 723	Advanced Techniques in Sports Medicine	
HNES 786	Diagnostic Ultrasound - Shoulder and Knee Basics	
HNES 787	Evidence Based Therapeutic Modalities	
HNES 788	Diagnostic Ultrasound - Case Studies and Ankle Basics	

HNES 798	Master's Thesis (6 credits)
HDFS 705	Quantitative Methods in Developmental Science
or STAT 725	Applied Statistics
or EDUC 702	Statistics In Educational Research
Electives: Minimum of 3 credits (must be 600/700 level)	3
Total credits	34

First Year					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
HNES 702	1	HNES 723	3	HDFS 705, STAT 725, or EDUC 702	3
HNES 710	3	HNES 786	3		
HNES 720	3	HNES 798	2		
HNES 787	3				
	10		8		3
Second Year					
Fall	**Credits**	**Spring**	**Credits**		
HNES 798	2	HNES 722	3		
Elective 600/700 Course	3	HNES 788	3		
		HNES 798	3		
		Elective 600/700 level course	2		
	5		11		

Total Credits: 37

Shannon David, Ph.D., ATC
Ohio University, 2013
Research Interests: Quantification of Intervention Outcomes, Patient-Clinician Relationship

Kara Gange, Ph.D., ATC
North Dakota State University, 2010
Research Interests: Therapeutic Modalities and Diagnostic Ultrasound

Nicole German Knodel, Ph.D., ATC
North Dakota State University, 2008
Research Interests: Critical Thinking, Clinical Practice

Katie Lyman, Ph.D., ATC
University of South Florida, 2014
Research Interests: Kinesio Tape®, Manual Medicine, and Emergency Medicine

Agribusiness and Applied Economics

Department Information

- **Department Location:**
  500 Barry Hall
- **Department Phone:**
  (701) 231-7441
- **Department Email:**
  ndsu.agribusiness@ndsu.edu
- **Department Web Site:**
  www.ag.ndsu.edu/agecon/
- **Application Deadline:**
  March 1

- **Degrees Offered:**
  M.S.
- **Test Requirement:**
  GRE or GMAT
- **English Proficiency Requirements:**
  TOEFL iBT 79; IELTS 6.5

Program Description

The Agribusiness and Applied Economics Master of Science degree includes areas of specialization in applied economics, agribusiness, and transportation and logistics.

The Applied Economics area emphasizes course work in economic theory, research methods, and quantitative techniques. The option is designed to prepare students for careers in agricultural economics research in private and public sectors and for Ph.D. programs at other institutions.

The Agribusiness specialization is a broad-based program which combines training in agribusiness management, economic analysis, and agricultural sciences. Training may include biotechnology, processing, and food and environmental safety. Students are prepared for a variety of successful careers in agribusiness by fulfilling the requirements for expertise in quantitative methods and developing a rigorous background in economic theory and research.

The Departments of Agribusiness and Applied Economics and Civil Engineering, in conjunction with the Upper Great Plains Transportation Institute, offer an interdisciplinary graduate program in multimodal transportation. The program includes rural and non-metropolitan planning, highway and railroad engineering, freight transportation operations and economics, and agribusiness logistics and distribution. Both thesis and comprehensive study options are available.

Students of all options have complete access to well-equipped research facilities and to faculty supervision time. The department has an excellent placement record with national and international agricultural and business firms, as well as government agencies.

In addition to the Graduate School admission requirements (https://bulletin.ndsu.edu/graduate/admission-information), applicants to the program must have earned a grade of B or higher in intermediate microeconomics and statistics including linear regression, and a grade of C or better in calculus.

Students who do not meet all requirements for admission or have deficiencies in prerequisite course work, but show potential for successful graduate study, may be admitted under a conditional status. Evidence must be provided showing that the applicant's potential is not adequately reflected by his/her record. After meeting the specified standards of performance set by the department, the student, in consultation with the major adviser, may request a change to full graduate standing.

Financial Assistance

The department offers assistantships on a competitive basis. Graduate Research Assistantships (GRAs) provide monthly stipends plus tuition waivers. Students must pay a minimal activity fee each semester. Assistantships do not begin until the first semester of full graduate standing when courses that apply for the Master of Science degree are taken.

Most assistantships are half-time (20 hours per week) or one-quarter-time (10 hours per week). Students on assistantship perform research or teaching duties in the Department in return for their stipend. Assistantships are typically limited to 16 months.

Granting assistantships depends on academic performance, departmental needs, and availability of assistantships.

Students pursuing a Master of Science in Agribusiness and Applied Economics (thesis option or comprehensive study option) must complete all core courses. Students select elective courses (with approval of the adviser and supervisory committee) to fulfill the remaining Graduate School credit requirements. It is required that students have competence in calculus, multiple regression analysis, and intermediate microeconomics.

Code	Title	Credits
Core Courses		
AGEC 701	Research Philosophy	1
ECON 710	Advanced Econometrics	3
AGEC 739	Analytical Methods for Applied Economics	3
AGEC 741	Advanced Microeconomics	3
Thesis Option		
Minimum of 16 credits numbered 601-689, 691; 700-789, 791; 800-889 and 891		
AGEC 798	Master's Thesis (6-10 credits)	
Comprehensive Study Option		

Minimum of 21 credits numbered: 601-689, 691; 700-789, 791; 800-889 and 891		
Of which a minimum of 7 credits of quantitative course work including: ECON 610 and the Core Courses listed above.		
AGEC 797	Master's Paper (2-4 credits)	
Total Credits:		30

James Caton, Ph.D.
George Mason University, 2016
Research Interests:Entrepreneurship Agent-based Computational Economics, Market Process Theory, Monetary Economics

William Nganje, Ph.D.
University of Illniois at Urbana-Champaign, 1999
Research Interests: Agriculturel Finance, Food Safety Economics

Erik Hanson, Ph.D.
University of Minnesota, 2016
Research Interests: Agricultural Finance, Farm Management, Marketing and Production Economics

Robert Hearne, Ph.D.
University of Minnesota, 1995
Research Interests: Natural Resource and Environmental Economics

Jeremy Jackson, Ph.D.
Washington University in St. Louis, 2008
Research Interests: Microeconomics, Political Economy, Public Finance

Siew Hoon Lim, Ph.D.
University of Georgia, 2005
Research Interests: Production Economics, Transportation, Industrial Organization

Dragan Miljkovic, Ph.D.
University of Illinois, 1996
Research Interests: Agricultural Prices, International Trade, Agricultural and Food Marketing and Policy

Frayne Olson, Ph.D.
University of Missouri, 2007
Research Interests: Crop Marketing Strategies, Crop Supply Chain Management, Agricultural Contracting, Agricultural Risk Management

Timothy Petry, M.S.
North Dakota State University, 1973
Research interests: Livestock Marketing

David Ripplinger, Ph.D.
North Dakota State University, 2011
Research Interests: Production Economics and Marketing

David Roberts, Ph.D.
Oklahoma State University, 2009
Research Interests: Natural Resource and Environmental Economics, Econometrics, Production Agriculture

David M. Saxowsky, J.D.
The Ohio State University, 1979
Research Interests: Agricultural Law

Saleem Shaik, Ph.D.
University of Nebraska, 1998
Research Interests: Agriculture Policy and Risk Management, Agriculture Production Economics

Anupa Sharma, Ph.D.
Virginia Polytechnic Institute and State University, 2016
Research Interests: Economics, Agriculture Business and Management

Cheryl J. Wachenheim, Ph.D.
Michigan State University, 1994
Research Interests: Agribusiness

Tom Wahl, Ph.D.
Iowa State University, 1989
Research Interests: International Marketing and Trade, Agricultural Trade Policy, Marketing and Price Analysis

William W. Wilson, Ph.D.
University of Manitoba, 1980
Research Interests: Commodity Marketing, Agribusiness, Industrial Organization

Lei Zhang, Ph.D.
University of Texas at Dallas, 2011
Research Interests: Applied Econometrics, Macroeconomics and Monetary Economics, Regional and Urban Economics

Agricultural and Biosystems Engineering

Department Information

- **Department Chair:**
  Sreekala Bajwa, Ph.D.
- **Graduate Coordinator:**
  Shafiqur Rahman, Ph.D.
- **Department Location:**
  Agricultural and Biosystems Engineering Building
- **Department Phone:**
  (701) 231-7261
- **Department Web Site:**
  www.ndsu.edu/aben/
- **Application Deadline:**
  International applications are due May 1st for fall and August 1 for spring. Domestic applications must be received at least one month prior to the start of the semester.
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 79; IELTS 6.5

Program Description

The Department of Agricultural and Biosystems Engineering offers graduate study leading to M.S. and Ph.D. degrees. The program emphasizes solving engineering problems for agricultural production, food and biofuels processing, and environmental resources management. Advanced work may involve specialized training in the following areas: irrigation and drainage engineering; agricultural hydrology; soil and water resources management; livestock waste management; air quality, process engineering for food and biofuels, and other bioproducts; agricultural machine systems; precision agriculture; machine vision and intelligent sensors for biological systems; and post-harvest handling and storage of biomass feedstocks and other biological materials.

Student research and academic programs are tailored to individual student needs and interests. Interdisciplinary approaches to agricultural and biosystems engineering programs are fostered.

The Department of Agricultural and Biosystems Engineering graduate program is open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full standing to the program, the applicant must meet the Graduate School's admission requirements and have a baccalaureate degree in engineering or have taken the equivalent of the basic undergraduate engineering courses.

Any student receiving an M.S. or Ph.D. degree from the NDSU ABEN department must have taken the following fundamental courses prior to attaining the graduate degree. If the courses (or their equivalent) were not taken prior to matriculating at NDSU, they should be taken in addition to other coursework required for the graduate degree.

- Mathematics through Differential Equations (NDSU: MATH 266 Introduction to Differential Equations)
- Statics (NDSU: ME 221 Engineering Mechanics I) and Dynamics (NDSU: ME 222 Engineering Mechanics II); these two may be substituted by a calculus-based Physics I class
- Thermodynamics (NDSU: ME 350 Thermodynamics and Heat Transfer); may be substituted with ABEN 644 Transport Processes, which may also count toward graduate degree

- Fluid Mechanics (NDSU: CE 309 Fluid Mechanics or ME 352 Fluid Dynamics)
- Physics II/Electricity and Magnetism (NDSU: PHYS 252 University Physics II)

Financial Assistance

Research assistantships are available and dependent on the grant funding of faculty research programs. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research. Students must be accepted into the Graduate School before they are eligible for an assistantship.

M.S. Degree

The M.S. degree program requires completion of 30 semester credit hours beyond the baccalaureate degree as detailed below. A Plan of Study (PoS) should be developed with the adviser by the end of the first semester of work. An oral examination covering the research-based paper or thesis and the student's understanding and ability to apply the subject matter to the research is required. Students typically require two years to complete their MS degree. An overall GPA of 3.0 or higher must be maintained.

The ABEN M.S. program requirements are:

Code	Title	Credits
Didactic Course Work (601-689, 691; 700-789, 791; 800-889 and 891)		16
ABEN 790	Graduate Seminar	
Additional Credits (as needed to complete 30 total credits)		
ABEN 798	Master's Thesis	6-10
Total Credits Required		30

- 30 credits after the B.S.
- 20-24 credit hours are from course work, while 6-10 credit hours are typically provided for a master's thesis
- A minimum of 6 credits of NDSU ABEN courses numbered 601-689 and 700-789 is required
- ABEN Graduate Seminar (ABEN 790)

Ph.D. Degree

Ph.D. candidates are encouraged to indicate their research interests when applying for admission and to select an adviser before entering the program. Typically, 3-4 years are required to complete the Ph.D. program after the completion of an M.S. degree.

The degree requirements are in accordance with the NDSU Graduate School requirements. The student's academic adviser will usually be selected during the acceptance process. Prior to the end of the first academic year, the student and academic adviser will arrange for appointment of a Graduate Advisory Committee.

The student and major adviser will prepare a Plan of Study by the end of the first year in residence. The student's Graduate Advisory Committee, the ABEN Department Chair, and the Dean of the Graduate School shall approve the Plan of Study. The Plan of Study (PoS) must be filed in the Graduate School of NDSU. An overall GPA of 3.0 or above must be maintained.

The ABEN Ph.D. program requirements are:

Code	Title	Credits
Didactic credit (601-689, 691; 700-789, 791; 800-889 and 891)		27
ABEN 899 and ABEN 790		30-45
Additional Credits (as need to complete 60 credits (post-master's) or 90 credits (post-bachelor's)		
Total credits		60-90

- 60 credits after the M.S. or 90 credits after the B.S.
- A minimum of 27 credits from NDSU courses numbered 601-689 and 700-789, at least 15 credits of which must be numbered 700-789
- A minimum of 30 credits of NDSU ABEN dissertation and graduate seminar after the M.S. or 45 credits after the B.S.
- A minimum of 9 credits of NDSU ABEN courses numbered 601-689 or 700-789, 15 credits if entering with other than an ABEN B.S.
- ABEN Graduate Seminar (ABEN 790)
- It is expected that one or more journal articles will be submitted for publication prior to the award of the degree.

*Any student receiving an M.S. or Ph.D. degree from the NDSU ABEN department must have taken the following fundamental courses prior to attaining the graduate degree. If the courses (or their equivalent) were not taken prior to matriculating at NDSU, they should be taken in addition to other coursework required for the graduate degree.

- Differential Equations (NDSU: Math 266)
- Statics (NDSU: ME 221) and Dynamics (NDSU: ME 222); these two may be substituted by a calculus-based Physics I class
- Thermodynamics (NDSU: ME 350); may be substituted with ABEN 644 which may also count toward graduate degree
- Fluid Mechanics (NDSU: CE 309 or ME 352)
- Physics II/Electricity and Magnetism (NDSU: PHYS 252)

The major adviser may appeal to the ABEN Graduate Committee (not the student's graduate advisory committee) for substitutions or waivers of these requirements.

Examinations

Comprehensive Examinations: Both a written and an oral examination will be taken after completion of the greater portion of the course work phase of the Ph.D. program. The written examination will be conducted to test the student's understanding and ability to apply the subject matter related to the chosen research area(s). The format and sequence of the written and oral examinations are dependent on the academic adviser and the examining committee. The examination will be graded pass, fail or marginal pass. If the student does not pass the written component of the comprehensive examination, the student will be provided another opportunity to pass the examination. If the student does not pass the written examination second time, the student must wait one semester before taking the examination for the third time. Failure of the third attempt will prevent the student from proceeding further in the Ph.D. program.

The oral examination will also be coordinated by the academic adviser. In this examination, the student will be required to provide a short presentation of the research progress to the date of the oral examination. The format of the examination is dependent on the academic adviser and the examining committee. This examination is to assess the student's ability to communicate his/her research problem, and how he/she is applying scientific and engineering principles to solve the research problem. This examination may be used by the committee to further ascertain the student's level of understanding of subject matter as observed from the written examination. This examination is graded pass or fail. If a student fails the oral examination, the student will be advised of the deficiencies and will be given a second opportunity to pass the examination. Should both attempts to pass an examination result in failure, the candidate may request to take the examination a third time. A request for a third examination requires the support of the supervisory committee, the Department Chair, and the Dean of the Graduate School after consultation with the Graduate Council. Failure of the third attempt will prevent the student from proceeding further in the Ph.D. program.

Successful completion of both written and oral examinations will formally admit the student into candidacy for the Ph.D. in Agricultural and Biosystems Engineering. At least one semester must elapse between admission to candidacy and final PhD. oral examination of the dissertation.

Final Examination: After the research work is completed, the student will write a Ph.D. dissertation following the guidelines of the Graduate School. The final oral PhD. examination will be arranged after the approval of his/her academic adviser. The complete Ph.D. dissertation will be distributed to the examining committee members a minimum of one week before the final examination. The student will present the complete research work during this final examination. After passing the final examination, the student will complete all the appropriate suggested changes of the committee. The student will follow the procedures as defined by the Graduate School to complete the submission of the Ph.D. dissertation.

Sreekala G. Bajwa, Ph.D.
University of Illinois at Urbana-Champagne, 2000
Research Interests: Remote Sensing, Precision Agriculture, Unmanned Aerial Systems, Bio-composites

Thomas Bon, Ph.D.
North Dakota State University, 2003
Research Interests: Machine Systems, Electronics and Instrumentation

Igathinathane Cannayen, Ph.D.
Indian Institute of Technology, 1997
Research Interests: Biomass Harvest, Storage, Collection and Pre-Processing

Kenneth J. Hellevang, Ph.D.
North Dakota State University, 1989
Research Interests: Post Harvest Technology, Structures

Xinhua Jia, Ph.D.
University of Arizona, 2004
Research Interests: Soil and Water Engineering, Hydrology

Zhulu Lin, Ph.D.
University of Georgia, 2003

Research Interests: Water and Soil Resources, Environmental Modeling

Scott W. Pryor, Ph.D.
Cornell University, 2005
Research Interests: Biorenewable Products and Bioprocessing

Shafiqur Rahman, Ph.D.
University of Manitoba, 2004
Research Interests: Livestock Waste Management. Water Quality and Air Quality Assessment and Mitigation, Dust and Particulate Matter Emission

Thomas S. Scherer, Ph.D.
University of Minnesota, 1986
Research Interests: Soil and Water Resources Management, Irrigation Systems

Halis Simsek, Ph.D.
North Dakota State University, 2012
Research Interests: Water and Wastewater Treatment, Animal and Agricultural Waste Management

Dean D. Steele, Ph.D.
University of Minnesota, 1991
Research Interests: Irrigation and Environmental Engineering

Dennis P. Wiesenborn, Ph.D.
Rice University, 1989
Research Interests: Food and Added Value Process Engineering for Food, Biofuels, and Other Bioproducts

Agricultural Education

Department Information

- **Department Chair:**
  Chris Ray, Ph.D.
- **Program Coordinator:**
  Adam Marx, Ph.D.
- **Department Location:**
  School of Education, FLC 210
- **Department Phone:**
  (701) 231-7921
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  M.S., M.Ed.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

Agricultural Education offers graduate study leading to the M.Ed. and M.S. degrees. Advanced work may involve specialized training in vocational education, extension education, international extension, and agricultural education.

Degree programs are planned cooperatively to meet the needs of individual students. Candidates are encouraged to include supporting work relevant to subject matter areas of interest. Some courses focus on problems related to various phases of Agricultural Education, including secondary, post-secondary, adult, and extension programs. Others emphasize issues common to all service areas in agricultural and extension education. Provision may be made for candidates to include internships in agribusiness, natural resources education, or other aspects of agricultural and extension education in their programs. Candidates should work closely with an adviser.

The NDSU programs in education are accredited by National Council for Accreditation of Teacher Education and are approved by the ND Education Standards and Practices Board. Changes in national and state legislation, standards, or rules can affect academic program requirements.

In addition to the Graduate School's required application materials, the program requires submission of a statement of career goals consistent with the five propositions of the National Board of Professional Teaching Standards (NBPTS) (http://www.nbpts.org), as well as reasons for applying to the program.

Admission is considered only after all required application materials have been received and reviewed. Where appropriate, all international student requirements must be met. If a program has a cohort group with enrollment limitations, an entrance interview will be required.

Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data. A student must meet all requirements for full admission.

NOTE: The School of Education reserves the right to obtain additional information about the student's professional competence from qualified professionals.

Master's programs within the School of Education require a minimum of 30 semester credits (minimums vary by academic program). The Master of Science (M.S.) degree requires a disquisition. The Master of Education (M.Ed.) degree is a non-disquisition, practitioner-oriented degree. Programs vary on requiring a written comprehensive exam or a portfolio/oral.

> ***NOTE:*** Earning an academic/professional degree does not necessarily lead to state credential or licensure. People seeking licensure must provide evidence of the required number of years of teaching or counseling, and, in the case of school administration, administrative experience. Potential and current students should consult with the appropriate academic program coordinator for advice about licensure, certification, or credentialing after communicating with the appropriate state official.

Code	Title	Credits
Core Courses		18
EDUC 750	Reflective Practice and Research in Education	
EDUC 751	Students and Their Learning	
EDUC 752	Curriculum Design and Delivery	
EDUC 753	Managing/ and Monitoring Learning	
Major/Concentration		18
Choose from the following:		
H&CE 724	Program Development In Vocational Education	
H&CE 740	Vocational Philosophy and Policy	
H&CE 743	SAE/Adult Programs	
H&CE 756	Program Development and Evaluation	
H&CE 781	Professional Development in Agricultural Education	
H&CE 787	Issues In Education	
H&CE 795	Field Experience	
Electives (as approved by adviser)		
H&CE 794	Practicum/Internship (OR)	
H&CE 798	Master's Thesis (for M.S. students only)	
Total Credits		30

Adam A. Marx, Ph.D.
University of Missouri, 2014
Research Interests: Adolescent Career Decision-Making, Student Engagement, Teacher Development

Animal Sciences

Department Information

- **Acting Chair:**
  David Buchanan, Ph.D.
- **Graduate Coordinator:**
  Anna Grazul-Bilksa, Ph.D.
- **Department Location:**
  102 Hultz Hall
- **Department Phone:**
  (701) 231-7641
- **Department Web Site:**

www.ag.ndsu.edu/ansc/

- **Application Deadline:**
  Applications are accepted for fall, spring and summer semester admits.
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Animal Sciences offers graduate study leading to M.S. and Ph.D. degrees. Advanced work may involve specialized training in the following areas: animal breeding, animal nutrition, animal genetics, animal health, physiology of reproduction, nutritional physiology, and meat science.

Student research and academic programs are tailored to individual student needs and interests. Interdisciplinary approaches to Animal Sciences programs are fostered.

The Department of Animal Sciences graduate program is open to all qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School's requirements, to be admitted with full status to the program, an applicant must have adequate preparation in animal sciences or in a complementary area of life sciences and have a background or interest in agriculture.

Financial Assistance

Research assistantships are available. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research.

The Animal Sciences program has two options for the M.S. degree: the thesis option and the comprehensive study option. The M.S. program requires completion of 30 semester credits of approved graduate and letter-graded course work with an overall GPA of 3.0 or better. The Ph.D. program requires the completion of 90 semester credits (or the equivalent) of graduate approved and letter graded course work with an overall GPA of 3.0 or more.

Each student must choose an adviser, usually based upon area of academic and research interest when starting the program. By the end of the first year of residence, the student must have selected an advisory/supervisory committee and have an approved graduate plan of study, including a research proposal. The advisory/supervisory committee advises the student and administers the graduate exams to the student. Students are referred to the Animal Sciences Graduate Student Handbook for information regarding additional requirements.

Candidates for the M.S. normally complete their degree requirements in two years. Candidates for the Ph.D. generally complete their degree requirements in three to four years.

The M.S. candidates are required to take an oral examination which covers both the research and academic subject matter covered in their program. Candidates for the Ph.D. are required to take a preliminary written and oral examination directed toward the academic subject matter of their chosen discipline and a final defense of a research based thesis.

Code	Title	Credits
Required Courses for M.S. Degree		
Didactic Course Work (601-689, 691; 700-789, 791; 800-889 and 891)		16
Statistical Courses (e.g. STAT 661 Applied Regression Models; PLSC 724 Field Design I)*		6
ANSC 790	Graduate Seminar	2
ANSC 792	Graduate Teaching Experience (**)	2
ANSC 798	Master's Thesis	6-10
Total Credits		30

* Other NDSU statistical courses or Equivalents (transferred degree(s) or course(s))

** Required or students receiving assistantships. All graduate students are encouraged to obtain teaching experience each semester.

See information in Graduate Bulletin

Marc L. Bauer, Ph.D.
University of Kentucky, 1996
Research Interests: Nutritional Physiology with emphasis on Nutrient Metabolism and Utilization in Ruminants

Eric P. Berg, Ph.D.
Purdue University, 1996

Research Interests: Influence of Environment, Nutrition, and Genetic Factors as They Impact Meat-Animal Production Efficiency, Health, Carcass Composition, and Meat Quality

Erika Berg, Ph.D.
University of Missouri, 2006
Research Interests: The Impact of Therapeutic Horsemanship on Human and Equine Participants. Maternal and Environmental Influence on Equine Neonatal Physiology

Kasey Maddock Carlin, Ph.D.
Iowa State University, 2005
Research Interests: Meat Science with emphasis on Physiological and Biochemical Changes in Muscle Postmortem on Meat Quality

Joel S. Caton, Ph.D.
New Mexico State University, 1987
Research Interests: Ruminant Nutrition with emphasis on Nutrition and Reproduction interactions, Forage Utilization, Digestive Physiology and Selenium Metabolism

Carl Dahlen, Ph.D.
University of Minnesota, 2009
Research Interests: Beef Cattle Production

Neil Dyer, DVM, M.S., Diplomate ACVP
Iowa State University, 1991
Research Interests: Infectious Diseases of Domestic Animals; Public Health

Lauren Hanna, Ph.D.
Texas A & M University, 2013
Research Interest: Animal Genetics; Genomics

Anna T. Grazul-Bilska, Ph.D.
University of Agriculture and Technology, Olsztyn, Poland, 1983
Research Interests: Applied and Basic Aspects of Embryology and Ovarian Function in Livestock Species

Carolyn Hammer, DVM, Ph.D.
Iowa State University, 2003
Research Interests: Equine Preventative Medicine, Growth and Development, Immunology

Greg Lardy, Ph.D.
University of Nebraska,1997
Research Interests: Cow-Calf Nutrition, By-Product Utilization, Range Nutrition

Rob Maddock, Ph.D.
Texas A&M University, 2000
Research Interests: Factors Affecting Beef Quality and Value, Consumer Acceptance of Meat Products

Miranda Meehan, Ph.D.
North Dakota State University, 2012
Research Interests: Riparian Ecology and Management, Livestock and Wildlife Interactions, Impacts of Energy Development on Livestock Production

Dale A. Redmer, Ph.D.
University of Missouri, 1983
Research Interests: Regulation of Ovarian and Uterine Function, Including Angiogenesis and Endocrine Control of Follicular and Placental Development in Farm Animals

Lawrence P. Reynolds, Ph.D.
Iowa State University, 1983
Research Interests: Maternal and Placental Physiology During Pregnancy in Livestock Including Cellular and Molecular Aspects

Gerald Stokka, DVM, M.S.
Iowa State University, 1982
Research Interest: Immunology; Preventive Medicine; Animal Stewardship-well-being

Kendall Swanson, Ph.D.
University of Kentucky, 2001
Research Interests: Ruminant Nutrition

Kimberly Vonnahme, Ph.D.
University of Wyoming, 2003
Research Interests: Nutritional Impacts on Placental Function in Livestock

Sarah A. Wagner, DVM, Ph.D.
Iowa State University, 2003
Research Interests: Food Animal Pharmacology and Therapeutics, Dairy Cattle Health

Alison Ward, Ph.D.
University of Saskatchewan, 2011
Research Interests: Nutritional and Genetic Interactions; Epigenetics, Especially In Regards to Maternal Nutrition and Fetal Programming

In addition to the above listed faculty, there are numerous adjunct faculty members who participate in the graduate program.

Anthropology

Department Information

- **Interim Department Chair:**
  Jeffrey Bumgarner, Ph.D.
- **Graduate Coordinator:**
  Pamela Emanuelson, Ph.D.
- **Department Location:**
  Minard 428
- **Department Phone:**
  (701) 231-8657
- **Department Email:**
  ndsu.anthropology@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/socanth
- **Application Deadline:**
  For full consideration, applications must be received by February 15 for fall semester and September 15 for spring semester
- **Degrees Offered:**
  M.A., M.S.
- **English Proficiency Requirements:**
  TOEFL ibt 100; IELTS 7

Program Description

The Department of Sociology and Anthropology offers an M.S. and M.A. degree in Anthropology. The program centers on human heritage past, present and future, both cultural and material, and it is based on the principle that graduate level education in Anthropology is a desirable preparation for a growing number of career orientations. The precise plan of study for each student is established in consultation with the academic adviser. Graduate students are also expected to enhance their course work and degree research by engaging in professional development activities such as paper or poster presentations and/or attendance at academic conferences, campus and community service, and teaching and research assistantships. Sample positions that our graduates have obtained include university and college teaching, contract archaeology, folklore program coordination, international studies administration, National Park Service archaeology, not-for-profit program event coordination management, teaching English in other countries abroad, and research analysis as cultural experts.

The focus of graduate education in Anthropology is directed toward both the development of applied anthropologists and the advanced training of those seeking to pursue a doctoral degree. Students may elect to take courses in a specialty area, or they may pursue a background in general anthropology. Areas of specialization include cultural anthropology and archeology.

The Anthropology graduate program provides students with the opportunity to expand their background and perspectives in research methods and theory. Consequently, the first year of the program is designed to expose students to anthropological theory and a variety of research methods. Research facilities include the Archaeology Technologies Laboratory and Anthropology Materials Laboratory.

Two program options are available for students. In the thesis option, students work on a research-based thesis. Students typically test theoretical assumptions using primary or secondary data. The comprehensive study option is designed for students who wish to combine their studies with some type of specialized field or internship experience. Students electing this option are required to complete a comprehensive study paper related to their experience, such as evaluating a program.

Students in the Anthropology graduate program benefit from a favorable faculty-to-student ratio.

The Anthropology graduate program is open to qualified graduates from universities and colleges of recognized standing. To be admitted with full standing to the program, the applicant must meet the Graduate School's requirements and have adequate preparation in anthropology.

Financial Assistance

Teaching assistantships are available to qualified applicants. Research assistantships may also be available, contingent on faculty research funds. Applicants for assistantships are considered on the basis of scholarship and potential to undertake advanced study and research. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference must be received by the Graduate School no later than February 15.

The masters degree (M.A. or M.S.) in Anthropology credit requirements consists of a minimum 30 credits (for the thesis option) or 35 credits (for the paper option), of which 16 must be didactic credits. Core requirements include the following:

- Successfully complete a theory-oriented Anthropology course (such as ANTH 680 Development of Anthropological Theory)
- Successfully complete a methods-oriented Anthropology course (such as ANTH 681 Qualitative Methods in Cultural Anthropology)
- Complete additional coursework to finish the 30-credit requirement (24 for thesis, 26 for paper)
- Complete a research-based thesis or a comprehensive study paper and pass an oral defense of the thesis or paper administered by the student's supervisory committee.

Jeffrey T. Clark, Ph.D.
University of Illinois at Urbana-Champaign, 1987
Research Interests: Archaeology, Digital Archaeology, Paleoenvironmental Studies, Archaeological Method/Theory, Heritage and Material Culture, Oceania, North America

John L. Creese, Ph.D.
University of Toronto, 2011
Research Interests: Archaeology, Spatial Analysis, Household and Settlement Archaeology, Material Culture, Theory, North America and Great Lakes

Kristen R. Fellows, Ph.D.
University of Pennsylvania, 2013
Research Interests: Anthropological Archaeology, Historical Archaeology, Ethnohistory, African Disaspora, Archaeology of Plantations; Colonial Encounters; Globalization and Transnationalism; Feminist Archaeology, the Caribbean; North America

Julia Kowalski, Ph.D.
University of Chicago, 2014
Research Interests: Gender, Kinship, and Transnational Rights Discourse in India and in the United States

Lecturers

Travis Kitch, M.S.
North Dakota State University, 2003
Research Interests: Archaeology, Medical Anthropology

Biochemistry

Department Information

- **Department Chair:**
  Gregory Cook, Ph.D.
- **Graduate Admissions Director:**
  Mukund P. Sibi, Ph.D.
- **Department Location:**
  Ladd Hall
- **Department Phone:**
  (701) 231-8694
- **Department Web Site:**
  www.ndsu.edu/chemistry
- **Application Deadline:**
  March 1 for fall, September 1 for spring. Spring admissions are given occasionally depending on fellowship availability and faculty interests. If there are no spring openings, spring applications are automatically considered for the subsequent fall semester.
- **Degrees Offered:**

Ph.D., M.S.

- **Test Requirement:**
  GRE (general required; subject recommended)
- **English Proficiency Requirements:**
  TOEFL ibT 81 (23 speak; 21 write) –TA, 71 – RA; IELTS 6.5 – TA; 6 – RA

Program Description

The Department of Chemistry and Biochemistry offers graduate study leading to the M.S. and Ph.D. degrees. The department also participates in the interdisciplinary Ph.D. program in Cellular and Molecular Biology.

At the start of the first year of study, entering graduate students take entrance examinations in chemistry and biochemistry, as well as analytical, inorganic, organic, and physical chemistry. The graduate student progress committee uses these exams for advisory purposes in recommending course work during the first year. As a consequence, programs are individually tailored to the needs of each student.

The chemistry, biochemistry, and molecular biology of plant, animal, insect, and microbial systems are studied through advanced course work and research. Selection of the area of emphasis depends on the interests of the student. Typically, course work is completed in one to one-and-a-half years for M.S. candidates, and two years for Ph.D. candidates, leaving later years for full-time thesis research. The typical time to complete a graduate degree averages three years for the M.S. degree and approximately five years for the Ph.D.

Research Opportunities and Infrastructure

The Department of Chemistry and Biochemistry has more than 10 externally funded faculty research programs. Research expenditures have averaged $1.8 million over the last 10 years, with more than $2.2 million in the last two years.

All research and most teaching activities within the department occur within three centrally-located buildings, including two connected facilities, Ladd Hall and Dunbar Laboratory, as well as the Quentin Burdick Building, located across the street.

Most departmental offices, classrooms and teaching labs, as well as some research labs are located in Ladd Hall, while Dunbar and the third floor of the Quentin Burdick Building primarily consist of research laboratories. Ladd Hall also houses departmental glass, machine, and electronics shops.

Modern instrumentation is vital to research in the chemical sciences. The quality and quantity of instrumentation within the department has been greatly enhanced in the last few years through aggressive fundraising efforts and university matching support.

The department has recently upgraded its mass spectrometry capabilities to include a Bio-TOF III with accurate mass analysis, ESI and CI ionization; as well as an Esquire 3000 Plus - an Ion trap instrument with MS-MS and proteomics capabilities. A dedicated LC can be integrated with the both the instruments.

The Organic Spectroscopy Laboratory is primarily devoted to maintenance and operation of Nuclear Magnetic Resonance (NMR) spectrometers. The recently upgraded facility includes three modern high-field instruments: Varian 500, 400, and 300 MHz spectrometers. All have multinuclear, 2-D, and variable temperature capabilities, and the 400 MHz instrument has been recently upgraded for solids capabilities. This center also includes the departmental FTIR.

The Materials Characterization Laboratory houses the departmental crystallography facilties, including a Bruker single crystal CCD X-ray diffractometer with low temperature capabilities, a Philips MPD (Multi- Purpose Diffractometer), two Philips X-ray powder diffractometers, and a Kevex X-ray fluorescence unit. CHN Elemental analysis, thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), and differential thermal analysis (DTA) are also available.

The Center for Protease Research - Core Biology Facility is a new facility housing equipment and technical personnel for performing bioassay, cell and tissue culture, and molecular biology experiments. For bioassays, the facility has a fluorimeter capable of top or bottom reading and the capability to handle both 96- and 384-well plates. For sample preparation, researchers can utilize cell and tissue culture capabilities such as flow hoods and culture chambers. In addition, RT-PCR and FPLC protein purification technology is available.

The chemistry library, located in Ladd Hall, provides graduate students and faculty with convenient 24-hour access to more than 200 journals and approximately 10,000 volumes. Literature searching via SciFinder is supported.

Prospective students are encouraged to visit the Department of Chemistry and Biochemistry website (http://www.ndsu.edu/chemistry) for the latest descriptions of research programs and instrumentation.

The graduate programs in biochemistry are open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full standing to the program, the applicant must meet the Graduate School's admission requirements, have adequate preparation for the study of chemistry and biochemistry at the graduate level, and show potential to undertake advanced study and research as evidenced by academic performance and experience.

Applications will be considered at any time. Application materials should be submitted directly to the Graduate School and need to be received before May 1 to be considered for the upcoming academic year.

Financial Assistance

The student must first apply to the Graduate School and be accepted in full or conditional status before he/she is eligible for an assistantship in the Department of Chemistry and Biochemistry.

Graduate students in the Department of Chemistry and Biochemistry are supported during both the academic year and during summer months by either teaching assistantships (TA) or research assistantships (RA). As of the 2014-2015 academic year, the standard stipend is $22,000 per year for both RAs and TAs. University tuition (no fees) is waived for all TAs and RAs in good academic standing.

Master of Science

The Master of Science program requires the completion of a total of 30 graduate semester credits with an overall GPA of 3.0 or better. This total is comprised of both class work and research credit, but must consist of at least 16 semester credits from letter-graded course work. The Ph.D. program requires the completion of a total of 90 graduate semester credits with an overall GPA of 3.0 or better. This total is comprised of both class work and research credit, but must consist of at least 27 semester credits from letter-graded course work.

Code	Title	Credits
Required Courses		
CHEM 720	Introduction to Chemical Research	2
CHEM 790	Graduate Seminar (second year seminar)	1
or BIOC 790	Graduate Seminar	
UNIV 720	Scientific Integrity	1
CHEM 790	Graduate Seminar (defense seminar)	1
or BIOC 790	Graduate Seminar	
Didactic Credits (601-689, 691; 700-789, 791; 800-889 and 891)		16 *
CHEM 798	Master's Thesis	6-10
or BIOC 798	Master's Thesis	
Total Credits Required		30
As part of total semester credits, the following departmental courses are recommended for students based on discipline:		
Analytical		
CHEM 632	Analytical Chemistry II	3
CHEM 730	Separations	2
CHEM 732	Advanced Analytical Chemistry	4
CHEM 736	Mass Spectrometry	2
Biochemistry and Molecular Biology		
BIOC 673	Methods of Biochemical Research	3
BIOC 674	Methods of Recombinant DNA Technology	3
BIOC 701	Comprehensive Biochemistry I	4
BIOC 702	Comprehensive Biochemistry II	4
Inorganic		
CHEM 724	Chemical Applications of Group Theory	1
CHEM 725	Advanced Survey of Inorganic Chemistry	3
CHEM 727	Organometallic Chemistry	3
CHEM 728	Physical Methods for Chemical and Biomolecular Research	2
CHEM 744	Organic Spectroscopy	2
Organic		
CHEM 741	Physical Organic Chemistry I	4
CHEM 742	Physical Organic Chemistry II	2
CHEM 744	Organic Spectroscopy	2
CHEM 745	Organic Synthesis	4
Physical		
BIOC 665		
CHEM 760	Statistical Thermodynamics	4

CHEM 763	Kinetics	2
CHEM 764	Dynamics	2

* A minimum of 10 must be from courses numbered 701-789; 791 or 800-889; 891

Each student chooses a thesis adviser within six months of beginning graduate school. As this is one of the most important decisions made in graduate school, students are strongly urged to visit multiple faculty members to discuss research opportunities. In addition, faculty seminars during the fall semester are designed to acquaint new students with the available research programs.

By the end of the first academic year, each student selects an advisory and examination committee, which consists of the thesis adviser, two other faculty members in the chemistry department, and one faculty member from a department outside the Department of Chemistry and Biochemistry.

Candidates for the PhD degree are required to earn at least 90 semester credits, which can include credits for seminar and research. No fewer than 27 of these 90 semester credits shall be earned in courses carrying graduate credit (courses numbered 601 to 789), and of these 27 credits, a minimum of 20 must be from courses numbered 701 to 789. Of these 20 credits, the requirement is 8 total credits in at least two fields of study other than the major area, selected from:

- Analytical Chemistry
- Biochemistry & Molecular Biology
- Coatings and Polymeric Materials
- Inorganic Chemistry
- Materials & Nanotechnology
- Microbiology
- Organic Chemistry
- Physical Chemistry
- Other related area (e.g., Physics, Math, Pharmacy, Engineering, Zoology)

A student matriculating with a Master's Degree, including one earned at an international institution, must earn not fewer than 60 graduate credits at NDSU. Of these credits, not fewer than 15 credits must be NDSU courses numbered from 701 to 789. Courses numbered 601-689 may be used for the Plan of Study as long as they have not been taken in an undergraduate or previous graduate program. Approved courses are Department of C&B 625, 626, 627, 628 and 630.

Code	Title	Credits
Required Courses		
CHEM 720	Introduction to Chemical Research	
BIOC 790	Graduate Seminar (second year seminar)	
or CHEM 790	Graduate Seminar	
BIOC 790	Graduate Seminar (proposal seminar)	
or CHEM 790	Graduate Seminar	
BIOC 790	Graduate Seminar (public presentation)	
or CHEM 790	Graduate Seminar	
BIOC 790	Graduate Seminar (defense seminar)	
or CHEM 790	Graduate Seminar	
UNIV 720	Scientific Integrity	
As part of total semester credits, the following departmental courses are required for students based on program:		
CHEM 725	Advanced Survey of Inorganic Chemistry	
BIOC 673	Methods of Biochemical Research	
BIOC 674	Methods of Recombinant DNA Technology	
BIOC 701	Comprehensive Biochemistry I	
BIOC 702	Comprehensive Biochemistry II	
CHEM 732	Advanced Analytical Chemistry	
CHEM 741	Physical Organic Chemistry I	
CHEM 759	Intermediate Physical Chemistry	
BIOC 899	Doctoral Dissertation	

Admission to candidacy for the Ph.D. degree is accomplished by satisfying three requirements: 1) satisfactory performance in course work with a minimum 3.0 grade-point average, 2) satisfactory performance on a written comprehensive examination, taken by the end of the fourth semester, and

3) satisfactory defense of an original research proposal on a topic approved by the student's advisory committee. The defense of this proposal must occur at least eight months prior to the final oral examination.

Following completion of dissertation research, the candidate must complete a written dissertation and an oral presentation to the department and advisory committee.

Christopher L. Colbert, Ph.D.
Purdue University, 2000
Postdoctoral, Howard Hughes Medical Institute, 2000-2004
Research Interests: Structural Biology and Metalloprotein Biochemistry

Heldur Hakk, Ph.D. (adjunct)
North Dakota State University, 1997
Research Interests: Fate and Metabolism of Environmental Contaminants

Stuart J. Haring, Ph.D.
University of Iowa, 2004
Postdoctoral, University of Iowa, 2004-2008
Research Interests: DNA Metabolism and Cell Cycle Regulation

Erika Offerdahl, Ph.D.
University of Arizona, 2008
Research Interests: Biochemistry/STEM Education

Sangita C. Sinha, Ph.D.
Purdue University, 2000
Postdoctoral, Howard Hughes Medical Institute, 2001-2005
Research Interests: Biochemistry and Structural Biology of Host-Pathogen Interaction

D. K. Srivastava, Ph.D.
Banaras Hindu University, 1980
Research Interests: Mechanistic Enzymology

John Wilkinson, Ph.D.
Vanderbilt University, 2001
Postdoctoral, University of Michigan, 2001-2006
Research Interests: Metabolic Control of Cancer Progression

Biological Sciences

Department Information

- **Department Head:**
  Wendy Reed, Ph.D.
- **Graduate Coordinator:**
  Katie Reindl, Ph.D.
- **Department Location:**
  218 Stevens Hall
- **Department Phone:**
  (701) 231-7087
- **Department Email:**
  ndsu.biological.sciences@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/biology/
- **Application Deadline:**
  Applications must be submitted by January 15 for full consideration for GTA or GRA positions.*
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5

*Applicants will not be considered without a department faculty member who has agreed to serve as the major adviser. For e-mail addresses for faculty members and for additional information about our programs, please visit our web site at http://www.ndsu.edu/biology/.

Program Description

The Department of Biological Sciences offers graduate study leading to Master of Science and Doctor of Philosophy degrees. Master of Science degrees are available in Biology and Environmental and Conservation Sciences.

Doctor of Philosophy degrees are available in Botany, Genomics, Cellular and Molecular Biology, Environmental and Conservation Sciences, STEM Education and Zoology. Advanced work may involve specialized training in the following areas: aquatic biology, behavior, biology education research, cell biology, comparative biochemistry and physiology, cancer biology, conservation biology, ecology, endocrinology, developmental biology, evolution, fisheries biology, molecular biology, plant biology, population biology, prairie pothole ecology, evolutionary ecology and wildlife biology.

Student research and academic programs are tailored to individual needs and interests. Interdisciplinary approaches to biological problems are encouraged.

Research Facilities and Equipment

The Department of Biological Sciences occupies approximately 20,000 square feet of floor space in Stevens Hall for research. The NDSU Library has extensive holdings of journals, monographs, books, and other reference materials covering various fields in biology. The library offers full access to online catalogs and databases.

Faculty in the department have research programs ranging from molecular biology to ecosystem ecology and work with a wide variety of organisms across multiple levels of organization, from cellular mechanisms to ecosystem function. Modern equipment is available for conducting research in cell and molecular biology and field ecology and behavior. The department has access to a vascular plant herbarium with 240,000 specimens emphasizing Northern Great Plains flora, a lichen herbarium consisting of about 15,000 specimens with a worldwide representation of taxa, and a vertebrate collection with approximately 10,000 specimens.

The department offers access to a range of equipment and facilities necessary for laboratory research, including greenhouses, animal rooms, growth chambers, tissue culture facilities, ultracentrifuges, spectrophotometers, electrophoresis, light microscopes, gas chromatography, GC-mass spectrometry, and high performance liquid chromatography. Facilities are available for protein and DNA sequencing, oligonucleotide synthesis, interactive laser cytometry, scanning transmission and electron microscopy, and confocal microscopy.

The graduate programs in the Department of Biological Sciences are open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full status to the program, the applicant must meet all Graduate School admission requirements.

Applications should be submitted directly to the Graduate School. For full consideration for GTA or GRA positions, applications must be submitted by January 15. Applicants will not be considered without a department faculty member who has agreed to serve as the major adviser. Correspondence with one or more departmental faculty members before and during the application process is essential. For email addresses for faculty members and for additional information about our programs, please visit our website at www.ndsu.edu/biology/.

Financial Assistance

Research assistantships and teaching assistantships are available. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, as well as financial need.

A student must first be accepted by the Graduate School before consideration for financial assistance. Assistantships include a waiver of tuition.

In addition to research and teaching assistantships, there are other types of financial support. A limited number fellowships are available through the Graduate School. Outstanding scholarship and financial need are primary considerations for these fellowships. Scholarships in specific areas are also available through the Department of Biological Sciences. These are generally supplemental and do not include tuition waivers. Students are considered for these awards after enrollment, with primary considerations being scholastic performance and research at NDSU.

Students must select a major adviser prior to their arrival for graduate studies.

The Master of Science program generally requires a minimum of 24 months of full-time study, during which an overall GPA of 3.0 or better must be maintained. The Master of Science degree may be earned by either of two options. The thesis option emphasizes completion of a research project. The comprehensive study option requires more course work, and instead of conducting research and presenting a thesis, the candidate presents a paper or papers approved by the adviser to the examining committee, demonstrating ability for scholarly study and written expression. Candidates under both options must present a seminar on the thesis research or comprehensive study, and must pass an oral examination.

Code	Title	Credits
Master of Science (M.S.)		30
Basic Research Principles		

BIOL 790	Graduate Seminar
UNIV 720	Scientific Integrity (or equivalent as approved by committee)
BIOL 842	Quantitative Biology (or equivalent as approved by committee)
Biological Content Courses to be approved by the advisory committee.	
BIOL 798	Master's Thesis

The Ph.D. program generally requires a minimum of 36 months of full-time study, during which an overall GPA of 3.0 or better must be maintained. Candidates for the Ph.D. are required to take a preliminary written and oral examination directed to academic subject matter and a final defense of the dissertation.

Code	Title	Credits
Doctor of Philosophy (Ph.D.)		90
Basic Research Principles		
BIOL 790	Graduate Seminar	
UNIV 720	Scientific Integrity (or equivalent as approved by the advisory committee)	
BIOL 842	Quantitative Biology (or equivalent as approved by the advisory committee)	
Biological Content Courses to be approved by the advisory committee.		
BOT 899	Doctoral Dissertation	

Laura Aldrich-Wolfe, Ph.D.
Cornell University, 2006
Research Interests: Community ecology, mycorrhyza and plant-fungal interactions

Julia H. Bowsher, Ph.D.
Duke University, 2007
Research Interests: Evolutionary and Developmental Biology of Insects

Malcolm G. Butler, Ph.D.
University of Michigan, 1980
Research Interests: Aquatic Ecology, Limnology, Fisheries, Water Quality, Wildlife Management

Mark E. Clark, Ph.D.
University of Tennessee, 1996
Research Interests: Fish and Wildlife Ecology, Population Biology, Ecological Modeling, Quantitative Ecology

Ned A. Dochtermann, Ph.D.
University of Nevada, 2009
Research Interests: Evolutionary and Behavioral Ecology

Erin H. Gillam, Ph.D.
University of Tennessee-Knoxville, 2007
Research Interests: Evolution and Behavioral Function of Communication Signals Using Bats as a Model

Kendra J. Greenlee, Ph.D.
Arizona State University, 2004
Research Interests: Comparative Physiology, Insect Respiration and Immunology

Timothy J. Greives, Ph.D.
Indiana University, 2009
Research Interests: Hormones and Behavior, Seasonality, Biological Rhythms, Reproductive Eco-physiology

Jill Hamilton, Ph.D.
University of British Columbia, 2012
Research Interests: Plant Evolutionary Genomics

Britt Heidinger, Ph.D.
Indiana University, 2007
Research Interests: Physiological Ecology, Senescence, Stress Physiology

Angela Hodgson, Ph.D.
University of Minnesota, 2010

Research Interests: Ecosystem Biology and Wildlife Conservation Biology

Donna L. Jacob, Ph.D.
University College Dublin, 2003
Research Interests: Wetland Science, Biogeochemistry

Jennifer L. Momsen, Ph.D.
Rutgers, 2007
Research Interests: Biology Education at the Undergraduate Level

Lisa M. Montplaisir, Ph.D.
University of Arizona, 2003
Research Interests: Science Education, Teaching and Learning, Curriculum Development

Keith Murphy, Ph.D.
Louisiana State University, 1989
Research Interests: Hereditary Diseases of the Domestic Dog

Marinus L. Otte, Ph.D.
Vrije Universiteit, 1991
Research Interests: Wetland Science, Biogeochemistry, Plant Ecophysiology

Wendy L. Reed, Ph.D.
Iowa State University, 2000
Research Interests: Physiological Ecology, Evolution of Life Histories, Maternal Effects

Katie M. Reindl, Ph.D.
North Dakota State University, 2006
Research Interests: Cancer Cell Biology, Identification and Validation of New Drug Targets

Matthew Smith, Ph.D.
University of Arkansas, 2012
Research Interests: Patterns of Phenotypic Variation in Natural Populations

Craig A. Stockwell, Ph.D.
University of Nevada, 1995
Research Interests: Evolutionary Ecology of Vertebrate Populations, Conservation Biology, Fisheries Biology

Jon Sweetman

Steven E. Travers, Ph.D.
University of California-Santa Barbara, 1998
Research Interests:
Plant Evolutionary Ecology

Emeritus

William J. Bleier, Ph.D.
Texas Tech University, 1975
Research Interests: Blackbirds, Animal Depredation, Avian Ecology

Gary K. Clambey, Ph.D.
Iowa State University, 1975
Research Interests: Ecology and Biogeography, Environmental Analysis and Planning, Structure Function Relations in Midwestern Ecosystems, Human Ecology

Theodore L. Esslinger, Ph.D.
Duke University, 1974
Research Interests: Lichenology; Taxonomy, Chemosystematics, and Floristics of Lichens; Emphasis on the Parmeliaceae and Physciaceae

James W. Grier, Ph.D.
Cornell University, 1975
Research Interests: Eagles and Other Birds of Prey, Herpetology, Aquatic Organisms, Fossils, Animal Population Dynamics, Habitat Ecology

Gary L. Nuechterlein, Ph.D.
University of Minnesota, 1980

Research Interests: Behavioral Ecology of Birds; Wildlife Ecology, Particularly of Nongame Species

Adjunct

Michael J. Anteau, Ph.D.
Louisiana State University, 2006

Ned H. Euliss, Jr., Ph.D.
Oregon State University, 1989

Mark A. Hanson, Ph.D.
North Dakota State University, 1990

Douglas H. Johnson, Ph.D.
North Dakota State University, 1986

George M. Linz, Ph.D.
North Dakota State University, 1982

Daniel C. McEwen, Ph.D.
North Dakota State University, 2008

David M. Mushet, Ph.D.
North Dakota State University, 2010

Marsha A. Sovada, Ph.D.
North Dakota State University, 1993

Steve K. Windels, Ph.D.
Michigan Technological University, 2008

Brian Wisenden, Ph.D.
University of Western Ontario, 1993

Biomedical Engineering

Department Information

- **Program Coordinator:**
  Annie Tangpong, Ph.D.
- **Email:**
  Annie.Tangpong@ndsu.edu
- **Department Location:**
  Dolve 101E
- **Department Phone:**
  (701) 231-8839
- **Department Web Site:**
  engineering.und.edu/bme/ (http://engineering.und.edu/bme)
- **Application Deadline:**
  February 15 for fall semester; September 15 for spring semester. Applications received after the deadline will still be considered, but preference is given to those submitted by the deadline.
- **Degrees Offered:**
  Ph.D., M.S.

Program Description

The graduate-level (M.S. and Ph.D.) programs in Biomedical Engineering (BME) are offered jointly by NDSU's College of Engineering, UND's School of Medicine and Health Sciences, and UND's College of Engineering and Mines.

The BME programs provide opportunities for technically qualified persons to attain specialized knowledge in an area of industry need, and to enhance career opportunities. The objective of the jointly-sponsored, interdisciplinary graduate programs is to:

- Meet the needs of regional students interested in biomedical engineering.
- Attract women and under-represented minorities into a developing field.
- Educate and train students through courses and research focused on biomedical research and device development.
- Advance the biomedical knowledge base through collaborative research directed by faculty from UND's School of Medical and Health Sciences, College of Engineering and Mines, and NDSU's College of Engineering and other qualified researchers from the two universities.
- Through biomedical research and device development, develop intellectual property to generate company spin-offs, attract new companies, and subsequent economic development.

For more information: engineering.und.edu/bme/ (http://engineering.und.edu/bme)

Ph.D.:

a) Bachelor of Science degree from an ABET accredited engineering program

b) Students holding a B.S. degree in other disciplines may be admitted to Qualified Status with an obligation to acquire the necessary background undergraduate engineering knowledge. The exact requirements will be determined on a case-by-case basis

c) Graduate Record Examination General Test for applicants from non-ABET accredited programs

d) Minimum GPA is 3.0 (4.0 scale) is required. Conditional admittance may be obtained for GPA less than 3.0.

M.S.:

a) Bachelor of Science degree from an ABET accredited engineering program.

b) Students holding a B.S. degree in other disciplines may be admitted to Qualified Status with an obligation to acquire the necessary background undergraduate engineering knowledge. The exact requirements will be determined on a case-by-case basis.

c) Graduate Record Examination General Test for applicants from non-ABET accredited programs.

d) Minimum GPA is 3.0 (4.0 scale) is required. Conditional admittance may be obtained for GPA less than 3.0.

Financial Assistance

Research and/or teaching assistantships may be available to qualified students. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. The availability of research and teaching assistantships is contingent upon current funding levels. Refer to the program website for current funding opportunities.

For more information: engineering.und.edu/bme/ (http://engineering.und.edu/bme)

Code	Title	Credits
M.S. (30 credits)		
Anatomy & Physiology		3-6
ZOO 660	Animal Physiology (or UND- EE-590 Special Topics: Anatomy and Physiology and for BME (6-credits))	3
ENGR 790	Seminar (or UND-ENGR 562 Seminar (1 credit), or UND-EE 570 Seminar (1 credit))	3
BRG Related Courses		6-9
Graduate Preparation (e.g. Grant Writing)		1-3
Internship (industrial, clinical, or research lab):		3-6
Electives (approved by adviser)		9 (max)
Master's thesis (9) or Master's project (non-thesis option) (3)		

Code	Title	Credits
Ph.D. (90 credits)		
Anatomy & Physiology		3-6
ZOO 660	Animal Physiology (or UND- EE-590 Special Topics: Anatomy and Physiology and for BME (6-credits))	3
ENGR 790	Seminar (one credit each semester, 3-6 total)	1-5
or UND-ENGR 562 Seminar (1 credit), or UND-EE 570 Seminar (1 credit)		
BRG Related Courses		12-15
ENGR 899	Doctoral Dissertation	1-15
Graduate Preparation (e.g. Grant Writing)		3-6

Internship (industrial, clinical, or research lab):	3-6
Electives (approved by adviser)	36 (max)

For more information: engineering.und.edu/bme/ (http://engineering.und.edu/bme)

Business Administration

Department Information

- **Program Director:**
  Derek Lehmberg, Ph.D.
- **Email:**
  derek.lehmberg@ndsu.edu
- **Program Coordinator:**
  Paul Brown, MBA
- **Email:**
  paul.brown@ndsu.edu
- **Department Location:**
  Barry Hall
- **Department Phone:**
  (701) 231-9407
- **Department Web Site:**
  www.ndsu.edu/business/graduate/mba
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring semester. Domestic applicants should apply at least six weeks prior to the start of classes.
- **Degrees Offered:**
  M.B.A.
- **Test Requirement:**
  GMAT or GRE
- **English Proficiency Requirements:**
  TOEFL iBT 79; IELTS 6.5

Program Description

The Master of Business Administration program at North Dakota State University is a non-thesis, professional program structured to serve qualified students with undergraduate degrees in various fields. The program is designed to provide the student with an effective set of analytical skills, a broad view of the way organizations work, and an understanding of the functional areas of business. The NDSU program takes a generalist approach to graduate business education while providing a variety of electives to give the student the opportunity to pursue a particular area of interest in business or a related discipline. Concentrations in the health care industry, and in supply chain and logistics are offered.

NDSU business faculty use a variety of teaching methods: case studies, group and individual projects, field research, computer applications, guest lecturers, student presentations, and discussion. Class interaction provides rich opportunity to network with aspiring professionals from a wide range of industries and countries. The student is able to acquire and improve problem-solving, teamwork, and communication skills and to apply these skills in business situations. Teleconferencing software enables distance learners to fully participate in class and complete the MBA program off-site.

Financial Assistance

The College of Business offers financial assistance through graduate assistantships and scholarships. Applicants must be admitted on a conditional or full-standing basis. Assistantships include a stipend and tuition waiver accompanying work within the college.

The tuition waiver is limited to graduate course work. Awards are based on academic excellence as determined by grade point average, high potential as measured by the GMAT score, and the financial needs of the student. Applications are available at www.ndsu.edu/business.

The total course requirements necessary to complete the MBA degree will vary depending on the background of the student. An adequate background in the functional areas of business is necessary for all students.

Foundation course areas include accounting, economics, statistics, management, marketing, and finance. Based on previous course work, some or all of these courses may be waived.

Beyond the foundation course requirements, all students must complete 30 semester hours of graduate work. Graduate courses in the MBA Program include the following eight required 3-credit core courses:

Code	Title	Credits
Core Courses		
MBA 701	Strategic Cost Management	3
MBA 702	Advanced Financial Management	3
MBA 703	Advanced Organizational Behavior	3
MBA 704	Supply Chain and Operations Management	3
MBA 705	Strategic Marketing Management	3
MBA 706		3
MBA 707	Microeconomics for Managers	3
MBA 708	Advanced Strategic Management	3
Elective course options for plan of study:		14
MBA 711	Financial Risk Management	
MBA 712	Advanced Investment Management	
MBA 713		
MBA 714		
MBA 721	Creating and Marketing Innovations	
MBA 722	Marketing Analytics and Customer Intelligence	
MBA 723		
MBA 724	Integrated Marketing Communications	
MBA 732	Managerial Leadership: Essential Competencies	
MBA 733	Management Decision Making	
MBA 734	Negotiations and Alternative Dispute Resolution	
MBA 751	Business Analytics Concepts	
MBA 752	Business Analytics Strategy	
MBA 753	Business Analytics Methods	
Total Credits		38

Health Care Industry Concentration

Code	Title	Credits
Core Courses		24
PH 704	Public Health Management and Policy	3
Two of the following courses:		6
PH 710	Healthcare Delivery in the United States	
PH 720	Environmental Health	
PH 741	Social and Behavioral Sciences in Public Health	
PH 765	Cultural Competence Health Care	
Total Credits		33

Supply Chain Logistics Concentration

Code	Title	Credits
Core Courses		24
Additional nine credits selected from the following set of courses:		9
TL 711	Logistics Systems	
TL 715	Introduction to ERP	
TL 721	International Logistics Management	
TL 723	Advanced Supply-Chain Planning Across the Enterprise	
TL 725	ERP Configuration	
TL 729	Adaptive Planning in Logistics Systems	

TL 731	Logistics Decision Analysis	
Total Credits		33

Margaret Andersen, Ph.D.
Indiana University, 1989
Field: Accounting

Somnath Banerjee, Ph.D.
University of Central Florida, 2015
Field: Marketing

Scott Beaulier, Ph.D.
George Mason University, 2004
Field: Economics

John Bitzan, Ph.D.
University of Wisconsin-Milwaukee, 1997
Field: Economics

Linlin Chai, Ph.D.
Iowa State University, 2016
Field: Marketing

Jun Chen, Ph.D.
University of North Carolina at Charlotte, 2014
Field: Accounting & Information Systems

James W. Clifton, M.Acc.
University of North Dakota, 1988
Field: Accounting

Thomas D. Dowdell, Ph.D.
Temple University, 2004
Field: Accounting

Rajani Ganesh-Pillai, Ph.D.
University of Central Florida, 2009
Field: Marketing

Yongtao "David" Hong, Ph.D.
Drexel University, 2008
Field: Accounting

Huichi Huang, Ph.D.
Syracuse University, 2012
Field: Accounting

Fariz Huseynov, Ph.D.
University of Memphis, 2009
Field: Finance

Joseph M. Jones, Ph.D.
University of Missouri-Columbia, 1991
Field: Marketing

Bonnie Klamm, Ph.D., CPA
Virginia Commonwealth University-Richmond, 1999
Field: Accounting Information System

Michael Krush, Ph.D.
University of Nebraska – Lincoln, 2009
Field: Marketing

Derek Lehmberg, Ph.D.
University of Western Ontario, 2010

Field: Strategic Management

Jin Li, Ph.D.
University of Alberta, 2007
Field: Marketing

Gerry Macintosh, Ph.D.
University of Nebraska-Lincoln, 1992
Field: Sales and Sales Management

Joshua Marineau, Ph.D.
University of Kentucky, Lexington, 2012
Field: Organizational Behavior

Supavich Pengnate, Ph.D.
Oklahoma State University, 2013
Field: Management Information Systems

Michael J. Peterson, Ph.D.
The University of Iowa, 2002
Field: Accounting

Tim O. Peterson, Ph.D.
Texas A&M University at College Station, 1988
Field: Management/Organizational Behavior

Frederick Riggins, Ph.D.
Carnegie Mellon University, 1994
Field: Management Information Systems

Herbert Snyder, Ph.D.
Syracuse University, 1994
Field: Auditing, Forensic Accounting

Charles D. Stevens, Ph.D.
University of Kansas, 1998
Field: Human Resource Management

Joseph G. Szmerekovsky, Ph.D.
Case Western Reserve University, 2003
Field: Operations

Chanchai Tangpong, Ph.D.
University of Southern Illinois, 2002
Field: Strategic Management

Ruilin Tian, Ph.D.
Georgia State University, 2008
Field: Finance

Rodney D. Traub, Ph.D.
Purdue University, 1994
Field: Operations Management

Newell Wright, Ph.D.
Virginia Polytechnic Institute, 1993
Field: Marketing

Limin Zhang, Ph.D.
University of Arizona, 2005
Field: Management Information Systems

Wei "David" Zhang, Ph.D.
Syracuse University, 2001
Field: Finance

Jill Zuber, Ph.D.
University of Arkansas, 2007
Field: Accounting

Emeritus

Bahman Bahrami, Ph.D.
University of Nebraska-Lincoln, 1983
Field: Managerial Economics, Management Information Systems, Labor Relations and Negotiation

C. Frederick Eisele, Ph.D.
University of Iowa, 1971
Field: Labor Management and Negotiation

Karen Froelich, Ph.D.
University of Minnesota, 1994
Field: Strategic Management

Terry W. Knoepfle, J.D., CPA
University of North Dakota, 1981
Field: Business Law and Tax Accounting

Cellular and Molecular Biology

Department Information

- **Program Coordinator:**
  Jane Schuh, Ph.D.
- **Department Phone:**
  (701) 231-6456
- **Department Web Site:**
  www.ndsu.edu/cellularmolecularbiology/
- **Application Deadline:**
  February 15 is the deadline for applicants seeking consideration of financial assistance (fellowship, assistantships) for fall semester and July 1 for spring semester.
- **Degrees Offered:**
  Ph.D.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The CMB program was formed in 1988 and was the first interdisciplinary graduate program at NDSU. The program was designed to respond to the evolving nature of research in the life sciences in which it was recognized that biological phenomena emerge from molecular and cellular events and that the elucidation of such processes increasingly relies on multidisciplinary approaches.

The CMB program provides cross training of graduate students in the areas of biochemistry and cellular and molecular biology. In this setting, students learn the most up-to-date approaches from a variety of fields. Integration across concepts as well as the application of various approaches to addressing biological problems is developed through their preliminary exam, in which students are required to write a research proposal in the format of a national granting agency different from their dissertation research, and to defend it orally. The students also develop and conduct an original line of research under the supervision of their major adviser. The program also brings together faculty with common interests and who use common approaches and equipment. Such a community of scientists fosters collaboration and engenders a sense of cooperation that leads to shared use of common equipment.

The CMB program prepares students for careers in academia and private industry. All graduates of the program have obtained permanent positions in their field or are engaged in postdoctoral training.

Nearly 40 faculty members in many different departments and representing a variety of colleges participate as faculty mentors. The program is led by the CMB Director, who receives guidance on policy, procedure, and program administration from a multidisciplinary group of faculty who serve on the CMB Steering Committee.

Program Objectives

The CMB program has been designed to respond to the evolving nature of research in the life sciences in which it was recognized that biological phenomena emerge from molecular and cellular events and that the elucidation of such processes increasingly relies on multidisciplinary approaches. In addition, new applications of sensor technology, disease diagnosis and treatment, and other emerging technologies require that scientists work across historical boundaries of their disciplines.

This is a research-oriented degree that requires advanced skills areas of biochemistry, cellular biology, molecular biology, and contemporary research techniques. Prospective students must have a high quantitative aptitude and be prepared to undertake rigorous graduate-level training in research including quantitative methods.

The Cellular and Molecular Biology Ph.D. program is open to qualified graduates of universities and colleges of recognized standing. To be admitted with full status to the program, the applicant must:

- Hold a baccalaureate degree from an educational institution of recognized standing.
- Have earned a cumulative grade point average (GPA) in all courses of at least 3.0 or equivalent at the baccalaureate level. Applications may be submitted directly to The Graduate School at any time.
- Have adequate preparation and show potential to undertake advanced study and research as evidenced by academic performance and experience.
- If possible, applicants should identify at least one Cellular and Molecular Biology faculty member with whom they wish to study.

A recent score (within 12 months) for the general Graduate Record Examination or successful completion of a relevant M.S. degree is required. No minimum GRE score is required, but investigators may use this as a piece of evidence in consideration of the student's application. Foreign students are required to have proficiency in English as shown by a TOEFL iBT of 71 or higher or an IELTS of 5.5 or higher, unless they have matriculated from an institution in which instruction is conducted in English.

The following undergraduate courses are required for graduate work in the CMB program:

- **Biology** - One year of general biology with laboratory and one course in genetics are required. Cellular biology or cellular physiology, animal or plant physiology, and microbiology are recommended.
- **Chemistry -** One year of general chemistry with laboratory and two sequential terms of organic chemistry with laboratory are required. Biochemistry is recommended.
- **Mathematics -** Two terms of life sciences calculus are required.
- **Physics** - Two sequential terms of general physics with laboratories (above the concept level) are required.
- **Recommended** - introductory courses in computer science, statistics, and technical writing.
- With program approval, up to 3 courses may be attempted within the first year of resident study to correct deficiencies in required courses. Graduate credit will not be earned for these courses.

Applicant Selection

Applications for the CMB program are accepted on a rolling basis throughout the year; however, for full consideration for a CMB program stipend, application must be made by the deadlines listed for fall admission (July 1). Acceptance into the program is based upon both the quality of the application and the capacity of the program.

As a program that encompasses many departments and core areas of research, as well as being an interdisciplinary training program, it is helpful to potential advisors to know what aspects of research the student is interested in. Students are encouraged to explore potential advisors' work and identify areas of interest that align with one or more CMB faculty research program(s). These areas should be addressed in the applicant's statement of purpose. If an applicant is open to a broad range of research, it is helpful to identify that as well (for example, working with plant genetics, any aspect of infectious disease, aspects of either cancer biology or therapeutics, etc). Students are only admitted to the program if a successful match with a CMB faculty member can be made, so this is a critical aspect of the application demonstrating what the student will bring to the research endeavor.

Participating Departments/Programs

North Dakota State University offers an interdisciplinary program leading to the doctoral degree in Cellular and Molecular Biology. The CMB program is a joint effort of the Colleges of Agriculture, Food Systems, Natural Resources; Science and Math; Health Professions; and Engineering and includes the Departments of Animal Sciences, Biological Sciences, Chemistry and Biochemistry, Coatings and Polymeric Materials, Electrical & Computer Engineering (Bioengineering), Microbiological Sciences, Pharmaceutical Sciences, Physics, and Plant Sciences.

Financial Assistance

Self-funded students who provide their own support through sponsored funding sources (governmental or grant funding only) may contact CMB faculty members with whom they wish to work or the CMB Director to inquire which investigators are accepting students so that a successful research mentorship can be arranged.

While the CMB program offers a limited number of competitive graduate assistantships that includes a full tuition waiver, financial support is usually provided by the department or laboratory in which the student will carry out research. Therefore, applicants are encouraged to research participating faculty members' areas of expertise and identify them in their statement of purpose. Students are encouraged to contact those with whom they would like to work regarding availability of positions and funding. In instances where specific investigators are not identified in the Statement of Purpose, the Director will contact faculty members who are accepting new students for their appraisal of the application.

Code	Title	Credits
BIOC 701	Comprehensive Biochemistry I (required)	
BIOC 702	Comprehensive Biochemistry II (required)	
BOT 820	Advanced Cell Biology	
Select one of the following:		
BIOC 719	Molecular Biology of Gene Expression and Regulation	
MICR 783	Advanced Bacterial Genetics and Phage	
PLSC 731	Plant Molecular Genetics	
BIOC 674	Methods of Recombinant DNA Technology (required)	
PLSC 684	Plant Tissue Culture and Biotechnology	
ANSC 899	Doctoral Dissertation	
Each student is expected to seek out professional development by attending regular seminars in their home department or in conjunction with their research interests (for example, a seminar series or COBRE science series). Students are required to present at least one scientific seminar per year throughout the program. In addition, students will supplement their knowledge of molecular biology, cell biology, and research techniques by fulfilling the remaining credits in their plan of study with a selection from the following list of electives. Other appropriate electives may be used if approved by the student's advisory committee, as well as the program Director with input from the Steering Committee:		
Molecular Biology		
ANSC 773	Energy Metabolism	
ANSC 774	Nitrogen Metabolism	
ANSC 875	Vitamins and Minerals	
BIOC 716	Protein and Enzyme Biochemistry	
BIOC 723	Structural Basis of Membrane Transport and Signaling	
BIOL 679	Biomedical Genetics and Genomics	
PSCI 746	Neuropharmacology	
PSCI 747	Cardiovascular Pharmacology	
PSCI 762	Advanced Biopharmaceutics	
PPTH 759	Host-Parasite Genetics	
PPTH 759	Host-Parasite Genetics	
Cellular Biology		
ANSC 813	Domestic Animal Endocrinology	
ANSC 828	Advanced Reproductive Biology	
ANSC 830	Growth Biology	
BIOC 683	Cellular Signal Transduction Processes and Metabolic Regulation	
MICR 775	Molecular Virology	
MICR 781	Advanced Bacterial Physiology	
PSCI 765	Cancer Cell Biology	
PPTH 760	Advanced Mycology	
ZOO 682	Developmental Biology	
Techniques		
ANSC 758	Molecular Biological Techniques in Animal Sciences	
BIOC 675	Computer Applications in Biochemistry and Molecular Biology	
CHEM 728	Physical Methods for Chemical and Biomolecular Research	

CHEM 729	X-Ray Structure Determination
CPM 771	Modern Methods of Polymer Characterization
ECE 713	Introduction to Lab-on-a-Chip Technology
PLSC 721	Genomics Techniques

Research

In addition to didactic credits, students take research credits to fulfill their dissertation studies on a topic of significant and original work. They must pass an oral and written preliminary examination which signifies their matriculation to doctoral candidacy. They also present a public presentation of their work in conjunction with a final dissertation examination on their research to attain the doctoral degree.

Laura Aldrich-Wolfe
Biological Sciences
Cornell University, 2006
Field: Community Ecology, Mycorrhizas, Plant-Fungal Interactions

Teresa Bergholz
Microbiological Sciences
Michigan State University, 2007
Field: Functional Genomics of Foodborne Pathogens

Eugene Berry
Microbiological Sciences
Northeastern University, 1983
Animal Virology (Ss (+) RNA Viruses), Genetic Variation,
Field: Mechanisms of Pathogenesis and Virulence

Julia Bowsher
Biological Sciences
Duke University, 2007
Field: Evolutionary Development and Biology

Amanda Brooks
Pharmaceutical Sciences
University of Wyoming, 2006
Field: Molecular Biology, Spider Silk as a Drug Delivery System

Yongki Choi
Physics
City University of New York, 2010
Field: Early Detection of Cancer Cells, Single Molecule Enzymology, Biotechnology

Chris Colbert
Chemistry and Biochemistry
Purdue University, 2000
Field: Structure Biology with a Focus on the Biochemistry of Proteins Involved In Iron Import and Utilization

Glenn Dorsam
Microbiological Sciences
Virginia Commonwealth University, 1998
Field: Epigenetic Regulation

Anna Grazul-Bilska
Animal Sciences
University of Agriculture and Technology, 1983
Field: Animal Embryology and Reproductive Physiology and Endocrinology, Assisted Reproductive Technology

Kendra Greenlee
Biological Sciences
Arizona State University, 2004
Field: Developmental Physiology and Immunology

Tim Greives
Biological Sciences

Indiana University, 2009
Endocrine Regulation of Seasonality, Reproductive Neuroendocrinology, Hormones and Behavior

Jill Hamilton
Biological Sciences
University of British Columbia - 2012
Field: Plant Evolutionary Genomics

Lauren Hanna
Animal Sciences
Texas A&M University, 2013
Field: Quantitative Genetics, Animal Breeding, Whole System Approaches To Genomic Associations of Quantitative Traits

Stuart Haring
Chemistry and Biochemistry
Texas A&M University, 2013
Field: Cellular DNA Duplication (Replication) and Mutation Prevention (Repair)

Britt Heidinger
Biological Sciences
University of Iowa, 2004
Field: Physiological Ecology

Yagna Jarajapu
Pharmaceutical Sciences
Indiana University, 2007
Field: Bone Marrow Dysfunction and Vascular Repair in Diabetes, ACE2-Angiotensin-(1-7)/Mas Receptor Pathway in Bone Marrow Cells, Regulation of Bone Marrow Mobilization by Leptin

Estelle Leclerc
Pharmaceutical Sciences
Glasgow Caledonian University, 2002
Field: Melanoma, Pancreatic Cancer; Monoclonal Antibodies as Diagnostic and Therapeutic Agents; Mechanism of RAGE Signaling

Guodong Liu
Chemistry and Biochemistry
Hunan University, 2001
Field: Development of Nano-Bioprobes for Biosensors and Bioassays for Detection of Nucleic Acids and Proteins

Phil Mcclean
Plant Sciences
University of Paris XI, 1994
Field: Dry Bean Genetics and Biotechnology

Dharmakeerthi "Karthik" Nawarathna
Electrical and Computer Engineering
Colorado State University, 2982
Field: Biomedical Engineering

Stephen O'Rourke
Pharmaceutical Sciences
University of Wisconsin-Madison, 1995
Field: Cerebral Vascular Function in Health and Disease

Birgit Pruess
Microbiological Sciences
Ruhr-Universitat Bochum, 1991
Field: Bacterial Physiology, Biofilm Biology, and Food Safety

Steven Qian
Pharmaceutical Sciences
University of Iowa, 1999
Field: Chemistry and Biology of Free Radical and COX-Catalyzed Fatty Acid Peroxidation as Related to Human Health and Disease

Mohi Quadir

Coatings and Polymeric Materials
Freie University of Berlin, 2010
Field:Polymeric Materials for Drug Delivery

Sheela Ramamoorthy
Microbiological Sciences
Virginia Tech, 2006
Field: Virology, Immunology, and Vaccinology

Jiajia Rao
Plant Sciences
University of Massachusetts-Amherst, 2013
Field: Food Chemistry and Ingredient Technology

Katie Reindl
Biological Sciences
North Dakota State University, 2006
Field: Cancer Cell Biology, Cancer Prevention and Treatment, Evaluating Bioactive Food Components

Larry Reynolds
Animal Sciences
Iowa State University, 1983
Field: Nutrition and Pregnancy in Ruminants

Kenton Rodgers
Chemistry and Biochemistry
University of Iowa, 1988
Field: Inorganic and Bioinorganic Chemistry

Jane Schuh
Microbiological Sciences
North Dakota State University, 2002
Field: Environmental Allergic Asthma Triggered By Mold

Sangita Sinha
Chemistry and Biochemistry
Purdue University, 2000
Field: Biochemistry and Structural Biology of Host-Pathogen Interactions

Kristine Steffen
Pharmaceutical Sciences
North Dakota State University, 2007
Field: Biology of Obesity and Post-Bariatric Outcomes, Gastrointestinal Microbiome Research

Chengwen Sun
Pharmaceutical Sciences
Jilin University, 2000
Field: Blood Pressure Regulation, Cell Signaling

Kendall Swanson
Animal Sciences
University of Kentucky, 2000
Field: Ruminant Nutrition, Energy Metabolism, Protein Metabolism, Pancreatic Function, Beef Cattle Production

Sathish Venkatachalem
Pharmaceutical Sciences
University of Madras
Field: Pulmonary Physiology and Pharmacology

Danling Wang
Electrical and Computer Engineering
Peking University, 2003; University 0f Washington, 2014
Field: Sensor Design, Fabrication, and Application of Early-State Human Disease Monitoring and Diagnosis

Alison Ward

Animal Sciences
University of Saskatchewan, 2011
Field: Livestock Epigenetics, Nutrient-Gene Interactions, and Developmental Programming

John Wilkinson
Chemistry and Biochemistry
Vanderbilt University, 2001
Field: Cancer Cell Metabolism, Cell Death Pathways, Mitochondrial Gene Expression, Animal Models of Tumorigenesis

Qifeng Zhang
Electrical and Computer Engineering
Peking University, 2001
Field: Nanomaterials for Sensor and Biomedical Applications, Nanotechnology

Cereal Science

Department Information

- **Department Chair:**
  Richard Horsley, Ph.D.
- **Program Coordinator:**
  Frank Manthey, Ph.D.
- **Department Location:**
  Plant Sciences, Loftsgard Hall
- **Department Phone:**
  (701) 231-7971
- **Department Web Site:**
  www.ag.ndsu.edu/cerealscience/
- **Application Deadline:**
  : International applications are due May 1st for Fall and August 1 for Spring. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

Cereal Science is a graduate program in the College of Agriculture Food Systems and Natural Resources and is administered by the Department of Plant Sciences. The Cereal Science graduate program offers graduate study leading to the M.S. and Ph.D. degrees in Cereal Science. Advanced work may involve research in the areas of proteins, carbohydrates, enzymes, and lipids of cereals, legumes, and other northern-grown crops; barley malting and brewing; and wheat milling, baking, and pasta processing. Functional foods and stability of bioactive compounds in food systems are also predominant areas of research.

The program has a close working relationship with the Northern Crops Institute and the USDA Hard Red Spring and Durum Wheat Quality Laboratory housed in the Harris Hall complex.

Research Facilities and Equipment

Faculty in the Cereal Science graduate program maintains specialized equipment that evaluates cereal and food quality, including laboratory equipment such as spectrophotometers, gas chromatographs, LC-MS, GC-MS, high-performance liquid chromatographs, various electrophoretic devices, a differential scanning calorimeter, and Rapid ViscoAnalyzer.

Flour mills, ranging up to pilot-plant size; two completely equipped bake shops; continuous bread-baking equipment; rheological instruments for dough testing; several pasta-processing units; malting equipment; Asian noodle making equipment; soy milk/tofu processing machines; a wet processing pilot plant; laboratory-scale UHT processing unit; HT/ST extruder; and a microbrewery are some examples of the specialized equipment.

The Cereal Science graduate program is open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full standing status to the program, the applicant must meet the Graduate School requirements and have adequate preparation in biochemistry/chemistry and the biological sciences, including microbiology.

Financial Assistance

Applicants must apply to the Graduate School and be accepted in full or conditional status before being eligible for an assistantship in the Cereal Science graduate program. All graduate students must qualify and be awarded a Graduate Research Assistantship. Alternative support, equivalent to a Graduate Research Assistantship, may be provided to a student by a sponsor such as a private company, university or government. The number of Graduate Research Assistantships varies from year to year, depending on industrial support and grant funding. Graduate tuition is waived for students with assistantships.

Selection of the major adviser will be made on the basis of the student's interest, source of funding, the availability of faculty members and a common desire of the student and professor to work together on a program that will enable the student to attain the desired degree. If a Graduate Research Assistantship is assigned to a specific research project, the project leader will be the major adviser of the Graduate Research Assistant.

Master of Science

The Master of Science program requires a minimum of 21 semester credits of course work with an overall GPA of 3.0 or better, as well as 10 research credits (CFS 798). With assistance from the adviser, a supervisory/advisory and examining committee is established and a plan of study developed. The student is required to prepare and defend a written research proposal. The plan of study and written research proposal must be approved within the first four and six months of study, respectively. For M.S. students, a final oral examination is required, where the student defends the thesis and is asked questions covering academic subject matter.

Code	Title	Credits
CFS 650	Cereal Technology	3
CFS 790	Graduate Seminar	2
PLSC 710	Professional Development I	1
CFS 798	Master's Thesis	10
Statistics (one of the following courses)		3
PLSC 724	Field Design I	
STAT 662	Introduction to Experimental Design	
STAT 725	Applied Statistics	
Technology Group		6
CFS 630	Food Unit Operations	
CFS 670	Food Processing II	
CFS 671	Food Processing Laboratory	
CFS 758	Fundamentals of Flour Testing and Bakng (s/b Baking)	
CFS 759	Milling	
CFS 760	Pasta Processing	
CFS 761	Malting and Brewing	
Science Group		6
MICR 653	Food Microbiology	
CFS 660	Food Chemistry	
CFS 661	Food Chemistry Laboratory	
CFS 662	Food Ingredient Technology	
CFS 664	Food Analysis	
CFS 672	Cereal and Food Fermentation	
CFS 674	Sensory Science of Foods	
CFS 764	Carbohydrate Chemistry	
CFS 765	Advanced Cereal and Food Chemistry I	
CFS 766	Advanced Cereal and Food Chemistry II	
MICR 752	Advanced Topics in Food Safety Microbiology	
Total Credits		30 (minimum)

Doctorate of Philosophy (Ph.D.)

The Graduate School minimum requirement is 90 credits or no fewer than 60 credits if an M.S. degree is earned prior to the Ph.D.

The Ph.D. program requires the completion of a minimum of 31 semester credits of required course work with an overall GPA of 3.0 or better, as well as 25 research credits (CFS 899). Remaining credits can be fulfilled as elective courses or as additional research credits (CFS 899). With assistance from the adviser, a supervisory/advisory and examining committee is established and a plan of study developed. The student is required to prepare and defend a written research proposal. The plan of study and written research proposal must be approved within the first six and nine months of study, respectively. Ph.D. candidates are required to take a preliminary written and oral examination covering academic subject matter and a final oral defense of a research-based dissertation.

Code	Title	Credits
CFS 650	Cereal Technology (Students that have previously taken CFS 650 can opt to take additional CFS 899 credits or another 600/700 course worth 3 credits.)	3
PLSC 710	Professional Development I	1
PLSC 711	Professional Development II	1
CFS 765	Advanced Cereal and Food Chemistry I	4
CFS 766	Advanced Cereal and Food Chemistry II	4
PLSC 790	Graduate Seminar	2
CFS 892	Graduate Teaching Experience	2
PLSC 899	Doctoral Dissertation	30
Statistics (one of the following courses)		3
STAT 662	Introduction to Experimental Design	
PLSC 724	Field Design I	
STAT 725	Applied Statistics	
Technology Group		9
CFS 630	Food Unit Operations	
CFS 670	Food Processing II	
CFS 671	Food Processing Laboratory	
CFS 759	Milling	
CFS 760	Pasta Processing	
CFS 761	Malting and Brewing	
Science Group		6
CFS 660	Food Chemistry	
CFS 661	Food Chemistry Laboratory	
CFS 662	Food Ingredient Technology	
CFS 664	Food Analysis	
CFS 672	Cereal and Food Fermentation	
CFS 674	Sensory Science of Foods	
CFS 764	Carbohydrate Chemistry	
MICR 752	Advanced Topics in Food Safety Microbiology	
Additional Credits		30

- Students entering the program with an eligible M.S. Degree (i.e. within the last ten years) may transfer in 10 credits of CFS 798 or equivalent toward the 90 credit Graduate School requirement.
- If the student has had an equivalent statistics course to the one stated above or if the student requires additional training in statistics, the appropriate statistics course will be taken as agreed upon by the Graduate Student and the Student's Advisory Committee.
- Students entering the program with an eligible M.S. Degree (i.e. within the last ten years) may transfer 20 credits of Graduate level course work toward the 90 credit Graduate School requirement. Additional credits may include research credits or coursework.

An accelerated **Master of Science program** is available for students currently enrolled in the undergraduate Food Science program at North Dakota State University. Students will be required to complete 31 credits consisting of 19 didactic credits (600/700 level), 2 graduate seminar credits (CFS 790) and 10 research credits (CFS 798) and maintain a graduate GPA of 3.0. Students will be required to complete a thesis.

Fifteen (15) of the didactic credits can be used to meet the requirement for the B.S. degree. A graduate stipend or assistantship will not be provided until the B.S. degree is granted. However, students are eligible for hourly funding (i.e., time slip) if available at any time after being accepted into the accelerated M.S. program and may qualify for tuition waiver on graduate courses. Upon completion of the B.S. degree requirement, students are eligible for assistantships pending availability. Differential tuition applies. Graduate tuition rates will apply to graduate level courses while undergraduate tuition applies to undergraduate courses.

Eligibility and Admission:

An online submission to the Graduate School is required. Students interested in the accelerated M.S. degree should consider submitting the application during their junior year or just before their senior year. For eligibility and admission please see information below.

At the time of application, the student:

- Must have completed at least **60 credits** towards their B.S. degree before conditional admission.
- Must have completed at least **30 credits** at NDSU before conditional admission.
- Must have a cumulative **GPA of 3.5** at NDSU to be eligible for conditional admission.
- Must have completed an introductory food science course (CFS 200 Introduction to Food Systems or CFS 210 Introduction to Food Science and Technology), introductory food processing (CFS 370 Food Processing I), MATH 146 Applied Calculus I or higher and general chemistry (CHEM 121 General Chemistry I).
- Must have completed or be concurrently taking MICR 350 General Microbiology, CHEM 341 Organic Chemistry I and BIOC 460 Foundations of Biochemistry and Molecular Biology I. MICR 202 Introductory Microbiology, CHEM 240 Survey of Organic Chemistry, and BIOC 260 Elements of Biochemistry courses, respectively, cannot serve as substitutes for the aforementioned courses.

Rules for Accepted Students:

- All admissions will be conditional. The minimum condition is completion of the B.S. degree prior to full standing in M.S. program.
- No undergraduate courses (100-400) may be counted toward a M.S. degree.
- Courses completed at the 600 level prior to be accepted to the program may be counted toward a M.S. degree.
- A maximum of 15 credits in the M.S. program can be used to meet the requirements for the B.S. degree.
- Students entering the M.S. degree with a B.S. degree in hand may not use courses earned as part of the bachelors program for the M.S. requirements.
- The student must meet all of the requirements that would normally be expected of a student in the M.S. program.
- All incoming graduate students will be given a written examination before the beginning of their first semester to assess their proficiency in English / Scientific writing.
- Graduate stipend or assistantship will not be provided until B.S. degree is granted. However, students are eligible for hourly funding (time slip) if available and may qualify for a tuition waiver. Upon completion of the B.S. degree requirement, students are eligible for and assistantships pending availability.

Bingcan Chen, Ph.D.
University of Massachusetts-Amherst, 2012
Research Interests: Food and Cereal Chemistry

Clifford A. Hall III, Ph.D.
University of Nebraska-Lincoln, 1996
Research Interests: Phytochemical Stability in Food Systems, Pulse Utilization and Quality, Flaxseed, Chemical Food Safety, Effect of Processing On Food Safety Issues

Frank Manthey, Ph.D.
North Dakota State University, 1985
Research Interests: Durum Wheat Quality, Pasta/Noodle Processing, and Milling

Jiajia Rao
University of Massachusetts-Amherst, 2013
Research Interests:Food Chemistry and Ingredient Technology

Paul B. Schwarz, Ph.D.
North Dakota State University, 1987
Research Interests: Malting Barley Quality

Kalidas Shetty, Ph.D.
University of Idaho, 1989
Research Interests: Plant Metabolism and Food Security

Senay Simsek, Ph.D.
Purdue University, 2006
Research Interests: Wheat Quality and Carbohydrate Research

Anuradha Vegi, Ph.D.
North Dakota State University, 2008

Research Interests: Teaching Techniques

Affiliate/Adjunct Faculty

Linda Dykes, Ph.D.
Texas A&M University, 2008
Research Interests: Wheat Quality

Jae Ohm, Ph.D.
Kansas State University, 1996
Research Interests: Cereal Chemistry

Chemistry

Department Information

- **Department Chair:**
  Gregory Cook, Ph.D.
- **Graduate Coordinator:**
  Guodong Liu, Ph.D.
- **Email:**
  guodong.liu@ndsu.edu
- **Department Location:**
  Ladd Hall
- **Department Phone:**
  (701) 231-8694
- **Department Web Site:**
  www.ndsu.edu/chemistry/
- **Application Deadline:**
  March 1 for fall, September 1 for spring Spring admissions are given occasionally depending on fellowship availability and faculty interests. If there are no spring openings, spring applications are automatically considered for the subsequent fall semester.
- **Degrees Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE (general required; subject recommended)
- **English Proficiency Requirements:**
  TOEFL ibT 81 (23 speak; 21 write) –TA, 71 – RA; IELTS 6.5 – TA; 6 – RA

Program Description

The Department of Chemistry and Biochemistry offers programs leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in Chemistry. At the start of the first year of study, entering graduate students take entrance examinations in analytical, inorganic, organic, and physical chemistry, as well as chemistry and biochemistry. The graduate student progress committee uses these exams for advisory purposes in recommending course work during the first year. As a consequence, programs are individually tailored to the needs of each student. Typically, course work is completed in one to one-and-a-half years for M.S. candidates, and two years for Ph.D. candidates, leaving later years for full-time thesis research. The typical time to complete a graduate degree averages three years for the M.S. degree and approximately five years for the Ph.D.

Research Opportunities and Infrastructure

The Department of Chemistry and Biochemistry has more than 10 externally funded faculty research programs. Research expenditures have averaged $1.8 million over the last 10 years, with more than $2.2 million in the last two years.

All research and most teaching activities within the department occur within three centrally-located buildings, including two connected facilities, Ladd Hall and Dunbar Laboratory, as well as the Quentin Burdick Building, located across the street.

Most departmental offices, classrooms and teaching labs, as well as some research labs are located in Ladd Hall, while Dunbar and the third floor of the Quentin Burdick Building primarily consist of research laboratories. Ladd Hall also houses departmental glass, machine, and electronics shops.

Modern instrumentation is vital to research in the chemical sciences. The quality and quantity of instrumentation within the department has been greatly enhanced in the last few years through aggressive fundraising efforts and university matching support.

The department has recently upgraded its mass spectrometry capabilities to include a Bio-TOF III with accurate mass analysis, ESI and CI ionization; as well as an Esquire 3000 Plus - an Ion trap instrument with MS-MS and proteomics capabilities. A dedicated LC can be integrated with the both the instruments.

The Organic Spectroscopy Laboratory is primarily devoted to maintenance and operation of Nuclear Magnetic Resonance (NMR) spectrometers. The facility includes three modern high-field instruments: Varian 500, 400, and 300 MHz spectrometers. All have multinuclear, 2- D, and variable temperature capabilities, and the 400 MHz instrument has been recently upgraded for solids capabilities. This center also includes the departmental FTIR.

The Materials Characterization Laboratory houses the departmental crystallography faculties including a Bruker single crystal CCD X-ray diffractometer with low temperature capabilities, a Philips MPD (Multi- Purpose Diffractometer), two Philips X-ray powder diffractometers, and a Kevex X-ray fluorescence unit. CHN Elemental analysis, thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), and differential thermal analysis (DTA) are also available.

The Center for Protease Research - Core Biology Facility is a new facility housing equipment and technical personnel for performing bioassay, cell and tissue culture, and molecular biology experiments. For bioassays, the facility has a fluorimeter capable of top or bottom reading and the capability to handle both 96- and 384-well plates. For sample preparation, researchers can utilize cell and tissue culture capabilities such as flow hoods and culture chambers. In addition, RT-PCR and FPLC protein purification technology is available.

The chemistry library, located in Ladd Hall, provides graduate students and faculty with convenient 24-hour access to more than 200 journals and approximately 10,000 volumes. Literature searching via SciFinder is supported.

Prospective students are encouraged to visit the Department of Chemistry and Biochemistry website (http://www.ndsu.edu/chemistry) for the latest descriptions of research programs and instrumentation.

The graduate programs in chemistry are open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full standing to the program, the applicant must meet the Graduate School's admission requirements, have adequate preparation for the study of chemistry at the graduate level, and show potential to undertake advanced study and research as evidenced by academic performance and experience.

Financial Assistance

The student must first apply to the Graduate School and be accepted in full or conditional status before he/she is eligible for an assistantship in the Department of Chemistry and Biochemistry.

Graduate students in the Department of Chemistry and Biochemistry are supported during both the academic year and during summer months by either teaching assistantships (TA) or research assistantships (RA). As of the 2014-2015 academic year, the standard stipend is $22,000 per year for both RAs and TAs. University tuition (no fees) is waived for all TAs and RAs in good academic standing.

Master of Science

The Master of Science program requires the completion of a total of 30 graduate semester credits with an overall GPA of 3.0 or better. This total is comprised of both class work and research credit, but must consist of at least 16 semester credits from letter-graded course work.

Code	Title	Credits
Required Courses		
CHEM 720	Introduction to Chemical Research	2
CHEM 790	Graduate Seminar (second year seminar)	1
or BIOC 790	Graduate Seminar	
UNIV 720	Scientific Integrity	1
CHEM 790	Graduate Seminar (defense seminar)	1
or BIOC 790	Graduate Seminar	
Didactic Credits (601-689, 691; 700-789, 791; 800-889 and 891)		16 *
CHEM 798	Master's Thesis	6-10
or BIOC 798	Master's Thesis	
Total Credits Required		30
As part of total semester credits, the following departmental courses are recommended for students based on discipline:		
Analytical		
CHEM 632	Analytical Chemistry II	3
CHEM 730	Separations	2
CHEM 732	Advanced Analytical Chemistry	4

CHEM 736	Mass Spectrometry	2
Biochemistry and Molecular Biology		
BIOC 673	Methods of Biochemical Research	3
BIOC 674	Methods of Recombinant DNA Technology	3
BIOC 701	Comprehensive Biochemistry I	4
BIOC 702	Comprehensive Biochemistry II	4
Inorganic		
CHEM 724	Chemical Applications of Group Theory	1
CHEM 725	Advanced Survey of Inorganic Chemistry	3
CHEM 727	Organometallic Chemistry	3
CHEM 728	Physical Methods for Chemical and Biomolecular Research	2
CHEM 744	Organic Spectroscopy	2
Organic		
CHEM 741	Physical Organic Chemistry I	4
CHEM 742	Physical Organic Chemistry II	2
CHEM 744	Organic Spectroscopy	2
CHEM 745	Organic Synthesis	4
Physical		
BIOC 665		
CHEM 760	Statistical Thermodynamics	4
CHEM 763	Kinetics	2
CHEM 764	Dynamics	2

* A minimum of 10 must be from courses numbered 701-789; 791 or 800-889; 891

Doctor of Philosophy

The Ph.D. program requires the completion of a total of 90 graduate semester credits with an overall GPA of 3.0 or better. This total is comprised of both class work and research credit, but must consist of at least 27 semester credits from letter-graded course work.

Code	Title	Credits
Required Didactic Courses		
CHEM 720	Introduction to Chemical Research	2
UNIV 720	Scientific Integrity	1
CHEM 725	Advanced Survey of Inorganic Chemistry	4
CHEM 732	Advanced Analytical Chemistry	4
CHEM 741	Physical Organic Chemistry I	4
CHEM 759	Intermediate Physical Chemistry	4
Required Non-Didactic Courses		
CHEM 790	Graduate Seminar (second year seminar)	1
CHEM 790	Graduate Seminar (proposal seminar)	1
CHEM 790	Graduate Seminar (defense seminar)	1
CHEM 899	Doctoral Dissertation (Number of research credits determined by student and supervisory committee)	1-68
Additional credits numbered 601 - 689, 691, 700 - 789 and 791 may also count toward the 90 credit total required by the School of Graduate and Interdisciplinary Studies if approved by the student's advisory and examination committee.		
Total Credits		90

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

ADDITIONALLY, The following departmental courses ARE available for students; CONSULT WITH COMMITTEE FOR RECOMMENDATIONS:

Code	Title	Credits
Analytical		
CHEM 632	Analytical Chemistry II	3
CHEM 730	Separations	2
CHEM 736	Mass Spectrometry	2
Biochemistry and Molecular Biology		
BIOC 673	Methods of Biochemical Research	3
BIOC 674	Methods of Recombinant DNA Technology	3
BIOC 701	Comprehensive Biochemistry I	4
BIOC 702	Comprehensive Biochemistry II	4
Inorganic		
CHEM 724	Chemical Applications of Group Theory	1
CHEM 727	Organometallic Chemistry	3
CHEM 728	Physical Methods for Chemical and Biomolecular Research	2
CHEM 744	Organic Spectroscopy	2
Organic		
CHEM 742	Physical Organic Chemistry II	2
CHEM 744	Organic Spectroscopy	2
CHEM 745	Organic Synthesis	4
Physical		
CHEM 665	Survey of Physical Chemistry	4
CHEM 760	Statistical Thermodynamics	4
CHEM 763	Kinetics	2
CHEM 764	Dynamics	2
CHEM 676	Introduction to Computational Quantum Chemistry	3

Each student chooses a thesis adviser within six months of beginning graduate school. As this is one of the most important decisions made in graduate school, students are strongly urged to visit multiple faculty members to discuss research opportunities. In addition, faculty seminars during the fall semester are designed to acquaint new students with the available research programs.

By the end of the first academic year, each student selects an advisory and examination committee, which consists of the thesis adviser, two other faculty members in the chemistry department, and one faculty member from a department outside the Department of Chemistry and Biochemistry.

Admission to candidacy for the Ph.D. degree is accomplished by satisfying three requirements:

1. satisfactory performance in course work with a minimum 3.0 grade point average,
2. satisfactory performance in comprehensive examinations taken by the end of the 4th semester, and
3. satisfactory defense of an original research proposal on a topic approved by the student's advisory committee.

The defense of this proposal must occur at least eight months prior to the final oral examination. Following completion of dissertation research, the candidate must complete a written dissertation and an oral presentation to the department and advisory committee.

Uwe Burghaus, Ph.D.
Free University of Berlin, 1995
Postdoctoral, University of Genoa, Italy, 1995-1997
Research Area: Surface Physical Chemistry

Gregory R. Cook, Ph.D.
Michigan State University, 1993
Postdoctoral, Stanford University, 1994-1996
Research Area: Synthetic Organic Chemistry

John F. Hershberger, Ph.D.
Yale University, 1986
Postdoctoral, Columbia University, 1986-1989
Research Area: Experimental Physical Chemistry, Laser Kinetics

Denley Jacobson, Ph.D.
Purdue University, 1984
Postdoctoral, California Institute of Technology, 1984-1986
Research Area: Gas Phase Ion Chemistry

Svetlana Kilina, Ph.D.
University of Washington, Seattle 2007
Los Alamos National Lab, 2007-2010
Research Area: Computational Chemistry

Guodong Liu, Ph.D.
Hunan University, 2001
Postdoctoral, New Mexico State University, 2002-2004;
Postdoctoral, Pacific Northwest National Laboratory, 2004-2006
Research Area: Nanotechnology and Biological Sensing

James Nyachwaya, Ph.D.
University of Minnesota, 2012
Research Area: Chemistry / STEM Education

Seth C. Rasmussen, Ph.D.
Clemson University, 1994
Postdoctoral, University of Oregon, 1995-1999
Research Area: Inorganic/Organic Materials Chemistry, Chemical History

Kenton R. Rodgers, Ph.D.
University of Iowa, 1988
Postdoctoral, Princeton University, 1989-1993
Research Area: Inorganic and Bioinorganic Chemistry

Mukund P. Sibi, Ph.D.
City University of New York, 1980
Postdoctoral, Dartmouth College, 1980-1982; University of Waterloo, 1982-1985
Research Area: Synthetic Organic Chemistry; Natural Products

Jayaraman Sivaguru, Ph.D.
Tulane University, 2003
Postdoctoral, Columbia University, 2003-2006
Research Area: Photochemistry, Photocatalysis (Organic and Supramolecular), Asymmetric Lighted Induced Synthesis, Molecular Recognition, Supramolecular Photochemistry, Photo-Degradation of Bio-Based Polymers

Wenfang Sun, Ph.D.
Institute of Photographic Chemistry, Chinese Academy of Sciences, 1995
Postdoctoral, University of Alabama, Birmingham, 1997-1999
Research Area: Organic Materials Chemistry

Pinjing Zhao, Ph.D.
Cornell University, 2003
Postdoctoral, Yale University, 2004-2006; University of Illinois at Urbana- Champaign, 2006-2007
Research Area: Inorganic and Organometallic Chemistry

Civil Engineering

Department Information

- **Department Chair:**
  David R. Steward, Ph.D.
- **Graduate Program Coordinator:**
  Kalpana Katti, Ph.D.
- **Department Location:**
  201 Civil and Industrial Engineering Bldg.
- **Department Phone:**
  (701) 231-7244
- **Department Web Site:**

www.ndsu.edu/ce/

- **Application Deadline:**
  February 15 for fall admission; September 15 for spring admission
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Civil and Environmental Engineering offers the M.S. and Ph.D. degrees in civil engineering and the M.S. degree in environmental engineering. Also, the College of Engineering offers a program leading to a Ph.D. degree in engineering in which civil engineering is a possible area of specialization. The department also participates in several interdisciplinary programs such as Environmental and Conservation Sciences, Materials & Nanotechnology and Transportation and Logistics.

Specialty areas in the M.S. and Ph.D. degrees in civil engineering include construction, environmental, geotechnical, materials, structural, transportation, and water resources engineering. Other related areas are also accommodated. The academic and research foci are tailored to individual needs and interests. To complement the major area of study, additional courses are often selected from other disciplines. The programs are designed to advance the technical knowledge, competence, and interdisciplinary understanding of the students and to prepare them for entering or advancing within the civil engineering profession.

Application to the Civil Engineering program is open to qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School admission requirements, the applicant must have adequate preparation in civil engineering. A master's degree in civil engineering is preferred for applicants to the Ph.D. program.

Financial Assistance

Research and/or teaching assistantships may be available. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference (and TOEFL results for international applicants) must be submitted to the Graduate School.

For teaching assistantships, TOEFL and additional requirements for eligibility can be found on the Graduate School webpage.

The Master of Science degree is offered in the thesis format. This format emphasizes research, and the ability to analyze and interpret data and to prepare a scholarly thesis. The student and adviser develop a program of study consisting of at least 30 credit hours of graduate level material to meet individual educational goals. An overall GPA of 3.0 or better must be maintained. An oral defense of the research-based thesis is required.

The Doctor of Philosophy degree requires a total of 90 credits beyond the baccalaureate degree in civil engineering with an overall GPA of 3.0 or higher (60 credits beyond an M.S. degree in Civil Engineering or a sub-area of Civil Engineering) for graduation. A dissertation advisory committee should be formed and a plan of study should be filed by the end of first year after admission. A minimum of 30 hours of additional course work chosen by the student and his/her advisory committee from appropriate existing Civil Engineering graduate courses, new courses, and courses outside the department must be completed.

An M.S. degree from another institution may substitute for up to 30 credits of the 90 credits required; however, suitability of transfer or use of courses and research credits in the plan of study would be decided by the adviser and advisory committee.

A comprehensive preliminary exam is administered after completion of the greater portion of the course work. The committee chair will coordinate the examination. The format and duration will be determined by the committee. The student will present a research proposal within one year after the preliminary examination. A minimum of 30 and a maximum of 40 credit hours can be earned for research, preparation, and defense of a dissertation in Civil Engineering. A minimum of 12 credit hours in a minor or cognate area as deemed appropriate by the student and the advisory committee may be completed by the student. The student will defend his/her dissertation in a final examination attended by the advisory committee members and other academics.

Achintya N. Bezbaruah, Ph.D.
University of Nebraska-Lincoln, 2002
Research Interests: Environmental sensors, Recalcitrant and micro pollutants, Contaminant fate and transport, Small community water and wastewater treatment, Environmental management

Xuefeng (Michael) Chu, Ph.D.
University of California, Davis, 2002
Research Interests: Watershed Hydrologic and Environmental Modeling, Overland Flow and Infiltration, Integrated Modeling of Flow and Contaminant Transport

S. Gajan, Ph.D.

University of California, Davis, 2006
Research Interests: Geotechnical Engineering, Earthquake Engineering, Dynamic Soil - Structure Interaction

Ying Huang, Ph.D.
Missouri University of Science & Technology, 2012
Research Interests: Structural Health Monitoring/Smart Structures for Transportation Infrastructure, Intelligent Transportation Systems, Applications of Adaptive and Smart Materials , Finite Element Modeling and Multi-Hazard Assessment and Mitigation

Dinesh Katti, Ph.D., P.E.
University of Arizona, 1991
Research Interests: Geotechnical Engineering, Constitutive Modeling of Geologic Materials, Expansive Soils, Multiscale Modeling, Steered Molecular Dynamics, Computational Mechanics, Nanocomposite, and Bio-nanocomposites. Computational Biophysics

Kalpana Katti, Ph.D.
(Graduate Coordinator)
University of Washington, 1996
Research Interests: Advanced Composites, Nanomaterials, Biomaterials, Biomimetics, Materials Characterization and Modeling, Analytical Electron Microscopy, and Microspectroscopy, Bone Tissue engineering

Wei Lin, Ph.D.
State University of New York at Buffalo
Research Interests: Water and Wastewater Treatment, Hazardous Waste Management

Zhibin Lin, Ph.D., P.E.
University of Wisconsin, 2010
Research Interests: Advanced Materials, High-Performance, Resilient and Sustainable Bridge Systems, Structural Durability and Structural Health Monitoring in Bridges and Earthquake Engineering

Kelly Rusch, Ph.D., P.E.
Louisiana State University, 1992
Research Interests: Microbial System Design and Modeling, Biofuels and Bioproducts, Engineering Education Research, Aquaculture Engineering, and Water and Wastewater Treatment.

Gary R. Smith, Ph.D.
Purdue University, 1986
Research Interests: Quality Control and Systems Applications, Decision Analysis and Modeling Techniques, Safety Performance Measurement and Improvements in Labor Productivity

Amiy Varma, Ph.D.
Purdue University, 1993
Research Interests: Transportation Systems and Planning, Traffic Engineering, Airports, and Infrastructure Management

Mijia Yang, Ph.D., P.E.
University of Akron, 2006
China University of Mining and Technology, 1999
Research Interests: Advanced Materials, Structural Assessment, Solid Mechanics

Adjunct & Emeritus

Eakalak Khan, Ph.D. (adjunct)
University of California, Los Angeles, 1997
Research Interests: Water and Wastewater Quality, Water and Wastewater Treatment, and Storm Water and Non-point Source Pollution

Denver D. Tolliver, Ph.D. (adjunct)
Virginia Polytechnic University, 1989
Research Interests: Transportation, Planning and Economics

Robert Zimmerman, Ph.D. (adjunct)
North Dakota State University, 1991
Research Interests: Water and Wastewater Treatment, Solid Waste

G. Padmanabhan, Ph.D. (emeritus)
Purdue University, 1980
Research Interests: Stochastic Hydrology, Water Resource Systems, and Hydrologic Modeling

Coatings & Polymeric Materials

Department Information

- **Department Chair:**
  Dean C. Webster, Ph.D.
- **Department Location:**
  Research I, Research Park
- **Department Phone:**
  (701) 231-7633
- **Department Web Site:**
  www.ndsu.edu/cpm/
- **Application Deadline:**
  April 15 for fall semester. Applications are reviewed for all semesters, however fall start is preferred.
- **Degrees Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE: Required for international applicants (unless the applicant has earned a bachelor's degree from a regionally accredited university within the United States); Recommended for all applicants
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5

Program Description

The Department of Coatings and Polymeric Materials offers graduate studies leading to the M.S. and Ph.D. degrees in polymers and coatings science, and students in the department may also get a Ph.D. in the Materials and Nanotechnology program. The departmental research bridges between basic and applied research in the field of polymers and coatings. There is a unique atmosphere and opportunities for cross-disciplinary research experience, often accomplished by multi-disciplinary research activities with, for example, chemistry or engineering departments. Advanced research work involves specialized training in the following areas: colloidal and interfacial chemistry of polymers and coatings, polymer synthesis, adhesion, durability, spectroscopy, corrosion, electrochemistry, nanomaterials design and synthesis, computational modeling, life cycle assessment, and rheology. The department has an industrial advisory board consisting of leading industrial scientists and/or former graduates who provide new directions and other feedback to the program.

During the fall semester, the faculty meet with the new students to acquaint them with the research programs in the department. Because students are required to team with a research adviser by the end of the first semester in residence, they are required to discuss research opportunities with all faculty members.

Research Facilities and Equipment

The Department of Coatings and Polymeric Materials is housed in a modern building in the NDSU Research and Technology Park on the northwest corner of the campus. This building consists of nearly 40,000 square feet of space for research and teaching. Modern equipment and instrumentation have profoundly influenced the development of instruction and are the cornerstones of research in the chemical sciences. The Department of Coatings and Polymeric Materials possesses extensive instrumentation to characterize polymers and colloids ranging from state-of-the-art spectrometers, thermal analysis systems, advanced electrochemical equipment to study corrosion, and atomic force microscopes, as well as equipment for paint making and testing. Other modern research facilities, including state-of-the-art electron microscopy, high-performance computing and NMR laboratories, are readily available to all researchers on the NDSU campus and in the NDSU Research and Technology Park.

The Department of Coatings and Polymeric Materials graduate program is open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full standing status to the program, the applicant must meet the Graduate School admission requirements and have adequate preparation in a science or engineering field.

Financial Assistance

The student must first be accepted in full or conditional status before he/she is eligible for an assistantship in the Department of Coatings and Polymeric Materials. To be considered for an assistantship, the Graduate School application packet must be complete no later than April 15. International students must also submit a TOEFL or IELTS score. General and subject GRE scores are highly encouraged if they are available to the student. Graduate students may be supported during both the academic year and summer months by either teaching or research assistantships.

The current monthly stipend is $1,750+ per month, for an annual stipend of $21,000+. University tuition is waived for qualified TAs and RAs

The Master of Science program requires the completion of 16 credits of letter-graded course work with an overall GPA of 3.0 or better. The Ph.D. program requires the completion of 27 credits of letter-graded course work with an overall GPA of 3.0 or better. Each student must choose a thesis

(research) adviser within three to six months of beginning graduate school. After two semesters, the student must also select a supervisory committee. This committee advises the student and administers oral examinations. Candidates for the M.S. program normally satisfy course requirements within one year of study. Ph.D. candidates typically take about two years to complete courses, leaving later years for full-time dissertation research.

Candidacy qualifying examinations are administered twice annually. All Ph.D. candidates are required to pass the qualifying exam and defend an original written research proposal at least eight months prior to the final dissertation examination. The proposal topic must be approved by the student's research adviser, and the supervisory committee administers the oral exam. Lastly, following completion of dissertation research and the presentation of an acceptable written dissertation, the candidate defends it before the supervisory committee.

Accelerated M.S. Program

An accelerated M.S. degree program is available for students enrolled in a major at NDSU and the Coatings and Polymeric Materials minor program. This program will allow qualified students to complete a B.S. plus M.S. degree in as little as five years. Students should declare their intent to enroll in the accelerated M.S. program during their sophomore year. Contact the department for more information on the requirements for the program.

Dante Battocchi, Ph.D.
University of Trento, 2001
North Dakota State University, 2012
Research Interests: Electrochemical Noise Measurements, Scanning Vibrating Electrode Technique (Svet), Organic Metal-Rich Primers Characterization and Development, Materials Protection and Metal Corrosion

Stuart G. Croll, Ph.D.
University of Leeds, 1974
Research Interests: Weathering Durability of Coatings, Service Lifetime Prediction, Colloidal Stability, Molecular Modeling, Pigment-Polymer Interactions, Film Formation Processes, Coating Physics, Art Conservation

Erik Hobbie, Ph.D.
University of Minnesota, 1990
Research Interests: Nanotechology, Nanoparticles Polymers, Optics and Rheology

Ghasideh Pourhashem, Ph.D.
Drexel University, 2014
Research Interests: Environmental impact assessment to inform decision making, Life cycle assessment (LCA) and techno-economic analysis (TEA) of bio-based products, Industrial Ecology, bio-based product policy

Mohiuddin Quadir, Ph.D.
Freie University Berlin, Germany, 2010
Research Interest: Organic Polymer Chemistry, Functional self-assembly of polymers, Biomaterials, Application-guided modification of polymers for pharmaceutical and medical use, Bio-based materials

Bakhtiyor Rasulev, Ph.D.
Uzbek Academy of Science, 2002
Research Interests: Cheminformatics, Computational Chemistry of Polymers and Coating Materials, Quantitative Structure-Activity Relationship, Predictive Models Development, Molecular Modeling, Nanoparticles, Physico-Chemical Properties and Toxicity Assessment

Andriy Voronov, Ph.D.
Lviv Polytechnic National University, 1994
Research Interests: Polymer Synthesis, Micellar Self-Assembly, Sustainable Biobased Polymeric Materials, Responsive Polymers for Biomedical Applications, Polymers for Biomimetic Conversion of Biomass, Polymer Latexes, Polymer Hydrogels, Polymer Thin Films.

Dean Webster, Ph.D.
Virginia Polytechnic Institute and State University, 1984
Research Interests: Polymer Synthesis, Thermosets, Polymerization Reactions, Bio-based materials, Marine Coatings, Combinatorial and High Throughput Methods.

Research Faculty

Dennis E. Tallman (formerly of NDSU Dept. of Chemistry)
The Ohio State University, 1968
Research Interests: Analytical And Physical Electrochemistry, Corrosion Mechanisms, Corrosion Control By Coatings, Electroactive Conducting Polymers, Scanning Probe Techniques Microelectrodes And Microelectrode Arrays

Adjunct Faculty

Bret Chisholm, (PolyOne Corporation)

University of Southern Mississippi, 1993
Research Interests: Electrochemical Noise Measurements, Scanning Vibrating Electrode Technique (Svet), Organic Metal-Rich Primers Characterization and Development, Materials Protection and Metal Corrosion

Matthew S. Gebhard (DSM)
Stanford University, 1990
Research Interests: Rheology in Coatings Processes, Final Film Properties, Architectural Binder Technology

Victoria Gelling, Ph.D. (Sherwin-Williams)
North Dakota State University, 2002
Research Interests: Electrochemistry, Corrosion, Environmentally Compliant Corrosion Inhibitors

Loren W. Hill, Ph.D. (Consultant)
Pennsylvania State University, 1965
Research Interests: Structure-Property Relationships of Thermoset Coatings, Dynamic Mechanical Analysis

Theodore Provder, Ph.D. (Consultant)
University of Wisconsin, 1965
Research Interests: Chromatographic and Separation Methods of Polymers, Particle Size Measurements

Richard R. Roesler, Ph.D. (Consultant)
University of Washington, 1969
Research Interests: Blocked Polyisocyanates, Polyurethane Pispersions, High Solids Amine Functional Coreactants for Polyisocyanate

Brian S. Skerry, Ph.D. (Sherwin-Williams)
University of Manchester, 1980
Research Interests: Corrosion and Coatings

College Teaching Certificate

Department Information

- **Program Director:**
  Paul Kelter, Ph.D.
- **Department Location:**
  FLC 314, Office of Teaching and Learning
- **Department Phone:**
  (701) 231-6336
- **Department Web Site:**
  www.ndsu.edu/otl/college_teaching_certificate.html
- **Degrees Offered:**
  Certificate (Students enrolled in the CTC program must be concurrently enrolled in a graduate program leading to a degree.)

Program Description

The College Teaching Certificate (CTC) is a three-semester (9 credit) program in pedagogy for NDSU graduate students from across campus who plan to teach in a college or university and individuals who already have a graduate degree and work on campus. Students study contemporary education research focused on higher education issues, as well as gain experience in the teaching and learning process through microteaching modules, field experience, peer observations, and a structured practicum.

To be admitted to the program, the applicant must:

1. Be a current degree-seeking student in a enrolled graduate program.
2. Submit a completed College Teaching Certificate Application (https://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Forms/Student_Forms/CTC_App_.pdf) to the Graduate School.
3. Hold a baccalaureate degree from an educational institution of recognized standing.
4. At the baccalaureate level, have earned a cumulative grade point average (GPA) in all courses of at least 3.0 on a 4.0 scale.

Code	Title	Credits
The College Teaching Certificate is a three-semester, 9 credit program		
Foundation Courses (choose one)		3
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences (Fall, annually)	

HDFS 802	Teaching Developmental Science (Spring every odd year, 2017, 2019, 2021)	
STEM 810	Teaching College Science (Fall, annually)	
Electives (choose one)		3
AHSS 796	Special Topics (Emerging Trends in Teaching and Learning Online-Spring, annually)	
EDUC 728	Instructional Technology for Teaching and Learning (Fall 2017 (Normal rotation less than once per year))	
EDUC 753	Managing/ and Monitoring Learning (Spring, annually)	
EDUC 853	Instructional Methods for Adult Learners	
HDFS 880	Supervision and Teaching Couple and Family Therapy	
STEM 820	STEM Curriculum and Instruction (Spring, every even year (2018, 2020, 2022))	
STEM 840	Designing Technology-infused Learning Environments in Higher Education	
Required Teaching Practicum		3
EDUC 792	Specialized Studies for K-12 Teachers (*)	
or EDUC 892	Graduate Teaching Experience	
Total Credits		9

*Refers to courses cross-listed to be taken under a prefix in the student's major field. For example, a HDFS major would take HDFS 892. This experience requires a minimum of 15 face-to-face teaching hours, with the remaining credit hours to be dedicated to preparing lesson plans, evaluating student data, and developing assessments. The field experience will be designed in consultation with a faculty teaching mentor. Students will prepare a 2-page field experience proposal for approval from the CTC director during the semester prior to the experience.

Notes:

1. This schedule is subject to change.
2. Every course has an enrollment cap. Please check with the course instructor about this.
3. **Once requirements are completed a student must submit the Verification of College Teaching Certificate** (https://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Forms/Student_Forms/Verification__CTC.pdf) **form.**

Communication

Department Information

- **Department Chair:**
  Stephenson Beck, Ph.D.
- **Graduate Coordinator:**
  Zoltan Majdik, Ph.D.
- **Department Location:**
  Minard Hall 338
- **Department Phone:**
  (701) 231-7705
- **Department Web Site:**
  www.ndsu.edu/communication/
- **Application Deadline:**
  Ph.D - March 1; M.S. and M.A. - March 15, October 15
- **Degrees Offered:**
  Ph.D., 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

Program Description

The graduate program in communication offers graduate study leading to the M.A., M.S., and Ph.D. degrees. The program prepares students for academic and management positions, as well as advancement within current career fields.

The department tailors student research projects and academic programs to individual needs and interests. Students may take interdisciplinary graduate course work to enhance their program of study. Information is available on the department's website, www.ndsu.edu/communication.

Admission Requirements

Programs are open to students holding baccalaureate degrees from accredited universities or colleges.

Master of Science or Arts

To be admitted with full status to the program, the applicant must meet the Graduate School requirements; have adequate study in communication, journalism or a related area; and provide a score for the Graduate Record Examination (GRE).

Doctor of Philosophy

To be admitted with full status to the program, the applicant must meet the Graduate School requirements. In addition to materials required by the Graduate School applicants must submit:

- A CV or resume which clearly identifies your current position, including your responsibilities; your professional publications and papers; your service and professional activity; and your teaching and training experiences
- A scholarly writing sample where the candidate is first author (single authorship preferred), such as a master's thesis, proposal, or chapter; conference paper; final course paper
- Evidence of effective teaching **potential** (please include one or more of the following): teaching evaluations, teaching philosophy statement, recommendation letter(s) may speak to experience or potential of applicant, peer evaluations/observations, sample syllabi, sample lesson plan/assignment, etc.
- Graduate Record Exam (GRE) scores
- TOEFL test results (required for international students)

Financial Assistance

Students admitted at full or conditional status may apply for teaching assistantships at the master's or doctoral degree level. Initially, teaching assistants conduct lab sessions for the Comm 110 class. Teaching assistants may have opportunities to teach other classes during their program. The teaching assistantship deadline is March 15 for the following fall semester.

Graduate assistants receive a stipend and tuition waiver. Applications are available from the department office or online from the department's website, www.ndsu.edu/communication.

Master's program

The Master of Arts program is designed for students who are interested in conducting qualitative or rhetorical research, while the Master of Science program is designed for those interested in quantitative research. Both programs require completion of 30 credit hours of graduate coursework with an overall GPA of 3.0 or better. The student can elect to complete a research-based thesis, for which six of the 30 credits are awarded, or a written exam, for which three credits are awarded. A prospectus meeting and final defense of the thesis/written exam is required.

Code	Title	Credits
Core		
COMM 700	Research Methods in Communication	3
COMM 711	Communication Theory	3
Research Tools		
Select at least two of the following:		6
COMM 704	Qualitative Research Methods in Communication	
COMM 707	Quantitative Research Methods in Communication	
COMM 767	Rhetorical Criticism	
SOC 700	Qualitative Methods	
SOC 701	Quantitative Methods	
STAT 725	Applied Statistics	
Students pursuing the M.A. degree must take at least one qualitative methods course (COMM 704, COMM 708, COMM 767, or SOC 700). Students pursuing the M.S. degree must complete at least one quantitative methods course (COMM 707, COMM 710, SOC 701, or STAT 725).		
Elective Specialization		
12-15 credits of additional coursework, depending on whether the thesis or exam option is selected. Students can select from a wide range of specializations, pending approval from their adviser. Students may also choose graduate-level electives from other departments that may enhance specialized communication study goals.		12-15

Thesis or Exam	
The thesis option requires six credits of COMM 798. The exam option requires three credits of COMM 799.	3-6

Doctor of Philosophy

The Ph.D. program is designed to be completed in 4 years, and requires at least 60 credit hours beyond the master's degree. These hours will be in a planned course of study approved and overseen by the student's adviser and advisory committee.

The department currently offers two areas of concentration:

- Media and Society
- Organizational Communication

Students with a master's degree in another discipline may be required to complete additional graduate course work in specific areas of communication deemed necessary by the student's adviser and advisory committee. Graduate work taken beyond the master's degree may be judged applicable by the advisory committee, but post-master's graduate credits beyond 9 semester hours will not count toward the 60 credit minimum required for the Ph.D.

Students are strongly encouraged to take all of the Summer Scholar courses.

Course Requirements

Minimum of 30 credit hours in core or content concentration:

Code	Title	Credits
Core Courses		
COMM 701	Advanced Research Methods in Communication I	3
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences	3
COMM 711	Communication Theory	3
COMM 735 or 783 Media and Society or Org Comm Theory Course		3
Content Concentration		
Minimum of 12 credit hours in the department's 700-level courses in the student's major concentration area		12
Minimum of 9 credit hours in the department's 700-level courses in the student's minor concentration area		9
Research Courses		
Exclusive of COMM 701, maximum of 6 credit hours of independent study		12
Dissertation		
Dissertation		15

Comprehensive Exam

When coursework is nearly completed, the DGS will consider the program of study and student's professional presentations and publications to determine readiness for the comprehensive exam process. Doctoral students will meet with their advisers to prepare for the comprehensive examination.

After completion of the written examination, the doctoral committee will evaluate the written work. If the committee deems the work to be acceptable, the advisor will schedule an oral examination in which the student will defend his or her exam.

Dissertation

Under the guidance of an adviser and advisory committee, doctoral candidates will submit and defend a dissertation prospectus and ultimately a completed dissertation.

Stephenson J. Beck, Ph.D.
University of Kansas, 2008
Research Interests: Group and Organizational Communication, Interaction Analysis, Communication Strategy

Ann Burnett, Ph.D.
University of Utah, 1986
Research Interests: Legal Communication, Small Group Communication, Interpersonal Communication, Gender and Communication

Ross F. Collins, Ph.D.
University of Cambridge, 1992

Research Interests: Media History, International Media

Elizabeth Crisp Crawford, Ph.D.
University of Tennessee, 2007
Research Interests: Visual Storytelling, Advertising Message Strategy, Advertising Education

Zoltan Majdik, Ph.D.
University of Southern California , 2008
Research Interests: Science and Risk Communication in Biotechnological Practice, Rhetorical and Argumentation Theory, Ethics and Moral Theory

Mark Meister, Ph.D.
University of Nebraska, 1997
Research Interests: Rhetorical and Critical Theory, Environmental Communication

Robert Mejia, Ph.D.
The College at Brockport, 2012
Research Interests: Media and Cultural Studies, Political Economy of the Media, Technology Studies, Game Studies, Rhetoric of Health and Disease

Charles Okigbo, Ph.D.
Southern Illinois University, 1982
Research Interests: Social and Behavioral Change Communication, Health Communication

Carrie Anne Platt, Ph.D.
University of Southern California, 2008
Research Interests: Rhetoric of Cultural Politics, Gender and Technology, Media in Society

Melissa A. Vosen Callens, Ph.D.
North Dakota State University, 2010
Research Interests: Online Pedagogy, Emerging Media and Classroom Technology, Representations of Race and Gender in Popular Culture

Justin A. Walden, Ph.D.
Pennsylvania State University, 2013
Research Interests: Organizational Communication, Organizational and Individual Technology Adoption, Employee/Brand Advocacy

Catherine Kingsley Westerman, Ph.D.
Michigan State University, 2008
Research Interests: Organizational Communication, Workplace Friendships

David Westerman, Ph.D.
Michigan State University, 2007
Research Interests: Computer Mediated Communication, Interpersonal Communication

Emeritus

Robert S. Littlefield, Ph.D.
University of Minnesota

Paul E. Nelson, Ph.D.
University of Minnesota

Judy C. Pearson, Ph.D.
Indiana University

Jerry Richardson, M.A.
University of Washington

Lou Richardson, M.A.
North Dakota State University

Community Development

Department Information

- **Program Coordinator:**
  Gary Goreham, Ph.D.
- **Email:**

gary.goreham@ndsu.edu

- **Department Location:**
  Minard 428
- **Department Phone:**
  (701) 231-7637
- **Department Web Site:**
  www.ndsu.edu/ced/
- **Application Deadline:**
  International application materials must be received before May 1 for the fall semester and prior to August 1 for spring and summer semesters. Domestic applications must be received at least one month prior to the start of the semester.
- **Degrees Offered:**
  M.A., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Sociology and Anthropology, in cooperation with the Department of Agribusiness and Applied Economics, offers a master's degree in Community Development. The degree is a multi-institutional, multi-disciplinary, online program in conjunction with the Great Plains Interactive Distance Education Alliance (IDEA). Other institutions participating in this program include Iowa State University, Kansas State University, the University of Nebraska-Lincoln, and South Dakota State University.

The primary audience for this program is community economic development officials and specialists already employed in the field.

The program requires a total of 36 credit hours, including 16 credits (six courses) of core courses, 15 credits in two of the four track areas, and up to six credits of thesis. The four track areas include Building Economic Capacity, Natural Resource Management, Working with Native Communities, and Non-profit Leadership.

Program Objectives

The objectives of the Community Development graduate degree program are to:

- Increase the skills, knowledge, and competencies of community economic development officials who are currently employed and have limited opportunity to participate in an on-campus degree program.
- Provide graduate training for individuals entering the community economic development career field who require training/degrees for career advancement.
- Enhance the community economic development skills, knowledge, and competencies of individuals working with Native American communities, natural resource-based communities, non-profit organizations, and/or state and local government.

A total of 36 credits are required for the master's degree program. Students will write a thesis or complete a creative component (Plan B) to capstone the degree program, which will be worth six credit hours. The student's schedule of courses must be approved by the faculty adviser and the campus coordinator. Students may select either a Master of Science (M.S.) or Master of Arts (M.A.) option. The M.A. option requirement normally includes two (2) years of a foreign language. This requirement can be satisfied with undergraduate courses and/or a proficiency examination.

Students will be required to take all of the six core courses and an additional 15 credits selected from at least two tracks.

There are presently four tracks that have been developed from which students may choose. These include:

- Building Economic Capacity
- Natural Resource Management
- Working with Native Communities
- Non-profit Leadership

Code	Title	Credits
Core Courses Credits		16
CED 709	Community Development Orientation	
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

NATURAL RESOURCE MANAGEMENT TRACK

Code	Title	Credits
CED 731	Ecological Economics	3
CED 733	Sustainable Communities	3
CED 735	Policy and Politics of Coastal Areas	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	Wellness in Native Communities	1
CED 726	Youth Development in Native Communities	1
CED 727	Indian Country Agriculture and Natural Resources	1
CED 728	Role of Tribal Colleges in Economic Development	1

BUILDING ECONOMIC CAPACITY TRACK

Code	Title	Credits
CED 741	Economic Development Strategies and Programs	3
CED 742	Economic and Fiscal Impact Analysis	1
CED 743	Cost-Benefit Analysis	1
CED 744	Local Economic Analysis	1
CED 745	Land Management Planning	3

Computer Science

Department Information

- **Department Head:**
  Kendall E. Nygard, Ph.D.
- **Graduate Coordinator:**
  Jun Kong, Ph.D.
- **Department Location:**
  258 QBB
- **Department Phone:**
  (701) 231-8562
- **Department Email:**
  gradinfo@cs.ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/cs/
- **Application Deadline:**
  February 1 for fall semester; September 1 for spring semester**
- **Degrees Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE

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

**Spring admissions are given only occasionally, depending on funding and faculty research needs. If there are no spring openings, spring applicants are automatically considered for the subsequent fall semester. There are no summer admissions for any Computer Science program.

Program Description

The Department of Computer Science and Operations Research offers the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in Computer Science. Graduate course work in Operations Research is offered and may be used to provide an operations research concentration to either program. For additional information, please contact the department at (701) 231-8562 or gradinfo@cs.ndsu.edu.

In addition to the minimum Graduate School requirements, the following items are required for all Computer Science applicants seeking an advanced degree:

Master of Science

- The applicant must have a bachelor's degree from an educational institution of recognized standing. Admission to the program is competitive; the following minimum requirements are necessary but are not sufficient for automatic admission.
- The applicant must show, by a combination of educational background, academic performance, and work experience, the potential to succeed in advanced study and research in computer science. Minimum preparation usually includes the ability to program in one or more modern, commonly used high-level languages (such as Java or C++); and experience in using data structures such as linked lists and binary trees. Minimum preparation for unconditional admission to the master's program would normally include courses in computer science principles and theory equivalent to the NDSU courses.

Code	Title	Credits
CSCI 161	Computer Science II	4
CSCI 222	Discrete Mathematics	3
CSCI 366	Database Systems	3
CSCI 372	Comparative Programming Languages	3

- The applicant for the Computer Science M.S. degree program must have a cumulative grade point average (GPA) in all previous courses of at least 3.0 (out of 4.0) or equivalent to attain full standing.
- The applicant for the Computer Science M.S. degree program must have a score above the median (50^{th} percentile) for the quantitative reasoning portion of the GRE exam.
- International students are welcome to apply. They must submit TOEFL, IELTS, or PTE Academic score. Minimum requirements are: TOEFL score of at least 550 (paper based) or 79 (internet based); IELTS score of at least 6.5; or PTE Academic score of at least 53.
- Eligibility for a teaching assistantship requires the following additional requirements: minimum TOEFL ibT score of 81 (IELTS of 7), a TOEFL ibT Speaking subscale score of 23 or above and a TOEFL ibT Writing subscale score of 21 or above. The IELTS equivalent scores are 6.0 and 6.0 respectively.
- These individuals must have a minimum TOEFL ibT score of 79 (IELTS of 6.5) and must score at or above the 40th percentile on the TOEFL ibT Speaking and Writing subscales (currently 19 and 21 respectively). The IELTS equivalent scores are 5.5 and 6.0 respectively.

Doctor of Philosophy

The applicant must have at least a four-year bachelor's degree, or a master's degree in computer science. In some cases, students with a degree in a closely related area may be considered, provided the course work includes exposure to the skills listed under M.S. above. Students with only a bachelor's degree should have substantial computer science experience, whether acquired through course work or professional experience.

Admission to the program is competitive, and requirements for admission to this program are more rigorous than for admission to the M.S. program. Students applying with a bachelor's degree only should meet a minimum GPA of 3.25 in previous coursework. The applicant for Computer Science Ph.D. degree program must have a GRE score above the median (50th percentile) for the quantitative reasoning portion. The admissions committee will evaluate the applicant's overall academic record, as well as any relevant employment and professional experience. Of particular importance is evidence of the applicant's potential for scholarship and independent research at the Ph.D. level. International students are welcome. English Language requirements are the same as for the Computer Science M.S. program.

The graduate admissions committee reviews all applications during the month following the application deadline and considers accepted students for any available assistantship positions within the department. If an assistantship is not offered at time of admission, accepted students can then fill out an application on the Computer Science website for later consideration.

Financial Assistance

Assistantships are available to selected graduate students. Teaching one section of a lower division service course requires 10 hours of work per week and qualifies the student for a waiver of graduate tuition and a monthly stipend. Other assistantships that provide a stipend and tuition waiver include research assistantships, which involve assisting faculty with their research, and graduate service assistantships, which involve tutoring, grading or computer-related work with faculty members or organizations on campus. Related prior experience increases the likelihood of a teaching or tutoring assistantship being awarded. For all assistantships, a student's chances are greater after they have been at NDSU one or two semesters.

Code	Title	Credits
Master of Science in Computer Science Degree Requirements		
Semester core courses (required of all students):		
CSCI 713	Software Development Processes	
CSCI 724	Survey of Artificial Intelligence	
CSCI 741	Algorithm Analysis	
CSCI 765	Introduction To Database Systems	
Additional 700-800 level Computer Science courses selected in consultation with your adviser.		
Thesis Option & Comprehensive Study Options		
CSCI 790	Graduate Seminar	
Thesis Option		32
Additional graduate coursework		8-12
CSCI 798	Master's Thesis (6-10 credits)	
Comprehensive Study Option		32
Additional Graduate Coursework		14-16
CSCI 797	Master's Paper (2-4 credits)	
Culminating Experience-Based Option		36
Additional Graduate Coursework		21
CSCI 771	Software Development Project I	

Students seeking an option in cybersecurty must take 9 credits from the below list. No more than 3 credits can be from CSCI 790.

Code	Title	Credits
CSCI 676	Computer Crime & Forensics	3
CSCI 791	Temporary/Trial Topics (cybersecurity focus)	1-5
CSCI 793	Individual Study/Tutorial (cybersecurity focus)	1-5
CSCI 790	Graduate Seminar (cybersecurity focus)	1-3
CSCI 689	Social Implications of Computers	3
CSCI 773	Foundations of the Digital Enterprise	3
CSCI 783	Topics In Software Systems (cybersecurity focus)	3

- Research adviser should be selected by the end of the second semester at NDSU.
- A Plan of Study listing coursework and examination committee members should be completed by the end of the second semester at NDSU.
- All course work must be approved by the student's adviser, Supervisory Committee, department chair, and graduate dean through the plan of study.
- A maximum of 9 semester credits may be transferred into the program. There may be a maximum of 6 credits of independent study.
- Comprehensive Examination (on the core courses) should be completed by the end of the fourth semester.
- Final Oral Examination on the student's research.

Code	Title	Credits
Doctor of Philosophy in Computer Science degree requirements		90
Core Courses: (or their equivalent in transfer or examination credits)		
CSCI 713	Software Development Processes	
CSCI 724	Survey of Artificial Intelligence	
CSCI 741	Algorithm Analysis	
CSCI 765	Introduction To Database Systems	

Five to ten additional courses selected in consultation with your adviser.

CSCI 899	Doctoral Dissertation

Students seeking an option in cybersecurty must take 9 credits from the below list. No more than 3 credits can be from CSCI 790.

Code	Title	Credits
CSCI 676	Computer Crime & Forensics	3
CSCI 793	Individual Study/Tutorial (cybersecurity focus)	1-5
CSCI 796	Special Topics (cybersecurity focus)	1-5
CSCI 790	Graduate Seminar (cybersecurity focus)	1-3
CSCI 791	Temporary/Trial Topics (cybersecurity focus)	1-5
CSCI 669	Network Security	3
CSCI 773	Foundations of the Digital Enterprise	3
CSCI 783	Topics In Software Systems (cybersecurity focus)	3

- Research adviser should be selected by the second semester at NDSU.
- A minimum of 15 didactic credits numbered 700 -789 or 800-898, of which at least 9 are not included in the Computer Science Core Courses listed above.
- 30-45 semester credit hours of research – The Ph.D. requires a research contribution to be made under the supervision of one of the Computer Science Department's graduate faculty members.
- Research proposal presentation and preliminary oral examination (qualifying exam) should be completed by the fourth semester at NDSU
- Satisfactory completion of the Comprehensive Exam at the PhD Level. (written based on the core courses)
- Dissertation
- Final oral examination on the dissertation

Some additional information regarding the course work:

- A student holding a Master of Science degree from an educational institution of recognized standing may use:
  - 30 credits previously completed toward the 90 total credits required for the doctoral degree **OR**
  - Up to 9 credits previously earned graduate level courses with a grade of B or better may be used toward the 90 total credits for the doctoral degree.
- The 90 credits (including any credits transferred) must be computing-related with at least 45 credits involving significant graduate level computer science material. Generally, these credits would be offered by a computer science department.
- The 90 credits may include a maximum of 15 credits of non-didactic courses (independent studies or seminars). Seminars are limited to 4 of those credits.
- The student's advisory committee, the department chair, the college dean, and the graduate dean all must approve the course work on the plan of study.

Department Faculty

Anne Denton, Ph.D.
University of Mainz, 1996
Research Interests: Data Mining, Bioinformatics, Scientific Informatics, Databases, Geospatial Data, Cloud Computing

Dean Knudson, Ph.D.
Northwestern University, 1972
Research Interests: Software Engineering, International Capstone Programs, University/Industry Relationships

Jun Kong, Ph.D.
University of Texas, Dallas, 2005
Research Interests: Human Computer Interaction, Mobile Computing, Software Engineering

Juan (Jen) Li, Ph.D.
University of British Columbia, 2008
Research Interests: Large-scale Distributed System (P2P and Cloud Computing, Distributed Search, Routing Algorithms), Semantic Web Technologies, Social Networks, Information Retrieval, Knowledge Discovery

Simone Ludwig, Ph.D.
Brunel University, 2004
Research Interests: Swarm Intelligence, Evolutionary Computation, Fuzzy Reasoning, Cloud Computing

Kenneth Magel, Ph.D.
Brown University, 1977
Research Interests: Software Engineering, Human-Computer Interfaces, Software Complexity, and Software Design

Kendall Nygard, Ph.D.
Virginia Polytechnic Institute and State University, 1978
Research Interests: Data Science, Optimization Modeling, Smart Grid, Sensor Networks, Agents, Artificial Intelligence, Security, Adaptive Systems, Swarm Intelligence

Saeed Salem, Ph.D.
Rensselaer Polytechnic Institute, 2009
Research Interests: Bio-Informatics and Data Mining

Brian Slator, Ph.D.
New Mexico State University, 1988
Research Interests: Artificial Intelligence, Educational Media

Jeremy Straub, Ph.D.
University of North Dakota, 2015
Research Interests: Multi-tier Mission Architecture & Control, Autonomous Data Link Reduction, Autonomous Vehicle Control, Machine Vision, Super Resolution

Vasant Ubhaya, Ph.D.
University of California-Berkeley, 1971
Research Interests: Algorithm Analysis, Approximation and Optimization

Gursimran Walia, Ph.D.
Mississippi State University, 2009
Research Interests: Empirical Software Engineering, Software Errors and Software Quality Improvement, Requirements Engineering, Human Cognition in Software Engineering, Managing and Estimating Software Quality

Changhui Yan, Ph.D.
Iowa State University, 2005
Research Interests: Bioinformatics, Computational Biology, Genomics, Machine Learning, Data Mining, Big Data, Cloud Computing

Professors of Practice

Oksana Myronovych, Ph.D.
North Dakota State University, 2009

Mark Pavicic, Ph.D.
Columbia University, 1985

Affiliate Faculty

Otto Borchert, Ph.D.
North Dakota State University, 2015
Research Interests: Artificial Intelligence, Educational Games, STEM Learning

Hyunsook Do, Ph.D.
University of Nebraska, 2007
Research Interests: Software Engineering, Software Testing, Regression Testing, Software Maintenance, Requirements Verification, Software Empirical Methodologies

Hassan Reza, Ph.D.
North Dakota State University, 2002
Research Interests: Software Architecture, Cloud Computing, Architectural Analysis & Description

Xiaodong Zhang, Ph.D.
Dalhousie University, Canada, 2001
Research Interests: Satellite Sensing, Geographic Information Systems

Construction Management and Engineering

Department Information

- **Department Chair:**
  Zhili (Jerry) Gao, Ph.D.
- **Graduate Coordinator:**
  Gary Smith, Ph.D.
- **Department Location:**
  Engineering 106
- **Department Phone:**
  (701) 231-6521
- **Department Web Site:**
  www.ndsu.edu/construction/
- **Application Deadline:**
  Fall: May 1; Spring: October 1 for M.S. and Master of Construction Management, November 1 for Certificate
- **Degrees Offered:**
  M.S., MCM, Certificate
- **Test Requirement:**
  GRE (M.S. applicants)
- **English Proficiency Requirements:**
  M.S.: TOEFL ibT: 81, IELTS: 7, PTE Academic 54; Master of Construction Management: TOEFL iBT: 79, IELTS: 6.5, PTE Academic: 53

Programs

The Department of Construction Management and Engineering offers three separate and distinct graduate programs as listed below..

Master of Science (M.S.) in Construction Management

The Master of Science in Construction Management program is an on-campus, research-focused degree. Students are expected to significantly contribute to the development and delivery of scholarly publications and to the development and submission of research grant proposals as determined by the major adviser.

Master of Construction Management

The Master of Construction Management program is an online professional program consisting of 30 credits of course work and the Associate Constructor (AC) Exam.

Graduate Certificate in Construction Management

The Graduate Certificate in Construction Management program provides an online course learning experience constituting a distinct knowledge-base and a specific set of associated skills within the areas of estimating, scheduling, and project management at the graduate level. These three areas constitute a body of knowledge that represents the fundamental core of construction management.

Master of Science (M.S.) in Construction Management

In addition to the Graduate School requirements, to be admitted into the Master of Science in Construction Management applicants must:

- Have earned a baccalaureate degree in construction, engineering, architecture, or other related discipline with a minimum CGPA of 3.0 or equivalent to attain full standing.
- Submit an official transcript for each college/university attended.
- Submit Graduate Record Examination (GRE) score.
- Submit a one-page “Statement of Purpose” outlining reasons for pursuing the Master of Science in Construction Management, emphasizing on research objectives and qualifications that directly relate to one of the “Research Interests” of the CM&E faculty.
- Submit a two-page resume.
- Submit three (3) letters of recommendation.

Prospective students must submit application materials directly to the NDSU Graduate School via the online application process.

Financial Assistance

For exceptional applicants, the CM&E Department may offer a graduate assistantship, which consists of a monetary stipend and a possible tuition waiver; however, student activity fees and program fees are not waived. There is no separate application process for graduate assistantships. Applicants are evaluated based on their credentials and/or experience.

*Master of Construction Management (*MCONSM)

In addition to the Graduate School requirements, to be admitted into the Master of Construction Management, applicants must:

- Have earned a baccalaureate degree in construction, engineering, architecture, or other related discipline with a minimum CGPA of 3.0 or equivalent to attain full standing.
- Submit an official transcript for each college/university attended.
- Submit a two-page resume.
- Submit a one-page "Statement of Purpose" outlining reasons for pursuing the Master of Construction Management.
- Submit three (3) letters of recommendation.

Prospective students must submit application materials directly to the NDSU Graduate School via the online application process. Applicants who are deficient in the CGPA requirement are encouraged to apply for the Graduate Certificate in Construction Management. Although successful completion of the Graduate Certificate does not guarantee acceptance into the Master of Construction Management, the Graduate Certificate will be seriously considered in application decisions related to the Master of Construction Management Program.

Financial Assistance

Graduate assistantships, tuition waivers, and financial aid offered by the CM&E Department, the Graduate School, or NDSU are not available to students in the Master of Construction Management program.

Graduate Certificate in Construction Management

In addition to the Graduate School requirements, to be admitted into the Graduate Certificate in Construction Management applicants must:

- Have earned a baccalaureate degree in construction, engineering, architecture, or other related discipline with a minimum CGPA of 3.0 or equivalent to attain full standing.
- Submit of an official transcript for each college/university attended.
- Submit a two-page resume.
- Submit a one-page "Statement of Purpose" outlining reasons for pursuing the Graduate Certificate in Construction Management.
- Submit three (3) letters of recommendation.

Prospective students must submit application materials directly to the NDSU Graduate School via the online application process.

Financial Assistance

Graduate Certificate in Construction Management Program students are not eligible for assistantships, tuition waivers, and financial aid offered by the CM&E Department, the Graduate School, or NDSU.

Master of Science in Construction Management

The Master of Science in Construction Management requires a total of 31 graduate-level credits (24 credits of course work, 6 credits of research/thesis, and 1 credit of seminar) and a thesis. The thesis requires the creation and presentation of new knowledge in providing a solution to a problem. Prior to submitting a thesis to the graduate student's supervisory committee, the thesis must be reviewed by a departmentally approved external editor. All costs associated with external review are the responsibility of the graduate student.

An example of the Plan of Study for the Master of Science in Construction Management is shown below:

Code	Title	Credits
CM&E 790	Graduate Seminar	1
CM&E 603	Scheduling and Project Control	3
CM&E 605	Construction Support Operations	3
CM&E 701	Construction Technology and Equipment	3
CM&E 711	Construction Cost Estimating	3
CM&E 712	Construction Management	3
600, 700 or 800-level electives *		9
CM&E 798	Master's Thesis	6
Total Credits		31

* Electives may be any 600, 700, or 800-level courses offered at NDSU determined by the student and the major faculty adviser. A minimum cumulative grade point average (CGPA) of 3.0 must be achieved in order to complete the M.S. degree.

Master of Construction Management

The Master of Construction Management degree consists of thirty (30) credits of course work and AC Exam. The following ten (10) courses constitute the thirty (30) credits of course work required for the degree.

Code	Title	Credits
CM&E 603	Scheduling and Project Control	3
CM&E 605	Construction Support Operations	3
CM&E 660	Infrastructure Management	3
CM&E 701	Construction Technology and Equipment	3
CM&E 703	Advanced Project Planning and Control	3
CM&E 711	Construction Cost Estimating	3
CM&E 712	Construction Management	3
CM&E 715	Construction Specifications and Contracts	3
CM&E 725	Decision Making and Risk Analysis	3
CM&E 740	Financial and Economic Concepts for Construction Managers	3
CM&E 793	Individual Study/Tutorial (ACExam)	
Total Credits		30

Schedule of Courses

Summer Semester
CM&E 603 Scheduling and Project Control
CM&E 660 Infrastructure Management

Fall Semester
CM&E 703 Advanced Project Planning and Control
CM&E 712 Construction Management
CM&E 715 Construction Specifications and Contracts
CM&E 740 Financial and Economic Concepts for Construction Managers

Spring Semester

CM&E 605 Construction Support Operations
CM&E 701 Construction Technology and Equipment
CM&E 711 Construction Cost Estimating
CM&E 725 Decision Making and Risk Analysis

Associate Constructor (AC) Exam

The Associate Constructor (AC) Exam is administered by the American Institute of Constructors & Constructor Certification Commission. All students in the Master of Construction Management Program must take the AC Exam before their graduation. There is no requirement that a student has to earn a pass score in order to receive the Master of Construction Management Degree from NDSU. However, students are encouraged to prepare for the AC Exam and earn a pass score or better established by the testing agency. The exam may be taken multiple times. The AC exam is the first level in reaching the designation of a "Certified Professional Constructor" (CPC), which is a three-stage process consisting of the AC exam (Level I), 4-5 years of relevant construction management work experience, and the CPC exam (Level II). The AC Exam is offered twice a year, typically in March and November. International applicants should note that the AC Exam is not offered online and is only offered in the United States. If a student has the AC designation, he/she may take the CPC Exam before the graduation. A pass score also is not required for the CPC Exam..

Graduate Certificate in Construction Management

The certificate program consists of nine credits encompassing the following three (3) courses:

Code	Title	Credits
CM&E 603	Scheduling and Project Control	3
CM&E 711	Construction Cost Estimating	3
CM&E 712	Construction Management	3

Only grades of C or higher will satisfy requirements for certificate completion with a CGPA of 3.0 or greater. The Dean of the Graduate School, using official NDSU transcripts, will verify course completion and issue the certificate. Courses used to satisfy the Graduate Certificate requirements cannot be older than three years at the time the certificate completion is verified.

Eric Asa, Ph.D.
Associate Professor and Accreditation Assessment Coordinator
University of Alberta, 2002
Research Interests: Infrastructure and Assets Management, Construction Materials, Engineering Education, Computational Modeling

Zhili (Jerry) Gao, Ph.D., P.E.
Associate Professor and Interim Department Chair
Iowa State University, 2004
Research Interests: Virtual Design and Construction (Visualization, BIM Development And Implantation), Advanced Concrete Techniques (Sustainable Concrete, New Concrete Materials And Structures)

Todd L. Sirotiak, MBA, Ph.D., P.E., C.P.C.
Associate Professor
Iowa State University, 2008
Research Areas: Cost Control, Sustainability, and Engineering Education

Gary R. Smith, Ph.D., P.E.
Professor and Graduate Coordinator
Purdue University, 1986
Research Areas: Quality Control and System Applications, Decision Analysis and Modeling Techniques, Safety Performance Measurement and Improvements, and Process and Productivity Improvement

Matthew L. Stone, Ph.D.
Assistant Professor
University of Alabama, 2013
Research Areas: Cost Estimating, Life Cycle Analysis, and Infrastructure Construction

Huojun Yang, Ph.D.
Assistant Professor
University of Nebraska-Lincoln, 2012
Research Interest: Built Environmental Systems and Building Energy

Yao Yu, Ph.D.
Assistant Professor
North Carolina A&T State University, 2014
Research Areas: Building Energy Conservation Technology, Computational Airflow Modeling, and HVAC System Design and Simulation

Counseling (Counselor Education)

Department Information

- **School of Education Head:**
  Chris Ray, Ph.D.
- **Graduate Coordinator:**
  Brenda Hall, Ed.D.
- **Department Location:**
  SGC Building, 1919 N. University Drive
- **Department Phone:**
  (701) 231-7202
- **Department Web Site:**
  www.ndsu.edu/ceduc/
- **Application Deadline:**
  February 1 for summer start
- **Degrees Offered:**
  M.Ed., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Counselor Educational program, accredited by the Council for Accreditation of Counseling and Related Programs (CACREP), within the School of Education prepares counselors to work professionally with persons from diverse cultural backgrounds and in a variety of settings. Program specializations are available in school counseling and in clinical mental health counseling at the master's degree level.

Review of application for master's degree programs is once each year beginning after the application deadline of February 1. Students who are accepted into the school counseling degree program are required to start classes the following summer; Students who are accepted into the clinical mental health degree program have the option to begin classes in the following summer or the following fall.

Qualified students may apply for admission to graduate programs in the School of Education leading to Master of Education (M.Ed.), or Master of Science (M.S.) degrees. In addition to the Graduate School's required application materials, the M.Ed. and the M.S. programs require an essay discussing professional philosophy and professional goals, as well as an entrance interview.

Admission is considered only after all required application materials have been received and reviewed. Where appropriate, all international student requirements must be met. If a program has a cohort group with enrollment limitations, an entrance interview will be required. The School of Education reserves the right to obtain additional information about the student's professional competence from qualified professionals. Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data.

A student must meet all requirements for full admission. A cumulative baccalaureate GPA of 3.0 or better on a 4.0 scale serves as a guideline for full acceptance. After being accepted for graduate study in the School of Education, the student should contact an adviser assigned to her/him for assistance in filing a plan of study for consideration by the School of Education.

Financial Assistance

Graduate assistantships are available in the School of Education. Applications are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. Students must be accepted into the Graduate School before they are eligible for an assistantship.

All enrollments in Education courses before the student files a graduate plan of study must be approved by the adviser. The School of Education will evaluate graduate courses taken prior to filing the graduate plan of study when the student's plan of study is being considered. Only those courses approved by the School of Education may be included on the final plan of study leading to the degree.

Master's programs within the School of Education require a minimum of 30 semester credits (minimums vary by academic program). The Master of Science (M.S.) degree requires a disquisition. The Master of Education (M.Ed.) degree is a non-disquisition, practitioner-oriented degree. Programs vary on requiring a written comprehensive exam or a portfolio/oral.

NOTE: Earning an academic/professional degree does not necessarily lead to state credential or licensure. People seeking licensure must provide evidence of the required number of years of teaching or counseling, and, in the case of school administration, administrative experience. Potential and current students should consult with the appropriate academic program coordinator for advice about licensure, certification, or credentialing after communicating with the appropriate state official.

Master of Education (M.Ed.)

Code	Title	Credits
Required Courses		
EDUC 703	Research, Measurement and Program Evaluation	3
CNED 710	Counseling Techniques	3
CNED 711	Counseling Theory	3
CNED 712	Human and Family Development 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 730	Crisis and Trauma in Counseling Practice	3
CNED 732	Family Counseling	3
CNED 734	Dynamics of Addiction	3
CNED 794	Practicum/Internship (Practicum)	3
CNED 794	Practicum/Internship (Internship)	4-6
Specialization Courses		

Clinical Mental Health Counseling		
CNED 723	Psychopathology and Diagnosis for Counselors	3
CNED 735	Clinical Mental Health Counseling	3
CNED 863	Advanced Clinical Assessment, Report Writing, & Treatment Planning	3
Electives		6
School Counseling		
Clinical Mental Health Counseling Total Credits		60
CNED 728	Guidance Administration and Consulting	3
CNED 729	Professional K-12 School Counseling	3
School Counseling Total Credits		48

Master of Science

School Counseling Specialization

Code	Title	Credits
I. Human Growth and Development		
CNED 712	Human and Family Development Across the Lifespan	3
CNED 734	Dynamics of Addiction	3
II. Social and Cultural Foundations		
CNED 716	Social and Cultural Foundtions of Counseling	3
III. Helping Relationships		
CNED 710	Counseling Techniques	3
CNED 711	Counseling Theory	3
CNED 732	Family Counseling	3
IV. Groups		
CNED 720	Group Counseling	3
V. Career & Lifestyle Development		
CNED 714	Career Counseling and Testing	3
VI. Appraisal		
CNED 713	Assessment Techniques	3
VII. Research & Program Evaluation		
EDUC 703	Research, Measurement and Program Evaluation	3
CNED 797	Master's Paper (OR)	3
CNED 798	Master's Thesis	6
VIII. Professional Orientation		
CNED 715	Professional Orientation and Ethics	3
CNED 728	Guidance Administration and Consulting	3
CNED 729	Professional K-12 School Counseling	3
IX. Practicum		
CNED 794	Practicum/Internship	3
X. Internship		
CNED 794	Practicum/Internship	4
XI. Electives (approved by adviser)		
Total Required Credits		48

Clinical Mental Health Counseling

Code	Title	Credits
I. Human Growth and Development		
CNED 712	Human and Family Development Across the Lifespan	3
CNED 734	Dynamics of Addiction	3
II. Social and Cultural Foundations		
CNED 716	Social and Cultural Foundtions of Counseling	3

III. Helping Relationships		
CNED 710	Counseling Techniques	3
CNED 711	Counseling Theory	3
CNED 732	Family Counseling	3
IV. Groups		
CNED 720	Group Counseling	3
V. Career & Lifestyle Development		
CNED 714	Career Counseling and Testing	3
VI. Appraisal		
CNED 713	Assessment Techniques	3
CNED 723	Psychopathology and Diagnosis for Counselors	3
CNED 863	Advanced Clinical Assessment, Report Writing, & Treatment Planning	3
VII. Research & Program Evaluation		
EDUC 703	Research, Measurement and Program Evaluation	3
CNED 797	Master's Paper (OR)	3
CNED 798	Master's Thesis	6
VIII. Professional Orientation		
CNED 715	Professional Orientation and Ethics	3
CNED 730	Crisis and Trauma in Counseling Practice	3
CNED 735	Clinical Mental Health Counseling	3
IX. Practicum		
CNED 794	Practicum/Internship	3
X. Internship		
CNED 794	Practicum/Internship	4
XI. Electives (approved by adviser)		
Total Required Credits		48

Carol E. Buchholz Holland, Ph.D.
Kansas State University, 2005
Research Interests: School Counseling; Career Education, Crisis Management Preparation, Trauma

Brenda Hall, Ed.D., NCC
Virginia Polytechnic Institute and State University, 1993
Research Interests: Relational Cultural Theory, Counselor Education Pedagogy, Intimate Partner Violence and Trauma

James Korcuska, Ph.D.
Kent State University, 2000
Research Interests: Counseling Research Methodology, Counselor Education, Men's and Gender Studies & Substance Abuse Counseling

Todd F. Lewis, Ph.D., LPC, NCC
Kent State University, 2002
Research interests: Risk Factors for Drinking during Emerging Adulthood, Theoretical Explanations for College Drinking and Substance Abuse, Substance Abuse Interventions, Motivational Interviewing, Process Addictions, and Quantitative Methods for Investigating These Issues.

Jill Nelson, Ph.D.
Kent State University, 2005
Research Interests: Community Counseling, Counselor Education Counselor Supervision, Brief and Solution-Focused Approaches

Jodi L. Tangen, Ph.D., NCC
University of North Carolina at Greensboro, 2015
Research Interests: Clinical Supervision, Counselor Education, Relational Depth, Spirituality

Counselor Education and Supervision

Department Information

- **Head, School of Education:**
  Chris Ray, Ph.D.
- **Graduate Coordinator:**

Jill Nelson, Ph.D.

- **Department Location:**
  SGC Building, 1919 N. University Drive
- **Department Phone:**
  (701) 231-7202
- **Department Web Site:**
  www.ndsu.edu/ceduc/doctorate_in_counselor_education_and_supervision/
- **Application Deadline:**
  October 1 for spring; May for fall
- **Degrees Offered:**
  Ph.D.

Program Description

The Counselor Education Program offers graduate study leading to the Master of Education (M.Ed.), Master of Science (M.S.), and Doctor of Philosophy (Ph.D.) degrees. The doctorate is in Counselor Education and Supervision.

The doctoral program (Ph.D.) in Counselor Education and Supervision upholds the highest national standards as demonstrated by accreditation from the Council for Accreditation of Counseling and Related educational Programs (CACREP). The program is accredited until October 30, 2020. Graduates of our program are trained to be leaders in recognizing and respecting the needs of individuals and groups and demonstrate an increased awareness of multicultural and diversity issues. The culture of the doctoral program is highly relational, and focuses on high expectations while providing individual attention and support from faculty so that students are able to develop a plan of study that best suits their individual needs and professional interests. There are a small number of students admitted each year so that faculty may build strong relationships with their advisees, as well as students in their classes. The counselor education faculty members mentor students in counseling, research, teaching, leadership and supervision.

The application deadline if February 1st each year for admission the following fall semester.

- Meet graduate school admissions requirements, including a Bachelor's Degree with a minimum grade average of 3.0;
- Possess a Master's degree in counseling or a related field. Graduates of CACREP accredited programs receive preference. If individuals do not have a master's degree, they may be considered, but must meet all CACREP requirements for a master's degree prior to taking core courses in counseling;
- Demonstrate an interest in counseling, teaching, research, leadership and professional service;
- Express counselor education and supervision career goals;
- Arrange for in-depth interview with the Counselor Education faculty at a date and time specified by the faculty;
- Complete all international student requirements, where appropriate;
- Discuss, as appropriate, relevant personal and professional history, research interests, and goals within the interview process;
- Sign a disclosure statement regarding activities, which may be deemed inappropriate by professional and/or ethical standards.

Financial Assistance

Limited graduate assistantships are available in the School of Education and on campus. We do not guarantee students an assistantship, but will alert students when we are aware of opportunities and support them in securing an appropriate assistantship. Students must be accepted into the Graduate School before they are eligible for an assistantship.

The doctoral degree in counselor education and supervision requires a minimum of 71 semester credits beyond the master's degree. Students must successfully complete required courses, electives, a 600 hour doctoral internship, comprehensive exams and a disquisition.

Code	Title	Credits
Required Courses		
EDUC 703	Research, Measurement and Program Evaluation	3
CNED 863	Advanced Clinical Assessment, Report Writing, & Treatment Planning	3
CNED 867	Advanced Group Counseling	3
CNED 869	Instructional Theory and Practice in Counselor Education and Supervision	3
CNED 870	Counselor Supervision	3
CNED 871	Advanced Multicultural Practice in Counselor Education and Supervision	3
CNED 872	Advanced Counseling Theories	3
CNED 876	Qualitative Research and Program Evaluation	3
CNED 879	Quantitative and Survey Research	3

CNED 887	Professional Issues: Professional Development, Consultation and Publishing	3
CNED 880	Ethical and Legal Issues in Counselor Education and Supervision	3
CNED 890	Graduate Seminar	1-5
CNED 894	Practicum/Internship	1-8
CNED 899	Doctoral Dissertation	1-15
Statistics		
STAT 725	Applied Statistics	3
Additional Statistics Course		3

Additional Electives are also required, a minimum of 71 credits is required to graduate.

Carol E. Buchholz Holland, Ph.D.
Kansas State University, 2005
Research Interests: School Counseling; Career Education, Crisis Management Preparation, Trauma

Brenda Hall, Ed.D.
Virginia Polytechnic Institute and State University, 1993
Research Interests: Intimate Partner Violence, Relational Cultural Theory, and Collaborative Group Practices Studies

James Korcuska, Ph.D.
Kent State University, 2000
Research Interests: Counseling Research Methodology, Counselor Education, Men's and Gender Studies & Substance Abuse Counseling

Todd F. Lewis, Ph.D., LPC, NCC
Kent State University, 2002
Research interests: Risk Factors for Drinking during Emerging Adulthood, Theoretical Explanations for College Drinking and Substance Abuse, Substance Abuse Interventions, Motivational Interviewing, Process Addictions, and Quantitative Methods for Investigating These Issues.

Jill Nelson, Ph.D.
Kent State University, 2005
Research Interests: Shame and shame resilience, mentoring, and women's issues in higher education.

Jodi L. Tangen, Ph.D.
The University of North Carolina at Greensboro, 2015
Research Interests: Clinical Supervision, Counselor Education, Relational Depth, Spirituality

Criminal Justice

Department Information

- **Department Head:**
  Jeffrey Bumgarner, Ph.D.
- **Graduate Coordinator:**
  Steve Briggs, Ph.D.
- **Department Location:**
  104 Putnam Hall
- **Department Phone:**
  (701) 231-8567
- **Department Web Site:**
  www.ndsu.edu/cjps/criminal_justice/graduate_program/
- **Application Deadline:**
  April 1 for Ph.D. applicants, Master's applications accepted for fall and spring enrollments on a rolling basis.
- **Degrees Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL ibT 100, IELTS 7; to qualify for assistantship TOEFL ibT 114, IELTS 8

Program Description

The Department of Criminal Justice offers graduate study leading to both a MS and a Ph.D. degree in Criminal Justice. The MS degree has two tracks; Applied Criminal Justice and Criminology. The program in Criminal Justice is designed to enhance student's skills in understanding, gathering, processing, and analyzing research in the areas of criminology and criminal justice. The topical curriculum is geared to understanding, critiquing, and analyzing the criminal justice system with an orientation toward urban issues as they impact crime and criminal justice. The curriculum consists of foundation courses in theory, policy, and research methods, plus three substantive areas: 1) criminology, 2) policing, and 3) corrections. Students have their choice of specializing in one of the three. Students also will be afforded course work in learning how to teach a college course.

Graduates will find an expanding and terrific academic job market available as well as professional employment in the criminal justice policy and research sector. There are currently fewer than 40 Criminal Justice Ph.D. programs operating on a national level, so students graduating with a Criminal Justice Ph.D. will be competitive for the 350 positions available annually in academic units.

Ph.D. in Criminal Justice

Students should enter the program with an approved master's degree. Students will be required to have had one course in research methods and one course in statistics. Plus, students should have adequate background preparation or demonstrated potential in the field of Criminology or Criminal Justice.

Students will be required to take the Graduate Record Examination (GRE) and submit their undergraduate and graduate transcripts. For admission to full standing, students are required to attain a combined minimum score on the GRE of 1,000 (verbal and quantitative) (old scoring) or 300 (new scoring) and achieve a minimum grade point average of 3.0 over their last 60 credit hours. Students not meeting these standards will be evaluated and possibly admitted on conditional status.

A student entering the program with a master's degree would take a minimum of 60 credit hours. Students entering the program with a master's degree should submit their research thesis to the graduate committee for review. This committee would be charged with determining whether the research project is sufficient in scope and depth to warrant further supervised research.

MS Degree in Criminal Justice

Students will need to enter the program with a baccalaureate degree. Students will be required to have had one course in research methods, one course in statistics, and should document adequate background preparation or demonstrated potential in the field of Criminology or Criminal Justice. For admission to full-standing, students are required to achieve a minimum grade point average of 3.0 over their last 60 credit hours. Students will be required to take the Graduate Record Examination (GRE) and submit all scores to the Graduate School.

Ph.D. in Criminal Justice

Students admitted to the doctoral program who have earned a master's degree in criminal justice/criminology will be given credit for their master's degree (up to 30 credits) and must take a minimum of 60 credits at NDSU. The amount of credit for the master's degree will be determined by the graduate coordinator.

Students entering with a master's degree that is not related to criminal justice/criminology must have a total must complete 90 credits post-baccalaureate.

Code	Title	Credits
Required Courses		
Theory/Policy		9
CJ 703	Advanced Criminology	
CJ 709	Criminal Justice Policy	
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences	
Research Skills (at least 9 of these credits must be completed at NDSU)		15
CJ 702	Program Evaluation	
CJ 734	Advanced Criminal Justice Methods	
CJ 759	Advanced Research Design in Criminal Justice	
STAT 725	Applied Statistics	
STAT 726	Applied Regression and Analysis of Variance	
Substantive Areas (Students must complete four courses in a substantive area of choice. Additionally, students must complete one course in each of their non-substantive areas.		18
Criminology		
CJ 721	Individual Theories of Crime	
CJ 722	Structural Theories of Crime	

CJ 750	Violence	
CJ 752	Crime and the Life Course	
Corrections		
CJ 707	Juvenile Corrections	
CJ 733	Issues in Institutional Corrections	
CJ 762	Community Corrections	
CJ 763	Correctional Rehabilitation	
CJ 764	Punishment and Society	
Policing		
CJ 754	Police and Society	
CJ 755	Administrative Policing	
CJ 760	Police and Race Issues	
CJ 761	Police Effectiveness	
CJ 765	Classics in Policing	
****Electives/Independent Study (Students should consult with their advisor as to other potentially appropriate electives. Below are example courses.)**		15
CJ 768	Gender and Justice	
CJ 793	Individual Study	
PSYC 640	Experimental Methods	
PSYC 670	Experimental Social Psychology	
SOC 700	Qualitative Methods	
STAT 660	Applied Survey Sampling	
STAT 665	Meta-Analysis Methods	
CJ 899	Doctoral Dissertation	12
Total Credits		60-90

** 36 credits for for students entering the program with a master's degree that is not related to criminal justice/criminology

MS Degree in Criminal Justice

Students will need to declare their choice of a Track by the end of their first semester in the program.

Code	Title	Credits
Foundation Courses (Required for both tracks.)		18
CJ 702	Program Evaluation	
CJ 703	Advanced Criminology	
CJ 709	Criminal Justice Policy	
CJ 734	Advanced Criminal Justice Methods	
CJ 759	Advanced Research Design in Criminal Justice	
STAT 725	Applied Statistics	
Applied Track (in addition to the foundation courses students must complete one course from these areas.		6
Corrections		
CJ 707	Juvenile Corrections	
CJ 733	Issues in Institutional Corrections	
CJ 762	Community Corrections	
CJ 763	Correctional Rehabilitation	
CJ 764	Punishment and Society	
Policing		
CJ 754	Police and Society	
CJ 755	Administrative Policing	
CJ 760	Police and Race Issues	
CJ 761	Police Effectiveness	
CJ 765	Classics in Policing	

Criminology Track (in addition to the foundation courses students must complete one course from the Theory area and Elective area		6
Theory		
CJ 721	Individual Theories of Crime	
CJ 722	Structural Theories of Crime	
Electives		
CJ 606	Crime and Delinquency	
CJ 607	Deviant Behavior	
CJ 752	Crime and the Life Course	
CJ 768	Gender and Justice	
CJ 750	Violence	
Thesis or Policy Paper/Indep. Studies		6
CJ 798	Master's Thesis (or CJ 797 or CJ 793)	
Total Credits		30

Carol Archbold, Ph.D.
University of Nebraska-Omaha, 2002
Research Interests: Policing, Race and Gender in the Criminal Justice System, Qualitative Research Methods

Sarah Boonstoppel, Ph.D.
University of Maryland, College Park, 2014
Research Interests: Crime and the Life Course, Criminological Theory, Qualitative and Mixed Research Methods

Steven J. Briggs, Ph.D.
University of Nebraska-Omaha, 2007
Research Interests: Police Effectiveness, Police Discretion, Social Ecology of Crime

Jeffrey Bumgarner, Ph.D.
University of Minnesota, 2000
Research Interests: Policing, Federal Law Enforcement, Federal Crime Policy, and Criminal Justice Administration

Andrew Myer, Ph.D.
University of Cincinnati, 2010
Research Interests: Effective Correctional Interventions, Evidence Based Program Evaluation, Actuarial Offender Risk Assessment Practices, and Macro-Social Research Methods

Amy J. Stichman, Ph.D.
University of Cincinnati, 2003
Research Interests: Corrections, Institutional Life, Inmate and Correctional Officer Attitudes, Treatment Program Evaluation, Gender Issues

Kevin M. Thompson, Ph.D.
University of Arizona, 1986
Research Interests: Delinquency, Quantitative Methods, Alcohol and Drugs, Juvenile Drug Courts

Cybersecurity Certificate

The Graduate Certificate Program in Cyber Security delivered cooperatively among North Dakota State University (NDSU), the University of North Dakota (UND), and Minot State University (MSU).

In addition to the Graduate School admission requirements, applicants must submit:

Code	Title	Credits
Core Courses		9
EE 590 Emerging Threats and Defenses (University of North Dakota)		
CSCI 773	Foundations of the Digital Enterprise	
CSCI 558 Applied Cryptography (Minot State University)		
Elective		3
CSCI 774	Topics of theDigital Enterprise	
CSCI 783	Topics In Software Systems	
CSCI 796	Special Topics (special topics project course in cyber security with a faculty mentor (available at NDSU, UND, and MiSU))	

EE 590 Information Security and Security Practices (University of North Dakota)	
Total Credits	12

Developmental Science

Department Information

- **Department Head:**
  Joel Hektner, Ph.D.
- **Graduate Coordinator:**
  Elizabeth Blodgett Salafia, Ph.D.
- **Email:**
  elizabeth.salafia@ndsu.edu
- **Department Location:**
  Evelyn Morrow Lebedeff Hall
- **Department Phone:**
  (701) 231-8268
- **Department Web Site:**
  www.ndsu.edu/hdfs/graduate_studies/ds/
- **Application Deadline:**
  February 1
- **Degrees Offered:**
  Ph.D.
- **Test Requirement:**
  GRE - General
- **English Proficiency Requirements:**
  TOEFL ibT 100 (subscores of at least 24 for speaking and 21 for writing); IELTS 7

Program Description

Developmental Science is an emerging approach to the study of human development that combines elements of more traditional approaches from the fields of Developmental Psychology and Human Development. Developmental Science entails the study of human development across the lifespan, integrating the biological, cognitive, and socioemotional underpinnings of development, and incorporating the familial, social, institutional and cultural contexts in which development occurs.

- Cumulative GPA of 3.0 or higher
- GRE
- Statement of purpose should be 500 words or less and address the following:
  - How your interest in this field developed
  - Why you chose our program at NDSU
  - The experiences you have had (e.g. informal, academic, employment, volunteer) that you see as related to this graduate program or your professional goals
  - What your research interests are and how they might fit with the current research emphases in the department. If you have questions about this, the HDFS faculty research interests are described on the HDFS website (http://www.ndsu.edu/hdfs).
  - What your professional goals are and how this graduate program will help you accomplish your professional goals
- Curriculum vitae or resume
- Thesis or writing sample
- For non-native English speakers, TOEFL ibT score of at least 100 or IELTS score of at least 7
- Subscores on the TOEFL ibT are at least 24 for speaking and 21 for writing

For those entering with a Master's degree:

- Master's degree from accredited educational institution in child development, developmental psychology, human development, developmental science, or related area
- At least one course in statistics and one course in research methods, with a grade of B or higher
- Completion of an empirical Master's thesis

For those entering with a Bachelor's degree:

- Bachelor's degree from accredited educational institution in child development, developmental psychology, human development, developmental science, or related area

Financial Assistance

All admitted students are awarded graduate assistantships, which provide a full tuition waiver plus a stipend.

Curriculum for students entering with a Bachelor's degree (90 credits total)

- Students earn a Master's degree after completing 30 credits, master's oral examination and the master's thesis.
- All courses 3 credits unless otherwise noted.

Code	Title	Credits
Development Core		12
HDFS 811	Developmental Concepts and Theories	
HDFS 813	Social and Emotional Development Across the Lifespan	
HDFS 815	Physical and Cognitive Development Across the Lifespan	
HDFS 817	Prevention Science	
Teaching Core		6
HDFS 802	Teaching Developmental Science	
HDFS 892	Graduate Teaching Experience	
Methodology and Statistics Core		12
HDFS 705	Quantitative Methods in Developmental Science (4 credits)	
HDFS 854	Advanced Quantitative Methods in Developmental Science	
HDFS 856	Longitudinal Research Methods and Analysis	
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 15 required))	
HDFS 894	Practicum/Internship (focus on teaching or non-academic role)	
Non-Didactic Courses		8
HDFS 801	Graduate Orientation Seminar (1 credit)	
HDFS 805	Professional Development in Developmental Science (1 credit)	
HDFS 890	Graduate Seminar (Qualifying Exam/Career, 6 credits total)	
2 credits during spring before doing qualifying exam; 2 credits in summer during qualifying exam; 2 credits during final year to focus on career development		
Independent Research		39
HDFS 893	Individual Study/Tutorial (18 credits)	
HDFS 798	Master's Thesis (6 credits)	
HDFS 899	Doctoral Dissertation (15 credits)	

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 Developmental Science	
HDFS 892	Graduate Teaching Experience	
Methodology and Statistics Core		12
HDFS 854	Advanced Quantitative Methods in Developmental Science	
HDFS 856	Longitudinal Research Methods and Analysis	
Didactic Electives		3
could include HDFS 824, HDFS 825, HDFS 893, HDFS 894, or 700- or 800-level course in HDFS or other department.		
Non-Didactic Courses		8
HDFS 801	Graduate Orientation Seminar (1 credit)	
HDFS 805	Professional Development in Developmental Science (1 credit)	
HDFS 890	Graduate Seminar (Qualifying Exam/Career, 6 credits total)	
2 credits during spring before doing qualifying exam; 2 credits in summer during qualifying exam; 2 credits during final year to focus on career development		
Independent Research		39
HDFS 893	Individual Study/Tutorial (10 credits)	
HDFS 899	Doctoral Dissertation (15 credits)	

Other Requirements

- Teach one undergraduate course, with supervision (as part of assistantship or for course credit in HDFS 894Practicum/Internship). Must have first taken HDFS 802 Teaching Developmental Science.
- Submit at least four proposal/abstracts for presentations or posters at national conferences, including as a co-presenter (2 submissions if enter with MS)
- Present (in person) at least twice at national conferences (once if enter with MS), unless a waiver is granted by the student's committee.
- Submit at least two peer-reviewed articles for publication (including as co-author). Note: Although these presentation and publication requirements do not carry course credit per se, they are projects that would be worked on as part of HDFS 893 Individual Study/Tutorial, and/or HDFS 899 Doctoral Dissertation.
- Qualifying examination
- Dissertation

Core Faculty

Sean Brotherson, Ph.D.
Oregon State University, 2000
Research Interests: Parenting and Fatherhood; Healthy Marriages; Family Stress; Rural Families; Grief and Bereavement; Family Life Education; Family Policy

James E. Deal, Ph.D.
University of Georgia, 1987
Research Interests: Personality Development in Children; Relationship Between Individual Development and Family Relationships

Heather Fuller, Ph.D.
University of Michigan, 2009
Research Interests: Social Relationships Across the Lifespan (E.G. Intergenerational Relationships); Psychological Well-Being in Old Age; Culture and Aging; Migration, Transnationalism and Acculturation; Biculturalism

Joel Hektner, Ph.D.
University of Chicago, 1996
Research Interests: Aggressive Children; Research Methods; Prevention Programs For High-Risk Aggressive Children; Peer Affiliation Patterns and Peer Influences on Children's Behaviors; Family and School Conditions That Facilitate Optimal Experiences (Flow) and Optimal Development; The Experience Sampling Method

Melissa Lunsman O'Connor, Ph.D.
University of South Florida, 2010
Research Interests: Cognitive and Functional Aging in Healthy and Clinical Populations; Older Drivers; Research Methods; Attitudes toward Dementia

Brandy A. Randall, Ph.D.

University of Nebraska-Lincoln, 2002
Research Interests: Relational and Contextual Influences on Adolescents' and Young Adults' Positive and Problem Behaviors

Elizabeth Blodgett Salafia, Ph.D.
University of Notre Dame, 2008
Research Interests: Family and Peer Influences on Adolescents' Disordered Eating Attitudes and Behaviors

Gregory F. Sanders, Ph.D.
University of Georgia, 1983
Research Interests: Later Life Families; Family Strengths

Rebecca Woods, Ph.D.
Texas A&M University, 2006
Research Interests: Perception and Cognition In Infancy; Object Processing; Multimodal Processing; Early Gender Differences

Affiliated Faculty within HDFS

Carrie Johnson, Ph.D.
Iowa State University, 2012
Research Interests: Personal Finance for Low-Income and Under-served Populations; Financial Education Impact; Student Loan Debt; Program Delivery Methods and Evaluation; Behavioral Finance across the Lifespan

Christie McGeorge, Ph.D.
University of Minnesota, 2005
Research Interests: Heterosexism and Homophobia; Single Parenting; Women's History; Gender Socialization From a Feminist Perspective

Meagan Scott, Ph.D.
Oklahoma State University, 2016
Research Interests: Understanding How Changing Trends in Society Influence Youth; Afterschool Training; Positive Youth Development; Professional Development Methods to Better Meet the Needs of 4-H Staff

Thomas Stone Carlson, Ph.D.
Iowa State University, 2000
Research Interests: Narrative Pedagogy; Relational Accountability Approach to Couples Therapy, LGBT Affirmative Therapy Competence Among Therapists, and Influence of Spirituality on Clinical Practice and Training

Affiliated Faculty outside of HDFS

Ben Balas, Ph.D.,
Psychology

Ardith Brunt, Ph.D.,
Health, Nutrition and Exercise Science

Erin Conwell, Ph.D.,
Psychology

Donna Grandbois, Ph.D.,
Nursing

Linda Langley, Ph.D.,
Psychology

Susan Ray-Degges, Ph.D.,
Apparel, Design and Hospitality Management

Molly Secor-Turner, Ph.D.,
Nursing

Kevin Thompson, Ph.D.,
Criminal Justice and Political Science

Kim Vonnahme, Ph.D.,
Animal Sciences

Rachelle Vettern, Ph.D.,

Center for 4-H Youth Development

Dietetics

Department Information

- **Graduate Coordinator:**
  Ardith Brunt, Ph.D.
- **Interim Department Chair:**
  Yeong Rhee, Ph.D.
- **Department Location:**
  Bentson Bunker Fieldhouse Room 1
- **Department Phone:**
  (701) 231-7474
- **Department Web Site:**
  https://www.ndsu.edu/hnes/
- **Degrees Offered:**
  M.S.

Students will be required to complete thirty-six credit hours and the following requirements:

- All core courses (9 credits)
- An additional 21 credits selected from the list of electives
- A thesis (6 credits) or 3 credits of additional electives + a comprehensive paper (plan B) or 6 credits of additional electives (Plan C).
- The student's schedule of courses must be approved by his/her faculty adviser and graduate committee and the Graduate School.

Code	Title	Credits
Core Courses		9
HNES 710	Introduction to Research Design and Methods in HNES	
HNES 728	Current Issues in Dietetics	
STAT 725	Applied Statistics	
Electives		21
ADHM 635	Cost Controls in Hospitality and Food Service Systems	
ADHM 736	Entrepreneurship in Dietetics	
HNES 642	Community Health and Nutrition Education	
HNES 652	Nutrition, Health and Aging	
HNES 655	Sports Nutrition	
HNES 658	Advanced Medical Nutrition Therapy	
HNES 719	Public Health Nutrition	
HNES 724	Nutrition Education	
HNES 726	Nutrition in Wellness	
HNES 729	Grant Writing for the Health Professional	
HNES 730	Fundamentals of Leadership	
HNES 732	Foodservice Operation Management	
HNES 733	Food Writing for Professionals	
HNES 734	Foodservice Systems within Healthcare	
HNES 740	Maternal and Child Nutrition	
HNES 741	International Nutrition	
HNES 742	Nutrition: A Focus on Life Stages	
HNES 743	Obesity Across the Lifespan	
HNES 744	Dietary and Herbal Supplements	
HNES 746	Nutrition and Health Disparities	
HNES 747	Understanding Food Culture	
HNES 750	Advanced Human Nutrition: Macronutrients	
HNES 751	Metabolism of Micronutrients	
HNES 752	Phytochemicals	

HNES 753	Nutrigenomics and Advanced Lipid Metabolism in Human Nutrition	
HNES 756	Pediatric Clinical Nutrition	
HNES 757	Nutritional Aspects of Oncology	
HNES 758	Clinical Aspects of Nutrition Support	
HNES 759	Nutrition and Immunology	
Research		6
HNES 798	Master's Thesis	

Ardith Brunt, Ph.D.
Iowa State University, 1999
Research Interests: Nutrition, Gerontology

Yeong Rhee, Ph.D.
Oklahoma State University, 1999
Research Interests: Chronic Disease Prevention, Immune Function, Functional Foods, Microbiome

Education - Doctoral

Department Information

- **School of Education Head:**
  Chris Ray, Ph.D.
- **Doctoral Graduate Coordinator:**
  Nate Wood, Ph.D.
- **Department Location:**
  School of Education, FLC 210
- **Department Phone:**
  (701) 231-7921
- **Department Web Site:**
  www.ndsu.edu/edp
- **Application Deadline:**
  February 1
- **Degrees Offered:**
  Ph.D., Ed.D.
- **English Proficiency Requirements:**
  TOEFL iBT 88, IELTS 6.5, PTE Academic 59

Program Description

The Education Doctoral Programs prepare scholars who will advance education research and practice and maintain the integrity and vitality of the profession. Our graduates will be stewards of the discipline, individuals entrusted with preserving, creating, and applying knowledge in education and with communicating educational knowledge to others. North Dakota State University offers both the Ed.D. and Ph.D. degrees in Education, with an emphasis in either **Institutional Analysis** or **Occupational and Adult Education**.

The ***Institutional Analysis*** curriculum was designed to provide the knowledge, skills and experiences necessary for understanding institutional performance both inside and outside of formal education settings. This option area focuses on the role of assessment, evaluation, and other research and analysis techniques in supporting institutional planning, policy formation, and decision-making.

The ***Occupational and Adult Education*** curriculum was designed to provide the knowledge, skills and experiences necessary for understanding the nature, function, and scope of adult learning both inside and outside of formal educational settings. This option area focuses on preparing individuals to engage in lifelong learning, working with adults of all ages and in all settings.

Qualified students may apply for admission through the Graduate School online application. In addition to the standard Graduate School application materials, applicants must submit an essay stating how their career goals align with the mission and goals of the Education Doctoral Programs as described on the program website. Admission is only considered after all required application materials are received by the Graduate School and reviewed by the program's faculty. An interview may be required. Admission is a selective process and decisions are based on the congruency of the applicant's professional goals with the program goals, predicted success of the applicant as a student and professional in the chosen field, and are made only after considering all available data. A student must meet all requirements for unconditional admission. Application deadline is February 1.

Financial Assistance

Graduate assistantships may be available in the School of Education. Applications are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. Students must be accepted into the Graduate School before they are eligible for an assistantship.

All registrations in Education Doctoral courses must be approved by the student's adviser. Only those courses approved by the student's supervisory committee may be included on the final plan of study leading to the degree.

The Education Doctoral Programs require a minimum of 90 semester hours beyond the bachelor's degree (a minimum of 60 semester hours beyond the master's degree). The advisory committee has authority to approve up to a maximum of 30 credit hours from a Masters degree or equivalent. An additional ten (10) hours may be allowable if candidate has multiple graduate degrees or coursework after the first graduate degree. The determination will be based upon review of the candidate's official transcript(s). The candidate's major adviser and committee are responsible for approving the program of study and for certifying that the candidate has met the academic requirements for the doctoral degree. The doctoral degree is awarded for expertise and excellence in the candidate's chosen field of study as recognized and approved by the adviser and committee, not just for an accumulation of credits.

Code	Title	Credits
Core Courses		
EDUC 801	Foundations of Doctoral Scholarship	3
EDUC 802	Foundations of Educational Research	3
EDUC 803	Philosophical Foundations of Education	3
EDUC 890	Graduate Seminar (Capstone Seminar)	3
EDUC 890	Graduate Seminar (1 credit per semester)	1
Select One:		3
EDUC 806	International and Comparative Education	
EDUC 807	Diversity and Educational Policy	
EDUC 808	Empowerment & Transformative Education	
Discipline Inquiry Core (Note: Required and Optional courses vary by degree and option area)		
EDUC 871	Planning and Conducting Needs Assessment	3
EDUC 872	Qualitative Research Methods	3
EDUC 873	Case-Based Educational Research and Statistics	3
EDUC 881	Computer Data Management and Decision Making	2
EDUC 882	Institutional Analysis Techniques	3
EDUC 883	Survey Research	3
EDUC 884	Program Evaluation Research	3
EDUC 885	Structural Equation Modeling Fundamentals	3
EDUC 886	Advanced Qualitative Research	3
HDFS 856	Longitudinal Research Methods and Analysis	3
Option Core Courses		9
Institutional Analysis		
EDUC 831	Institutional Quality Control	
EDUC 832	Assessment Techniques for Educational Institutions	
EDUC 833	Strategic Planning for Institutional Improvement	
Occupational and Adult Education		
EDUC 851	Adult Learning	
EDUC 852	Foundations of Occupational & Adult Education	
EDUC 853	Instructional Methods for Adult Learners	
Professional Emphasis Area		9-12
EDUC 899	Doctoral Dissertation	12
Total Credits		60-90

Myron Eighmy, Ed.D.
University of Minnesota, 1995
Research Interests: Higher Education Policy, Training and Human Resources Development, State and Federal Policy for Workforce Education and Training

Brent D. Hill, Ph.D.

Oklahoma State University, 2011
Research interests: Monte Carlo Simulations; Educational and Psychological Measurement; Learning Theory; Structural Equation Modeling; Q Methodology; Time Series Analysis

Claudette Peterson, Ed.D.
Oklahoma State University, 2006
Research Interests: Adult Learning; Non-formal Learning; Learning Strategies; Instrumented Learning

Christopher Ray, Ph.D.
Oklahoma State University, 2007
Research Interests: Institutional Effectiveness; Learning Outcomes Assessment; Instrument Development; Moral Development and Education; College Student Development

Nathan Wood, Ph.D.
University of Minnesota, 2006
Research Interests: Sociocultural Issues in Education; Identity Development; Preparation of Educational Researchers

Educational Leadership

Department Information

- **Program Coordinator:**
  Thomas Hall, Ph.D.
- **Department Location:**
  School of Education, FLC 210
- **Department Phone:**
  (701) 231-7202
- **Department Email:**
  c.nelson@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/education/educational_leadership/
- **Application Deadline:**
  Domestic application materials are due two months prior to the start of classes. International application materials must be received before May 1 for the fall semester and before August 1 for spring and summer semesters.
- **Degrees Offered:**
  Ed.S., M.S., M.Ed.
- **English Proficiency Requirements:**
  TOEFL iBT 88, IELTS 6.5

Program Description

The principal purpose of the Educational Leadership program is to provide professional/academic education for individuals preparing for leadership roles in Pk-12 and higher education settings. These roles include teacher leadership, mid-level administrative positions (elementary school principal, secondary school principal or higher education administrator), and upper-level administrative positions such as superintendent of schools. Degrees offered include a 30-credit Master of Education (M.Ed.) in Educational Leadership-Teacher Leadership, a 36-credit Master of Education (M.Ed.) or Master of Science (M.S.) in Educational Leadership, and an Education Specialist (Ed.S.) degree. Programs meet certification requirements in the various areas appropriate to the North Dakota requirements for K-12 administration positions.

The program is accredited by the Council for the Accreditation of Educator Preparation and approved by the North Dakota Education Standards and Practices Board. Changes in national and state legislation, standards, or rules can affect academic program requirements.

Required application materials for the

Education Specialist (Ed.S.) degree in Educational Leadership

- Official transcripts of all previous collegiate work, including one verifying graduation with a master's degree from an accredited institution;
- A cumulative GPA of 3.25 or higher in all graduate-level courses;
- Resume including credentials, licenses and certificates;
- Two references that evaluate the applicant's potential for success as a graduate student and as an educational leader; and
- A leadership essay.

Master of Education (M.Ed.) or the Master of Science (M.S.)

- Official transcripts of all previous collegiate work, including one verifying graduation with a bachelor's degree from an accredited institution;
- A cumulative baccalaureate GPA of 3.0 on a 4.0 scale;
- Resume including credentials, licenses and certificates;
- Two references that evaluate the applicant's potential for success as a graduate student in the chosen master's degree program and as an educational leader; and
- A leadership essay.

Admission is considered only after all required application materials have been received and reviewed. Where appropriate, all international student requirements must be met.

Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data. A student must meet all requirements for full admission.

After being accepted for graduate study in the School of Education, the student should contact an adviser assigned to her/him for assistance in filing a plan of study for consideration by the program.

The Master of Science (M.S.) and the Education Specialist (Ed.S.) degrees require a disquisition. The Master of Education (M.Ed.) degree is a non-disquisition, practitioner-oriented degree. Programs vary in their requirements for a written comprehensive exam or a portfolio/oral.

Thomas Hall, Ed.D.
University of South Dakota, 2005
Research Interests: Teacher Leadership, School Community Relations, Professional Development, Adult Learning & Education

Denise K. Lajimodiere, Ed.D.
University of North Dakota, 2006
Research Interests/Area of Expertise: Native American Female Leadership; Horizontal Violence/Relational Aggression; Native American Boarding Schools

Ann Trousdale Clapper, Ed.D.
Drake University, 1991
Research Interests/Areas of Expertise: Teacher Leadership, Educational Change, Implementation Science, & Student Assessment

Dennis Van Berkum, Ed.D.
University of South Dakota, 1990
Research Interests: School Law, Organizational Behavior, Leadership, the Principalship

Electrical and Computer Engineering

Department Information

- **Department Chair:**
  Benjamin Braaten, Ph.D.
- **Graduate Coordinator:**
  Rajesh Kavasseri, Ph.D.
- **Department Location:**
  101 Electrical Engineering Building
- **Department Phone:**
  (701) 231-7019
- **Department Web Site:**
  www.ndsu.edu/ece/
- **Application Deadline:**
  February 28 for fall and October 15 for spring (openings may be very limited for spring)
- **Degrees Offered:**
  Ph.D., M.S., M.Engr.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL ibT 71, IELTS 6; To qualify for teaching assistantship TOEFL ibT 100, IELTS 7

Program Description

The Department of Electrical and Computer Engineering offers graduate programs in selected specialty areas leading to the M.Engr., M.S. and Ph.D. in Electrical and Computer Engineering. Current departmental research expertise falls into one of the following areas: Biomedical Engineering, Communications/Signal Processing, Computer Architecture, Cyber Physical and Embedded Systems, Electromagnetics/Optics, Power/Power Electronics, and VLSI. The ECE Department is also a key contributor to NDSU's Research and Technology Park.

Research Facilities and Equipment

The department is housed in a modern, well-equipped building. Graduate students have access to laboratories, instrument rooms, and computer services ranging from the university computer system to departmental computers. Research facilities include cardiovascular engineering lab, computer architecture lab, digital systems lab, EMI shield room, power and power electronics lab, signal processing and systems lab, and printed circuit lab.

Admission Requirements

The preferred avenue is to contact and work with an NDSU ECE Professor before coming to NDSU, such that the professor recommends you for admittance into the program. Each professor will have different expectations for the amount and type of work he/she will require you to do in order for him/her to recommend you for admittance into the NDSU ECE graduate program. Please look at each faculty's website (https://www.ndsu.edu/ece/people/faculty)and contact a faculty member working in a research area in which you are interested in pursuing your graduate studies. A secondary avenue is to have a GRE score of at least 145 Verbal and 155 Quantitative and a minimum GPA of 3.0 on your latest Electrical Engineering or Computer Engineering degree, either B.S. or M.S. The GRE subject area test is not required. To be admitted as an ECE M.E. student, you must have a GRE score of at least 145 Verbal and 155 Quantitative and a minimum GPA of 3.0 on your Electrical Engineering or Computer Engineering B.S. degree.

The 3.0 minimum GPA admission requirement may be waived for M.E. students with substantial ECE industry experience. The GRE subject area test is not required.

Financial Assistance

The department has a limited number of both teaching and research assistantships available. These assistantships provide a monthly salary during the academic year, a waiver of graduate tuition during the academic year and summer, but do not cover the minimal activity fee. In addition, there are opportunities, both in the department and on the campus, to perform part-time work as graders, teachers, tutors, and consultants. These assistantships are awarded on a competitive basis -- typically at the time of admission for fall semester.

Master of Engineering and Master of Science

The Master of Engineering and the Master of Science degrees require a minimum of 30 semester credits beyond the B.S. degree. The Master of Engineering is a course-work only program requiring a capstone consisting of a portfolio or written exam. For the Master of Science, 6 hours of the 30 must be assigned to the thesis. All students must pass a final oral examination covering both course work, and the thesis.

Ph.D. Program

The Doctor of Philosophy degree requires a minimum of 90 credits beyond the baccalaureate with an overall GPA of 3.0 or higher. Of these 90 credits, a minimum of 36 credits of graduate-level coursework and a minimum of 30 credits of dissertation are required, including ECE 702: Advanced Research Topics, 1 credit.

Academic Good Standing

All graduate students must maintain a 3.00 GPA or better and make significant progress towards their degree to remain in good standing. Failing to do either may hinder the student's financial assistance and/or ability to register for courses in the ECE graduate program.

Benjamin Braaten, Ph.D.
North Dakota State University, 2009
Research Interests: Applied Electromagnetics, Electromagnetic Compatibility and Signal Integrity

Dong Cao, Ph.D.
Michigan State University, 2012
Research Interests: Power Electronics and High Power Electrical Motor Drives, Renewable Energy Systems Grid-Integration and Standalone Operation, Power Management For Smart Grid, Transportation Electrification/Hybrid Electric Vehicle, Microgrid/Distributed Generation Source, Wide-Band Gap Device

Nilanjan Ray Chaudhuri, Ph.D.
Imperial College, 2011
Research Interests: Power System Dynamics and Control, Wide-Area Monitoring Systems, Application Of Power Electronics In Power Systems, Online System Identification, FACTS, HVDC, Renewable Energy Systems, Distributed Energy, Demand Side Response

Debasis Dawn, Ph.D.
Tohoku University, 1993
Research Interests: Microelectronics/Microsystems, Radio Frequency Integrated Circuits (RFIC) Silicob (CMOS/SiGe), Ics for radar, sensors

Daniel L. Ewert, Ph.D.
University of North Dakota, 1989
Research Interests: Biomedical Engineering

Jacob Glower, Ph.D.
The Ohio State University, 1988
Research Interests: Control Systems, Digital Systems

Na Gong, Ph.D.
University of Buffalo, SUNY, 2013
Research Interests: VLSI, Computer Architecture, and EDA

Roger Green, Ph.D.
University of Wyoming, 1998
Research Interests: Signal Processing, Array Processing, Time-frequency Analysis

Sanjay Karmakar, Ph.D.
University of Colorado, Boulder 2012
Research Interests: Wireless Communications, Information Theory, Coding for MIMO Systems

Rajesh G. Kavasseri, Ph.D.
Washington State University, 2002
Research Interests: Power Systems, Nonlinear Dynamics, Renewable Energy resources

Samee U. Khan, Ph.D.
University of Texas-Arlington, 2007
Research Interests: Optimization, Robustness, and Security Of: Cloud, Grid, Cluster and Big Data Computing, Social Networks, Wired and Wireless Networks, Power Systems, Smart Grids, and Optical Networks.

Ivan T. Lima Jr., Ph.D.
University of Maryland, Baltimore County, 2003
Research Interests: Photonics

Dharmakeerthi Nawarathna, Ph.D.
University of Houston, 2005
Research Interests: Lab-on-a-chip Technologies, Single-cell Genomics, Nanobio-engineering, Tissue Engineering, Novel Imaging Techniques for Biology and Computational Simulations.

David A. Rogers, Ph.D.
University of Washington, 1971
Research Interests: Microwave Engineering, Electromagnetics, Fiber Optics

Mark Schroeder, Ph.D.
University of Texas, Austin, 1999
Research Interests: Biomedical Engineering

Scott C. Smith, Ph.D.
University of Central Florida, 2001
Research Interests: Asynchronous Logic, VLSI, Computer Architecture, Embedded Systems

Sudarshan Srinivasan, Ph.D.
Georgia Institute of Technology, 2007
Research Interests: Computer Engineering

Danling Wang, Ph.D.
University of Washington, 2013
Research Interest: Development of Sensor Devices Based on Novel Nanostructured Materials and Advanced Techniques. Focusing on Sensor Design, Fabrication, and Application of Early-Stage Human Disease Monitoring and Diagnosis, Such as Breath Analyzer for Diabetes; Industrial, and Military Safety, Such as Environmental Explosive or Toxic Gas Detection

Jinhui Wang, Ph.D.
University of Rochester and Bejing University of Technology, 2006

Research Interests: VLSI, Power Management for SoC and Microprossor, Novel Memory Design, CAD Methodologies in VLSI

Qifeng Zhang, Ph.D.
Peking University, 2001
Research Interests Electric Materials and Devices for Energy Conversion and Storage, involving Solar Cells, Lithium Batteries, and Solid State Electrolytes; Nanomaterials for Sensor and Biomedical Applications; and Nanotechnology

Emergency Management

Department Information

- **Department Chair:**
  Jessica Jensen, Ph.D.
- **Department Location:**
  Minard Hall
- **Department Phone:**
  (701) 231-5595
- **Department Web Site:**
  www.ndsu.edu/emgt/
- **Application Deadline:**
  Applications are reviewed on a rolling schedule.
- **Degrees Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE (All applications who have not completed a master's degree)
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The mission of NDSU's Emergency Management Program is to create a cadre of graduates with extensive theoretical and applied knowledge in emergency management who can advance the field and discipline of emergency management. The program is built on a core of emergency management and methods/theory courses to help students approach the study of disasters and emergency management from the emergency management disciplinary perspective. Additionally, the program draws from other disciplines that enhance the development of processes and techniques to deal with emergencies and disasters.

The master's and doctoral degree programs in emergency management at NDSU are campus-based. Potential students are encouraged to visit the campus and meet faculty and current graduate students.

Master of Science Degree

The comprehensive and challenging Master's degree program in Emergency Management is intended to explore the academic research literature related to emergency management as well as provide students with opportunities to apply their knowledge through research and/or practicum. The program is built on a core of emergency management courses to help students learn how human beings create, interact, and cope with hazards, vulnerability, and associated events. The program emphasizes the study of how human beings cope with hazard events through activities related to preparedness, response, recovery, and mitigation.

The Department of Emergency Management offers two tracks in its master's degree program. The first option - the thesis track - is a research-focused degree track that entails a combination of emergency management course work and research methods. This option is ideal for graduate students who intend to pursue a doctoral degree in Emergency Management or a related discipline and for those students who want to complete a traditional master's degree. The second option - the comprehensive study option - is a more practice-based track with course work in emergency management and a significant practicum requirement.

Doctoral Degree

North Dakota State University offers a Doctor of Philosophy in Emergency Management designed to prepare graduates for careers teaching future generations of emergency management students in higher education programs, conducting research that describes and explains patterns, processes, change, and effectiveness/efficiency related to emergency management, and/or policy development and analysis related to emergency management.

The degree program is built on a core of emergency management courses to help students learn how human beings create, interact, and cope with hazards, vulnerability, and associated events. All courses students take (outside of methods) involve study of scholarship related to these topics that has been generated by many academic disciplines.

This comprehensive and challenging program is committed both to extensive research and its practical application in the areas of emergency management. Students select two of the four functional areas of emergency management in which they want to specialize. They work one-on-one with faculty in two different specialization courses to develop themselves as scholars in these areas. Students also take a minimum of 3 research practicum credits while pursuing their degree. These credits, not part of the dissertation, allow students to explore (alone or in conjunction with a faculty member) a topic of the student's interest through empirical research. Students must submit a manuscript from this work to a scholarly journal prior to being allowed to schedule their dissertation defense. Students also take applied practicum credits while pursuing their doctoral degree. These credits ensure that our students understand the on-the-ground-realities of emergency management. Finally, students also have the option to participate in the Department's Teaching Mentoring Program to develop both subject matter expertise and expertise in instruction, pedagogy, and assessment.

The Ph.D. is awarded in recognition of significant depth of understanding and scholarly achievement in emergency management. The recipient must complete all of the required course work, pass two written comprehensive exams with oral defenses (one on emergency management theory and one on research methods), complete a novel and significant research project for the dissertation; and successfully defend this research in an oral examination. The student's progress will be reviewed by a supervisory committee that is responsible for reviewing the student's plan of study, comprehensive examinations, dissertation proposal, and dissertation defense.

The Department of Emergency Management at NDSU is selective in choosing graduate applicants for entry into the master's and doctoral programs. Admission is competitive reflecting the department's commitment to small, high quality, student cohorts that match the mentoring capacity of the faculty.

Applicants will be evaluated in a two-stage process. In the first stage, the applicant's Graduate School application, letters of reference, GRE scores (if applicable), and academic writing paper samples will be reviewed by the Department of Emergency Management faculty. Applicants demonstrating goodness-of-fit with the Department of Emergency Management's mission and goals and an aptitude for graduate study will be invited to complete the second stage of the admissions process.

Admissions Process

The two-stage admissions process for graduate studies in the Department of Emergency Management is as follows:

STAGE ONE

1. Applicants must first complete the Graduate School's online application form (https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=ndusndsugr) and submit the required materials.
2. Applicants must submit transcripts from the higher education institutions they have attended to the Graduate School.
3. Applicants must submit three letters of reference through the Online Application tool. Academic references are preferred.
4. All applicants who have not completed a master's degree in the United States must submit GRE scores. If an applicant has completed a master's degree in the United States, then GRE scores are not required but still strongly recommended. It is helpful to have as much data as possible about applicants and their aptitude for graduate work in our program. In no case are specific GRE discipline tests required. At this time, however, no specific score totals are used as a cutoff. Applications are evaluated holistically using all indicators of student aptitude for successful completion of graduate study in this program. Applicants must submit GRE scores by requesting that ETS-GRE (http://www.ets.org/gre) send the NDSU Graduate School their score.
5. Applicants must submit electronic copies of two writing samples through the Online Application tool. The samples may be a publication, material from prior course work, or specifically written for this application. The samples do not have to focus on emergency management or disasters. The samples must be written in English. Writing samples are used to gain information on the applicant's writing style and ability to write research-based papers. Samples submitted in support of an application would ideally be eight or more pages in length. In addition, to meet the objective of the admission criteria, the paper must employ formal citations. Writing samples will most typically be library-based research papers but papers based on original data gathering are also encouraged. The latter might be more likely to come from an applicant with a master's degree.

STAGE TWO

1. Applicants invited to participate in the second stage of the admissions process will take part in a conference call interview with two or more of the program faculty. Applicant interviews are designed to provide two-way communication between the faculty and prospective applicant. Faculty will ask questions but will also want the applicant to pose questions about the program and departmental educational objectives. The interview should assist the applicant and faculty to further assess the goodness-of-fit between the program and the applicant. Interviews will also evaluate the applicant's ability to engage in evidence-based reasoning.

We are most likely to accept doctoral applicants who demonstrate their understanding of the concepts included in the following list of books:

- Mileti, D. (ed) (1999). Disasters by design: A reassessment of natural hazards in the United States. Washington, DC: John Henry Press.
- Rubin, C. (ed) (2007). Emergency Management: The American experience 1900-2006. PERI.

- Sylves, R. (2008). Disaster policy & politics. Washington, DC: CQ Press.
- Tierney, K., Lindell, M., & Perry, R. (2001). Facing the unexpected: Disaster preparedness and response in the United States. Washington, DC: John Henry Press.
- Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2004). At risk: Natural hazards, people's vulnerability and disasters. New York: Routledge.

The emergency management faculty at NDSU believe that the best doctoral degree program in emergency management will be made up of a diverse student body. We welcome applicants to the doctoral degree program with master's degrees from a variety of disciplines; applicants from all countries; applicants with different professional backgrounds; and applicants with varying goals and interests. We want to ensure, however, that applicants entering the program are knowledgeable about emergency management and some of the literature that provides the foundation for the discipline. Therefore, when applicants are interviewed during the application process, the faculty expects that the best candidates will demonstrate their familiarity with the major concepts presented in the books listed above.

By asking potential doctoral students to enter the program with foundational knowledge of the emergency management literature, the department hopes to accomplish several goals. First, in reading the books on the reading list, prospective students will be able to confirm their desire to pursue a doctoral education in the discipline of emergency management. Second, the department assumes that students who undertake this reading in preparation for their application interview will be bright, motivated, and passionate about the study of emergency management. Third, and finally, a basic understanding of the emergency management literature will help students coming into the program from a variety of backgrounds succeed once they begin their studies at NDSU.

Financial Assistance

Both teaching and research assistantships are available, contingent on departmental and faculty research funds. All students are automatically considered for graduate assistantships, unless they request otherwise, so no separate application process is required for such consideration. Awards are based on past academic and professional performance. The review process is highly competitive.

Emergency Management Master's Thesis Track

Code	Title	Credits
Core		
SOC 700	Qualitative Methods	3
or COMM 704	Qualitative Research Methods in Communication	
SOC 701	Quantitative Methods	3
or COMM 707	Quantitative Research Methods in Communication	
EMGT 720	Theory, Research and Practice	3
Disaster Phases		
EMGT 761	Preparedness Theory and Practice	3
EMGT 762	Mitigation Theory and Practice	3
EMGT 763	Response Theory and Practice	3
EMGT 764	Recovery Theory and Practice	3
Electives		
Select 3 of the following:		9
EMGT 610	Comprehensive Emergency Management Planning	
EMGT 614	Spatial Analysis in Emergency Management	
EMGT 620	Hazard, Risk, and Vulnerability Assessments	
EMGT 625	International Emergency Management	
EMGT 645	Vulnerability and Functional Needs in Emergency Management	
EMGT 661	Business Continuity & Crisis Management	
EMGT 663	Voluntary Agency Disaster Services	
ANTH 664	Disaster and Culture	
EMGT 681	Disaster Analysis	
EMGT 696	Special Topics	
EMGT 730	Advanced Research Methods	
Practicum		
EMGT 795	Field Experience	3
Thesis		

EMGT 798	Master's Thesis (minimum 6 - maximum 10 credits, only 6 count toward degree)	6
Total Credits		39

Emergency Management Master's Comprehensive Study Track

Code	Title	Credits
Core		
EMGT 720	Theory, Research and Practice	3
EMGT 761	Preparedness Theory and Practice	3
EMGT 762	Mitigation Theory and Practice	3
EMGT 763	Response Theory and Practice	3
EMGT 764	Recovery Theory and Practice	3
Electives		
Group A: Emergency Management Elective Courses		
Select four of the following:		12
EMGT 610	Comprehensive Emergency Management Planning	
EMGT 620	Hazard, Risk, and Vulnerability Assessments	
EMGT 625	International Emergency Management	
EMGT 635	Issues in Homeland Security and Emergency Management	
EMGT 645	Vulnerability and Functional Needs in Emergency Management	
EMGT 661	Business Continuity & Crisis Management	
EMGT 663	Voluntary Agency Disaster Services	
ANTH 664	Disaster and Culture	
EMGT 681	Disaster Analysis	
EMGT 696	Special Topics	
Group B: Critical Thinking and Analysis Elective Courses		
Select two of the following:		6
EMGT 614	Spatial Analysis in Emergency Management	
SOC 700	Qualitative Methods [1]	
SOC 701	Quantitative Methods [1,2]	
STAT 725	Applied Statistics	
EMGT 730	Advanced Research Methods	
Practicum		
EMGT 795	Field Experience	6
Total Credits		39

1 Students must have completed an undergraduate research methods course prior to enrolling in Quantitative and Qualitative Methods.

2 Students must complete a statistics course as a prerequisite for Quantitative Methods.

* Those students lacking in field experience will be expected to complete an applied, field-based emergency management practicum; however, students with ample field experience in emergency management will be expected to complete a research practicum to fulfill the practicum credits. The research practicum can be fulfilled by participating in a member of the faculty's research or by the student conducting his/her own research under the supervision of a faculty member. The student and his /her adviser will determine the type of practicum a student ought to take.

Doctorate in Emergency Management

Code	Title	Credits
Core		
Theory and Methods		
SOC 700	Qualitative Methods [1]	3
SOC 701	Quantitative Methods [1,2]	3
EMGT 720	Theory, Research and Practice	3

STAT 725	Applied Statistics	3
EMGT 730	Advanced Research Methods	3
Emergency Management Functional Areas		
EMGT 761	Preparedness Theory and Practice	3
EMGT 762	Mitigation Theory and Practice	3
EMGT 763	Response Theory and Practice	3
EMGT 764	Recovery Theory and Practice	3
Functional Area Specialization (complete two courses)		
EMGT 861	Preparedness Theory II	
EMGT 862	Mitigation Theory II	
EMGT 863	Response Theory II	
EMGT 864	Recovery Theory II	
Electives		
Group A: Emergency Management Elective Courses (complete six courses)		18
EMGT 610	Comprehensive Emergency Management Planning	
EMGT 614	Spatial Analysis in Emergency Management	
EMGT 620	Hazard, Risk, and Vulnerability Assessments	
EMGT 625	International Emergency Management	
EMGT 635	Issues in Homeland Security and Emergency Management	
EMGT 645	Vulnerability and Functional Needs in Emergency Management	
EMGT 661	Business Continuity & Crisis Management	
EMGT 663	Voluntary Agency Disaster Services	
EMGT 681	Disaster Analysis	
EMGT 696	Special Topics	
Group B: Other Elective Course (complete five courses) [3]		15
Practicum		
EMGT 794	Practicum/Internship [4]	6
EMGT 895	Field Experience	9
Dissertation		
Dissertation		15
Total Credits		90

1 Students must have taken an undergraduate or graduate research methods course prior to enrolling in both Quantitative and Qualitative Methods.

2 Students must have taken a statistics course prior to enrolling in Quantitative Methods.

3 Courses in this section of electives are for transfer credits, prior thesis, comprehensive study, or technical papers completed as part of a master's degree program or additional electives of the students choice such as didactic courses, seminars, independent study, and/or field research. Students may also take an additional 6 credits from Emergency Management Electives above

4 All doctoral students must take a minimum of 3 credits of research practicum. The research practicum can be fulfilled by participating in a member of the faculty's research or by the student conducting his/her own research under the supervision of a faculty member. For every 3 credits of research practicum a student takes the student must submit a manuscript to a scholarly, peer-reviewed emergency management journal by the time they defend their dissertation. Students also must take 3-6 credits of an applied, field-based emergency management practicum; however, students with ample field experience in emergency management may complete additional research practicum credits to fulfill the 9 required practicum credits. The student and his/her advisor will determine how the credits will be fulfilled in this category.

Sarah Bundy, Ph.D.
North Dakota State University, 2013
Research Interests**:** Comprehensive Emergency Management, Planning, and Development of Emergency Management as an Academic Discipline

Carol Cwiak, J.D., Ph.D.
Western State University, 1995
North Dakota State University, 2009
Research Interests: Preparedness and Mitigation, Business Continuity, Law and Emergency Management

Yue (Gurt) Ge, Ph.D.
Texas A&M, 2013

Research Interests: Land Use Planning & Emergency Planning, Hazard Mitigation & Disaster Recovery, Environmental Hazards Management, Spatial Analysis

Jessica Jensen, Ph.D.
North Dakota State University, 2010
Research Interests: Response, Recovery, and Preparedness, Voluntary Agencies in Disasters, Development of Emergency Management Academic Discipline

Daniel J. Klenow, Ph.D.
University of Notre Dame, 1977
Research Interests: Special Populations, International Disasters, Emergency Management Theory and Methodology

English

Department Information

- **Department Chair:**
  Rebecca Weaver-Hightower, Ph.D.
- **Graduate Coordinator:**
  Verena Thiele, Ph.D.
- **Email:**
  verena.theile@ndsu.edu
- **Department Location:**
  318 Minard Hall
- **Department Phone:**
  (701) 231-7143
- **Department Web Site:**
  www.ndsu.edu/english/
- **Application Deadline:**
  February 1
- **Degrees Offered:**
  M.A., Ph.D.
- **English Proficiency Requirements:**
  TOEFL ibT 100; IELTS 7; PTE Academic 68

Master of Arts

Our program encourages individuality and collaboration as it prepares candidates for academic and non-academic careers. Graduates have gone on to top-tier Ph.D. programs or opted to work in industry or for national and local nonprofits.

Admissions Requirements

Graduate studies in English is open to all qualified applicants who hold a BA or a BS in English or a related field from an accredited college or university.

Financial Assistance

Teaching assistantships are available and are awarded on the basis of the applicant's scholastic record, letters of recommendation, and the student's letter of interest. All applicants that are accepted by the Graduate School in good standing are eligible for an assistantship in the Department of English. Letters of interest (if applicable) for teaching assistantships should be submitted at the same time as the application to the program is submitted to the Graduate School and should address prior experience and qualifications.

Graduate students are awarded teaching assistantships for the academic year only. University graduate tuition charges (not fees) are waived for all TAs. Teaching Fellowships are available to selected TAs after completing course work. Moreover, the Department of English annually awards the Rooney Scholarship and the Madeline S. Giddings Scholarship.

The Master of Arts program consists of 27 credit hours of letter-graded course work with an overall GPA of 3.0 or better, and (at least) a 3 credit Master's Paper. Note that ENGL 764 Classroom Strategies For TA'Sis required of all GTAs who have not taken a similar class elsewhere.

Code	Title	Credits
MA Core		9
ENGL 755	Composition Theory	
ENGL 760	Graduate Scholarship	
ENGL 762	Critical Theory	
Rhetoric/Writing/Linguistics		6
Literature		6
Other/Electives		6
ENGL 797	Master's Paper	3
Total Credits		30

Ph.D. Rhetoric, Writing and Culture

Code	Title	Credits
Plan of Study		
Core Courses		12
ENGL 755	Composition Theory	
ENGL 756	Composition Research	
ENGL 760	Graduate Scholarship	
ENGL 762	Critical Theory	
Other Research Methods		3
Students select, in consultation with their adviser, at least one of the following methods courses.		
COMM 704	Qualitative Research Methods in Communication	
COMM 767	Rhetorical Criticism	
HIST 701	Methods of Historical Research	
SOC 700	Qualitative Methods	
SOC 701	Quantitative Methods	
Pedagogy		
Students select, in consultation with their adviser, at least one of the following pedagogy courses.		
COMM 704	Qualitative Research Methods in Communication	
ENGL 764	Classroom Strategies For TA'S	
ENGL 765	Upper Division Writing: Pedagogy, Practice, and Technology	
ENGL 766	Teaching Literature	
Addition Courses		21-51
Students must take English courses that match their research goals and deepen their understanding of the field. Three additional methods, theory, or pedagogy courses may be taken from outside the English department, as approved by adviser and graduate director. Courses in the category may be at the 600-,700-, or 800-level.		
ENGL 649	Usability and User Experience	
ENGL 655	International Technical Writing	
ENGL 656	Literacy, Culture and Identity	
ENGL 659	Researching and Writing Grants and Proposal	
ENGL 753	Rhetorics, Poetics Of New Media	
ENGL 754	Rhetorics of Science and Technology	
ENGL 758	Topics in Rhetoric, Writing, and Culture	
ENGL 759	History of Writing Instruction	
ENGL 761	Writing: Invention to Innovation	
COMM 700	Research Methods in Communication	
COMM 707	Quantitative Research Methods in Communication	
COMM 782	Theories of Persuasion	
Additional English options: Students with no background in English studies must include courses in literature and linguistics in their plan of study and that topics/studies courses may be repeated.		
ENGL 652	History of the English Language	

ENGL 653	Social and Regional Varieties of English	
ENGL 654	Language Bias	
ENGL 671	American Realistic Literature	
ENGL 672	20th Century American Writers	
ENGL 674	Native American Literature	
ENGL 676	Topics in American Literature	
ENGL 680	Medieval Literature	
ENGL 682	Renaissance Literature	
ENGL 683	Topics in British Literature	
ENGL 685	18th Century Literature	
ENGL 686	Romantic Literature	
ENGL 770	Studies in American Literature	
ENGL 780	Studies in British Literature	
Experiential Learning		6
Flexible credits for English 795: Experiential Learning may be earned in the following ways:		
1) Teaching Mentorship (0-6 credits), may be taken twice. Students work with faculty to read theory and co-teach 200-, 300-, or 400-level class.		
2) Internship (0-6 credits), may be taken twice. Students work outside or inside academia in administrative, editing, or consulting roles.		
3) Life-Experience Credit (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.		
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 depart¬¬ment. The exams consist of two timed, written exams and conclude with the defense of the dissertation proposal.		
Language Requirement		
Students are required to demonstrate foreign language competency by the time they begin to write the dissertation.		
ENGL 899	Doctoral Dissertation (The dissertation proposal concludes the comprehensive exams and 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.)	15
Total: 90 credits		

Anastassiya Andrianova, Ph.D.
City University of New York, 2011
Field: British Romantic and Victorian Literature, Drama, Translation, Pedagogy, Postcolonial Literature, Slavic Literature, Animal Studies

Lisa R. Arnold, Ph.D.
University of Louisville, 2011
Field: Rhetoric and Composition, Writing Program Administration, History of Writing Instruction

Elizabeth Birmingham, Ph.D.
Iowa State University, 2000
Field: Rhetoric and Professional Communication, Gender Studies, Architectural History, Theory, and Criticism

Kevin Brooks, Ph.D.
Iowa State University, 1997
Field: Rhetoric and Professional Communication, Computers and Composition, Writing Program Administration

Muriel Brown, Ph.D., Emerita
University of Nebraska, 1971
Field: Medieval Literature, Modern Drama, Women's Studies

Sean Burt, Ph.D.
Duke University, 2009
Field: Ancient Jewish Literature, Genre Theory, Ancient Hebrew Poetry, Poetics, Horror Literature & Theory

Gordon Fraser, Ph.D.
University of Connecticut, 2015
Field: Nineteenth-Century and Early American Literature; American Studies; Nationalism and Revolution

Adam Goldwyn, Ph.D.
City University of New York, 2010

Field: Medieval Studies, Medieval Greek World, Influence of Ancient Greek Culture in the Middle Ages

Alison Graham Bertolini, Ph.D.
Louisiana State University, 2009
Field: Contemporary American Literature, Literature of the Southern United States, Women's Literature, Contemporary Ethnic and Postcolonial Literature

Linda L. Helstern, Ph.D., Emerita
Southern Illinois University-Carbondale, 2001
Field: Native American Literature, Modernism, Contemporary Poetry, Literature and the Environment

R.S. Krishnan, Ph.D., Emeritus
University of Nebraska, 1981
Field: Restoration and 18th-Century British Literature, Postmodern Theories, British Novel, Postcolonial Literature

Bruce Maylath, Ph.D.
University of Minnesota, 1994
Field: International Technical Communication, Rhetoric and Composition, Linguistics

Robert O'Connor, Ph.D., Emeritus
Bowling Green State University, 1979
Field: Romantic Literature, Science Fiction and Fantasy

Kelly Sassi, Ph.D.
University of Michigan, Ann Arbor, 2008
Field: English Education, Composition and Rhetoric, Native American Literatures, Culturally Responsive Pedagogy

Dale Sullivan, Ph.D., Emeritus
Rensselaer Polytechnic Institute, 1988
Field: Rhetoric Theory and History, Rhetoric of Science, Rhetoric of Religion, Technical Communication

Verena Theile, Ph.D.
Washington State University, Pullman, 2006
Field: 16th/17th Century Literature, Shakespeare, Early Modern Drama, European Literature, Literary Theory, Science Fiction and Fantasy, Film and Adaptation Studies

Emily D. Wicktor, Ph.D.
Kansas, 2010
Field: 19th Century British Literature and Culture, particularly Victorian Sexuality and Sexual History; Rhetoric, Composition, and Pedagogy; Literary Theory; Modern British and American Drama; Research Methods and Methodology

Entomology

Department Information

- **Director, School of Natural Resource Sciences:**
  Frances Casey, Ph.D.
- **Program Leader:**
  Jason Harmon, Ph.D.
- **Email:**
  jason.harmon@ndsu.edu
- **Department Location:**
  202 Hultz Hall
- **Department Phone:**
  (701) 231-7582
- **Department Web Site:**
  www.ndsu.edu/entomology
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  Ph.D., M.S.

- **Test Requirement:**
  TOEFL ibt 79; IELTS 6.5

Program Description

The Department of Entomology in the School of Natural Resource Sciences offers graduate study leading to the M.S. and Ph.D. degrees. Advanced work involves specialized training in the following areas: behavior, biochemistry, biodiversity, biological control, chemical ecology, ecology, host plant resistance, insect pathology, pest management, molecular genetics, physiology, and systematics. The Department also participates in interdisciplinary programs in Environmental and Conservation Sciences and Natural Resources Management. The close working relationship between the department and the USDA Red River Valley Agricultural Research Center, located on campus also provides students many opportunities for research and consultation.

Student research and academic programs are tailored to individual needs and interests. Interdisciplinary approaches to entomological programs are fostered. Prospective students are encouraged to check the Department of Entomology website (http://www.ndsu.edu/entomology) for the latest descriptions of the graduate program.

The Department of Entomology graduate program is open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full status to the program, the applicant must have adequate preparation in entomology and should be in contact with potential faculty advisors about opportunities for new students. More information is found on the Department website (https://www.ndsu.edu/entomology/prospective_students/).

Applications should be submitted directly to the Graduate School and will include a letter stating reasons for pursuing an advanced degree in entomology and expressing the applicant's research interests.

Financial Assistance

All specified application materials must be submitted to the Graduate School, and the student must be admitted in full or conditional standing to be considered for financial assistance. Graduate research assistantships are awarded on the basis of scholarship, potential for advanced study and research, and availability. Graduate research assistantships provide a monthly stipend and a waiver of graduate tuition.

For M.S. candidates, a minimum of 30 semester credits beyond the B.S. and an oral defense of a research-based thesis and academic subject matter is required.

See information in Graduate Bulletin

The Ph.D. requires a minimum of 90 semester credits beyond the B.S., (or 60 beyond the M.S. degree), preliminary written and oral examinations directed toward academic subject matter, and a final oral defense of a research-based dissertation.

Mark A. Boetel, Ph.D.
South Dakota State University, 1996
Research Interests: Integrated Pest Management of Sugarbeet and Corn Insects, Microbial Control

Stephen P. Foster, Ph.D.
University of Waikato, 1983
Research Interests: Insect Chemical Ecology, Pheromone Biochemistry, Reproductive Behavior

Jason P. Harmon, Ph.D.
University of Minnesota, 2003
Research Interests: Environmental Change and Ecological Interactions, Biological Control, Insect Ecology

Marion O. Harris, Ph.D.
Michigan State University, 1986
Research Interests: Insect Behavior, Insect-Plant Interactions, Resistance of Plants to Insects

Janet J. Knodel, Ph.D.
North Dakota State University, 2005
Research Interests: Extension Entomology, IPM of Field Crop Insects, Insect-Disease Surveys, Emerging Insects, Chemical Control

Deirdre Prischmann-Voldseth, Ph.D.
Washington State University, 2005
Research interests: Agricultural Integrated Pest Management and Arthropod Ecology

David A. Rider, Ph.D.
Louisiana State University, 1988

Research Interests: Systematics of the Pentatomoidea, Molecular Genetics, Ecology of the Northern Tall Grass Prairie Arthropods

Environmental and Conservation Sciences

Department Information

- **Program Director:**
  Craig Stockwell, Ph.D.
- **Department Location:**
  Biological Sciences, Stevens 119
- **Department Phone:**
  (701) 231-7717
- **Department Web Site:**
  www.ndsu.edu/ecs/
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring semester. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5

Program Description

The graduate program leading to an M.S. or a Ph.D. in Environmental and Conservation Sciences (ECS) rests on an integrative curriculum and a multidisciplinary team approach. The program emphasizes the common ground shared by all sciences, and seeks to bridge methodological and philosophical boundaries that might hinder interdisciplinary communication and cooperation. The program offers three tracks: Environmental Science, Conservation Biology and Environmental Social Sciences. The Environmental Science track focuses on abiotic environmental issues, such as water, air, and land pollution. The Conservation Biology track focuses on biotic issues, such as the preservation of biodiversity and ecosystem function. The Environmental Social Sciences track emphasizes relationships between humans and the natural environment with a focus on environmental economics and policy.

The interdisciplinary nature of this program is reflected by the participation of faculty from across the campus, including the Colleges of Agriculture, Food Systems, and Natural Resources; Arts, Humanities, and Social Sciences; Engineering; and Science and Mathematics.

Environmental Science

Areas of Environmental Science, such as climate change, groundwater, hazardous waste, and water chemistry, require broad training across discipline lines for successful application. To better predict anthropogenic environmental impacts, the engineering, earth material, chemical, and biological data must be considered in an integrated manner.

Conservation Biology

Conservation Biology offers a new philosophy of looking at complex problems. This discipline focuses on the loss of regional and global biodiversity, but considers the human element as well in its approach to resource issues. As an example, landscape ecology, sustainable development, and conflict resolution are themes promoted by the field of Conservation Biology.

Environmental Social Sciences

Environmental Social Sciences discipline looks at interactions between humans and the environment which tend to be complex and often require interdisciplinary efforts to understand and manage. Environmental policy and economics are examples of the fields of study.

Admissions Requirements

To be admitted to the Environmental and Conservation Sciences program, the applicant must meet the Graduate School requirements. Further, applicants are only considered after an ECS affiliated faculty member has agreed to to admit the student to her/his lab and make arrangements of stipend and research funding. Thus, applicants should contact ECS faculty members who share their research interests. https://www.ndsu.edu/ecs/index.php/people/faculty

Financial Assistance

The applicant should contact a prospective mentor to identify sources of financial aid. Teaching and research assistantships may be available through funded research or participating departments. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research. Contact the office of Financial Aid and Scholarships for information and applications regarding scholarships.

Program Administration

The graduate program is administered by the ECS Steering Committee. The committee is composed of ECS graduate faculty members representing the participating colleges: Agriculture, Food Systems, and Natural Resources; Engineering; and Science and Mathematics. The committee also includes a student member which is nominated annually by the ECS Graduate Student Association.

The ECS Program Director presides over ECS Steering Committee meetings. The duties of the ECS Steering Committee include:

1. review of requests to join the ECS faculty and
2. program review and administration.

By the end of the second semester, the student and academic adviser will arrange for the appointment of a Graduate Supervisory Committee. For Ph.D. study, the Graduate Supervisory Committee will consist of at least four members of the NDSU graduate faculty. The committee must include the student's adviser, two additional ECS faculty members, and a Graduate School representative. One committee member must be from outside the student's home college.

For M.S. study, the Graduate Supervisory Committee will consist of at least three members of the NDSU graduate faculty and will include the student's adviser, an ECS faculty member and a faculty from outside the student's home college. The plan of study will be prepared by the student, in consultation with the major adviser, by the end of the first year in residence.

Master of Science in Environmental and Conservation Sciences

The total credits will be not less than 30 graduate credits, with at least 16 credits of graduate courses numbered 601-689, 691; 700-789, 791 or 800-889, 891 plus the ECS graduate seminar for 1 credit, and research credits (798) not fewer than 6 nor more than 10 thesis credits. The didactic credits must include at least 1 ECS core course; 1 ECS track course and UNIV 720 Scientific Integrity. All M.S. students must complete a thesis and pass a final examination as described in The Graduate School Policies section of the Graduate Bulletin. An overall GPA of 3.0 or better must be maintained.

Doctor of Philosophy in Environmental and Conservation Sciences

Each Ph.D. student will complete at least 27 credits of didactic courses plus the ECS graduate seminar for 1 credit. The didactic courses will include: 3 core courses (9 credits), UNIV 720 Scientific Integrity, a minimum of 14-15 credits from a chosen track, and 2-3 credits of electives from another track or other NDSU courses numbered 601-689, 691; 700-789, 791 or 800-889, 891. The 15 track credits must be from at least 2 course categories. Two of the three courses must come from outside of the student's chosen track. Of the 27 didactic course credits, a total of 15 must be at the 700-800 level. A total of 90 credits are required.

For students entering the program with a Master's Degree or previous graduate coursework, up to 12 credits of previous graduate work can transfer and be counted toward the 27 credits. Such transferred credits must be approved by the student's supervisory committee, the program director and the Graduate Dean. The student must earn no fewer than 60 graduate credits at NDSU. Of these, no fewer than 15 credits must be at the 700 or 800 level (700-789, 791; 800-889 and 891).

Code	Title	Credits
Environmental Social Sciences Track		
ECON 681	Natural Resource Economics	3
ECS 770	Environmental Law and Policy	3
HIST 634	Environmental History	3
or HIST 710	Research Seminar in North American History	
or HIST 780	Readings in World History	
NRM 631	National Environmental Policy Act & Environental Impact Assessment	3
NRM 702	Natural Resources Management Planning	3
SOC 631	Environmental Sociology	3
Environmental Sciences Track		
CE 770	Hazardous Waste Site Remediation	3
GEOL 614	Hydrogeology	3
MICR 652	Microbial Ecology	3
PH 720	Environmental Health	3

Conservation Biology Track		
BOT 862	Environment and Adaptation	3
BOT 864	Ecological Processes	3
ZOO 675	Conservation Biology	3
ZOO 850	Advanced Conservation Biology	3

CONSERVATIVE BIOLOGY TRACK - TOTAL 18 CREDITS

Code	Title	Credits
Biodiversity		
Select 3-9 credits of the following:		
BIOL 681	Wetland Science	
BOT 717	Aquatic Vascular Plants	
ENT 750	Systematic Entomology	
RNG 716	Agrostology	
ZOO 650	Invertebrate Zoology	
ZOO 652	Ichthyology	
ZOO 654	Herpetology	
ZOO 658	Mammalogy	
Ecology and Evolution		
Select 3-9 credits of the following:		
BIOL 850	Advanced Ecology	
BIOL 859	Evolution	
BOT 660	Plant Ecology	
BOT 862	Environment and Adaptation	
BOT 864	Ecological Processes	
ENT 765	Biological Control of Insects and Weeds	
ENT 770	Writing a Scientific Literature Review	
GEOL 640	Quaternary Biology	
MICR 652	Microbial Ecology	
PLSC 631	Intermediate Genetics	
PLSC 751	Advanced Plant Genetics	
PLSC 781	Quantitative Genetics	
RNG 765	Analysis Of Ecosystems	
SOIL 610	Soils and Land Use	
SOIL 647	Microclimatology	
ZOO 662	Physiological Ecology	
ZOO 670	Limnology	
ZOO 850	Advanced Conservation Biology	
ZOO 860	Evolutionary Ecology	
ZOO 870	Aquatic Community Ecology	
Human Dimensions and Management		
Select 3-9 credits of the following:		
ANTH 662	Anthropology and the Environment	
COMM 783	Advanced Organizational Communication I	
CE 678	Water Quality Management	
ECON 682	Environmental Economics	
POLS 642	Global Policy Issues	
POLS 650	Politics of the Developing Countries	
RNG 656	Range Habitat Management	
ZOO 675	Conservation Biology	
ZOO 676	Wildlife Ecology and Management	
ZOO 677	Wildlife and Fisheries Management Techniques	

ZOO 850	Advanced Conservation Biology
Research Tools	
Select 3-9 credits of the following:	
CE 677	Applied Hydrology
GEOG 655	Introduction to Geographic Information Systems
GEOG 656	Advanced Geographic Information Systems
GEOL 660	Biogeochemistry
GEOL 760	Advanced Biogeochemistry
PLSC 724	Field Design I
PSYC 640	Experimental Methods
RNG 650	Range Plants
SOC 701	Quantitative Methods
SOIL 784	Advanced Soil Genesis, Morphology and Classification
STAT 661	Applied Regression Models
STAT 662	Introduction to Experimental Design
STAT 663	Nonparametric Statistics
STAT 665	Meta-Analysis Methods
STAT 670	Statistical SAS Programming
STAT 730	Biostatistics
STAT 761	Advanced Regression
STAT 770	Survival Analysis

ENVIRONMENTAL SCIENCES TRACK-TOTAL 17 CREDITS

Code	Title	Credits
Water Sciences		
Select 3-9 credits of the following:		
ABEN 664	Resource Conservation and Irrigation Engineering	
ABEN 765	Small Watershed Hydrology and Modeling	
CE 610	Water & Wastewater Engineering	
CE 677	Applied Hydrology	
CE 676	Watershed Modeling	
CE 678	Water Quality Management	
CE 679	Advanced Water and Wastewater Treatment	
CE 776	Ground Water and Seepage	
CE 779	Watershed Water Quality Modeling	
CE 796	Special Topics	
GEOL 640	Quaternary Biology	
ZOO 670	Limnology	
Soil and Solid Waste		
Select 3-9 credits of the following:		
ABEN 696	Special Topics	
CE 672	Solid Waste Management	
CE 770	Hazardous Waste Site Remediation	
SOIL 610	Soils and Land Use	
SOIL 633	Soil Physics	
SOIL 733	Advanced Soil Nutrient Cycling	
Environmental Management		
Select 3-9 credits of the following:		
CE 672	Solid Waste Management	
CE 678	Water Quality Management	
COMM 783	Advanced Organizational Communication I	
RNG 656	Range Habitat Management	

ZOO 675	Conservation Biology
ZOO 676	Wildlife Ecology and Management
ZOO 677	Wildlife and Fisheries Management Techniques
Research Tools	
Select 3-9 credits of the following:	
ABEN 682	Instrumentation & Measurements
ABEN 696	Special Topics
CE 677	Applied Hydrology
GEOG 655	Introduction to Geographic Information Systems
GEOG 656	Advanced Geographic Information Systems
GEOL 660	Biogeochemistry
GEOL 760	Advanced Biogeochemistry
IME 660	Evaluation of Engineering Data
RNG 650	Range Plants
STAT 662	Introduction to Experimental Design
STAT 725	Applied Statistics
STAT 761	Advanced Regression

ENVIRONMENTAL AND SOCIAL SCIENCES TRACK-TOTAL 17 CREDITS

Code	Title	Credits
Social Science Theory		
Select 3-9 credits of the following:		
AGEC 741	Advanced Microeconomics	
ANTH 680	Development of Anthropological Theory	
COMM 711	Communication Theory	
ECON 640	Game Theory and Strategy	
POLS 720	Theoretical Perspectives to the Study of Political Science	
SOC 622	Development Of Social Theory	
SOC 723	Social Theory	
Cultural and Behavioral Aspects		
Select 3-9 credits of the following:		
AGEC 711	Applied Risk Analysis I	
ANTH 662	Anthropology and the Environment	
ANTH 664	Disaster and Culture	
ECON 656	History of Economic Thought	
ECON 681	Natural Resource Economics	
ECON 682	Environmental Economics	
HIST 634	Environmental History	
POLS 642	Global Policy Issues	
POLS 653	Environmental Policy and Politics	
SOC 631	Environmental Sociology	
SOC 639	Social Change	
SOC 643	International Disasters	
Management Techniques		
Select 3-9 credits of the following:		
COMM 783	Advanced Organizational Communication I	
GEOL 660	Biogeochemistry	
NRM 631	National Environmental Policy Act & Environental Impact Assessment	
NRM 632	Environmental Impact Statement	
NRM 653	Rangeland Resource/Watershed Management	
NRM 701	Terrestrial Resources Management	
NRM 702	Natural Resources Management Planning	

RNG 654	Wetland Resources Management
RNG 656	Range Habitat Management
SOC 604	Community Assessment
TL 755	Context Sensitive Solutions
ZOO 675	Conservation Biology
ZOO 676	Wildlife Ecology and Management
ZOO 850	Advanced Conservation Biology
Research Tools	
Select 3-9 credits of the following:	
AGEC 701	Research Philosophy
AGEC 739	Analytical Methods for Applied Economics
BIOL 850	Advanced Ecology
COMM 700	Research Methods in Communication
COMM 701	Advanced Research Methods in Communication I
COMM 704	Qualitative Research Methods in Communication
COMM 707	Quantitative Research Methods in Communication
ECON 610	Econometrics
ECON 710	Advanced Econometrics
EMGT 614	Spatial Analysis in Emergency Management
ENGL 656	Literacy, Culture and Identity
ENGL 758	Topics in Rhetoric, Writing, and Culture
GEOG 655	Introduction to Geographic Information Systems
GEOG 656	Advanced Geographic Information Systems
PSYC 640	Experimental Methods
RNG 652	Geographic Information Systems in Range Survey
RNG 765	Analysis Of Ecosystems
SOC 700	Qualitative Methods
SOC 701	Quantitative Methods
STAT 660	Applied Survey Sampling
STAT 661	Applied Regression Models
STAT 662	Introduction to Experimental Design
STAT 663	Nonparametric Statistics
STAT 665	Meta-Analysis Methods
STAT 670	Statistical SAS Programming
STAT 725	Applied Statistics
STAT 726	Applied Regression and Analysis of Variance
STAT 730	Biostatistics
STAT 761	Advanced Regression
STAT 770	Survival Analysis

Preliminary Examinations for Doctoral Students

The written preliminary examination will cover the core areas for ECS and each of the core topic areas for the appropriate track. The preliminary examination will typically be taken in the middle of the third year. The written exam must be passed before the comprehensive oral examination can be scheduled.

The comprehensive oral examination will be taken no later than the end of the third year in residence. The examination will cover the topic areas for the appropriate track.

Dissertation Research

A proposal describing research suitable for preparation of a dissertation in Environmental and Conservation Sciences will be prepared in the format of a NSF Dissertation Improvement Grant. Alternative formats must be agreed to by the Graduate Supervisory Committee. The proposal will be submitted

to the student's Graduate Supervisory Committee for review and approval. The dissertation must show originality and demonstrate the student's capacity for independent research.

F. Adnan Akyuz, Ph.D.
University of Missouri-Columbia, 1994
Research Interests: Applied Climatology and Microclimatology/Climate Based Agriculture

Allan C. Ashworth, Ph.D.
University of Birmingham, 1969
Research Interests: Quaternary Paleoecology, Paleoclimatology

Peter Bergholz, Ph.D.
Michigan State University, 2007
Research Interests: Food Safety and Environmental Microbiology, Landscape Genomics

Achintya Bezbaruah, Ph.D.
University of Nebraska-Lincoln, 2002
Research Interests: Nanomaterials for Pollution Control, Recalcitrant and Micro Pollutants, Contaminant Fate and Transport, Small Community Water and Wastewater Treatment, Environmental Sensors, Environmental Management

Julia Bowsher, Ph.D.
Duke University, 2007
Research Interests: Evolutionary and Developmental Biology

Malcolm G. Butler, Ph.D.
University of Michigan, 1980
Research Interests: Aquatic Invertebrate Biology, Limnology, Wetland Ecology

Igathinathane Cannayen, Ph.D.
Indian Institute of Technology, 1997
Research Interests: Biomass Harvest, Storage, Collection and Pre-Processing

Frank X.M. Casey, Ph.D.
Iowa State University, 2000
Research Interests: Field and Laboratory Studies of Water Flow and Chemical Transport Processes

Amitava Chatterjee, Ph.D.
University of Wyoming, 2007
Research Area/Activity: Soil Fertility Management, Greenhouse Gas Emissions

Xuefeng (Michael) Chu, Ph. D.
University of California, Davis, 2002
Research Interests: Watershed Hydrologic and Environmental Modeling, Overland Flow and Infiltration, Integrated Modeling of Flow and Contaminant Transport

Larry Cihacek, Ph.D.
Iowa State University, 1979
Research Interests: Carbon Sequestration in Soils, Soil Physical Properties, Soil Management for Waste Disposal

Gary K. Clambey, Ph.D.
Iowa State University, 1975
Research Interests: Ecology and Biogeography, Environmental Analysis and Planning, Structure Function Relations in the Midwestern Ecosystems

Mark E. Clark, Ph.D.
University of Tennessee, 1996
Research Interests: Population Ecology, Landscape Ecology, Fish and Wildlife Ecology, Ecological Modeling, Spatial Modeling, Species Interactions

Dennis Cooley, Ph.D.
University of Rochester, 1995
Research Interests: Ethics of Science

Aaron Daigh, Ph.D.
Iowa State University, 2013
Research Interests: Soil Physics, Transport in Soils, Soil Residue and Water Management, Crop Rotations, and Nutrient/Agrochemical/Industrial Byproduct Soil Amendment Impacts on Soil Physical Properties

Stephanie Day, Ph.D.
University of Minnesota, 2012
Research Interests: Fluvial Geomorphology, Slope Stability, Geospatial Sciences

Edward (Shawn) DeKeyser, Ph.D.
North Dakota State University, 2000
Research Interests: Wetland Ecology, Wetland Assessment and Monitoring, Invasive Species Ecology and Management, Native Prairie Restoration

Anne Denton, Ph.D.
University of Mainz, 1996
Research Interests: Data Mining, Bioinformatics, Scientific Informatics, Educational Technology, Model Building, Databases

Thomas M. DeSutter, Ph.D.
Kansas State University, 2004
Research Interest: Trace Gas Fluxes, Inorganic Soil Chemistry, Soil Environmental Conditions

Ned Dochtermann, Ph.D.
University of Nevada, Reno, 2009
Research Interests: Ecological and Evolutionary Causes and Consequences of Phenotypic Variation

Nathan Fisher, Ph.D.
University of Michigan, 2006
Research Interests: Ecological and Evolutionary of Bacterial Virulence

Ann-Marie Fortuna, Ph.D.
Michigan State University, 2001
Research Interests: Microbial and Soil Process Regulating Nutrient Cycling, Soil Health and Global Climate Change, Soil Health Indicators

Erin Gillam, Ph.D.
University of Tennessee, 2007
Research Interests: Behavioral ecology of bats, ecological and evolutionary basis of behavior in all animal groups, behavioral, ecological, and evolutionary factors influence the structure of animal communication signals and wildlife ecology and conservation.

Gary A. Goreham, Ph.D.
South Dakota State University, 1985
Research Interests: Rural Sociology, Community, Family Research Methods, Sociology of Religion, Sociology of Agriculture

Kendra Greenlee, Ph.D.
Arizona State University-Tempe, 2004
Research interests: Environmental and respiratory physiology of insects; insect immunology.

Timothy Greives, Ph.D.
Indiana University, 2009
Research Interests: Physiology and Behavior of Animals in Response to Environmental Signals

James W. Grier, Ph.D.
Cornell University, 1975
Research Interests: Animal Behavior and Ecology, Animal Population Dynamics, Applied Biostatistics, Philosophy of Research

Jill Hamilton, Ph.D.
University of British Columbia, 2012
Research Interests: Plant Evolutionary Genomics

Jason Harmon, Ph.D.
University of Minnesota, 2003
Research Interests: Environmental change; ecosystem services; population and community ecology

Marion O. Harris, Ph.D.
Michigan State University, 1986
Research Interests: Insect-Pest Management, Host-Plant Relationships

Mark Harvey, Ph.D.
University of Wyoming, 1986
Research Interests: American West, Environmental History, Public History

Harlene Hatterman-Valenti, Ph.D.

Iowa state University, 1993
Research Interests: High-Value Crop Production

Robert R. Hearne, Ph.D.
University of Minnesota, 1995
Research Interests: Economic Analysis of Emerging Environmental and Resource Issues in the Northern Great Plains

Britt Heidinger, Ph.D.
Indiana University, 2007
Research Interests: Physiological Ecology, Senescence, Stress Physiology

Linda Helstern, Ph.D.
Southern Illinois University-Carbondale, 2001
Research Interests: Writing, Literature and the Environment, Multicultural Literature

David Hopkins, Ph.D.
North Dakota State University, 1997
Research Interests: Soil Formation and Chemistry

Tom Isern, Ph.D.
Oklahoma State University, 1977
Research Interests: History of Agriculture, History of Great Plains

Donna Jacob, Ph.D.
University College, 2004
Research Interests: Wetland ecology, biogeochemistry, ecophysiology and ecotoxicology

Sivaguru Jayaraman, Ph.D.
Tulane University, 2003
Research Interests: Photocatalysis, Photochemistry, Green Chemistry

Xinhua Jia, Ph.D.
University of Arizona, 2004
Research Interests: Evapotranspiration, Subsurface drainage and Water quality

Dinesh Katti, Ph.D.
University of Arizona, 1991
Research Interests: Geotechnical Engineering, Constitutive Modeling of Geologic Materials, Expansive Soils, Multiscale Modeling, Steered Molecular Dynamics, Computational Mechanics, Nanocomposite, and Bio-nanocomposites. Computational Biophysics

Eakalak Khan, Ph.D.
University of California Los Angeles, 1997
Research Interests: Water Quality, Biological Process Development for Water and Wastewater Treatment, Storm water and Non-Point Source Pollution Control

Kenneth E. Lepper, Ph.D.
Oklahoma State University, 2001
Research Interests: Quaternary Geology and Age Dating

Wei Lin, Ph.D.
SUNY at Buffalo, 1992
Research Interests: Water and Wastewater Treatment, Hazardous Waste Management

Zhulu Lin, Ph.D.
University of Georgia, 2003
Research Interests: Surface and Subsurface Hydrology and Modeling, Soil and Water Resources Management, Environmental Systems Analysis, Risk Identifications and Assessment, Geostatistics and Spatial Statistics

Guodong Liu, Ph.D.
Hunan University, 2001
Research Interests: Synthesis of Novel Nanomaterials, Biosensors, Bioassays

John McEvoy, Ph.D.
University of Ulster Northern Ireland, 2002
Research Interests: Cryptosporidium Virulence Factors and Mechanisms of Pathogenesis

Mark Meister, Ph.D.
University of Nebraska, 1997
Research Interests: Rhetorical and Critical Theory, Environmental Communication

Jennifer Momsen, Ph.D.
Rutgers, 2007
Research Interests: Biology Education, Systems Thinking in Introductory Biology, Visualization, Assessing the Cognitive Level of STEM Courses

Bakr Mourad Aly Ahmed, Ph.D.
Virginia Tech., 2001
Research Interests: Sustainability Indicators and Implementation, Carrying Capacity Measurements, Coastal Development, Built Environment and Natural Resources Conservation

Jack Norland, Ph.D.
North Dakota State University, 2008
Research Interests: Restoration Ecology, Application of Remote Sensing to Natural Resource Management, Study of Natural Resources Management Problems in a Socio-ecological Setting

Peter Oduor, Ph.D.
University of Missouri - Rolla, 2004
Research Interests: Geographic Information Systems, Groundwater Flow Modeling, Groundwater Contamination

Marinus Otte, Ph.D.
Vrije Universiteit, 1991
Research Interests: Wetland ecology, Biogeochemistry, Ecophysiology and Ecotoxicology

G. Padmanabhan, Ph.D.
Purdue University, 1980
Research Interests: Hydrology, Water Resources, Hydraulic Engineering

Birgit Pruess, Ph.D.
Ruhr- Universitat Bochum, 1991
Research Interest: Microbial Physiology and Gene Regulation

Scott Pryor, Ph.D.
Cornell University, 2005
Research Interests: Biofuel Production from Cellulosic Feedstocks, Biobased Chemicals and Materials, Bioprocess Engineering, Process Optimization, Solid State and Liquid Fermentation Systems

Shafiqur Rahman, Ph.D.
University of Manitoba, 2004
Research Interests: Animal Waste Management, Biosolids Management, Air Quality, Water Quality, Composting

Wendy L. Reed, Ph.D.
Iowa State University, 2000
Research Interests: Physiological Ecology, Wetland and Bird Ecology, Environmental Endocrinology

David A. Rider, Ph.D.
Louisiana State University, 1988
Research Interests: Insect Systematics, Biodiversity

David C. Roberts, Ph.D.
Oklahoma State University, 2009
Research Interests: Evaluation and Design of Economically Efficient Tools and Policies for Pollution Control, Economic Valuation of Environmental and Ecological Attributes Through Revealed and Stated Preference Methods, Valuation of Environmental Risk, and Low-Impact and Precision Agriculture

Bernhardt Saini-Eidukat, Ph.D.
University of Minnesota, 1991
Research Interests: Environmental Geochemistry, Igneous Petrology, Economic Geology

Donald P. Schwert, Ph.D.
University of Waterloo, 1978
Research Interests: Quaternary Paleoecology, Analysis of Fossil Insects

Halis Simsek, Ph.D.
North Dakota State University, 2012

Research Interests: Bioenvironmental Engineering

Dean D. Steele, Ph.D.
University of Minnesota, 1991
Research Interests: Irrigation and Environmental Engineering

Craig A. Stockwell, Ph.D.
University of Nevada, 1995
Research Interests: Conservation Biology, Evolutionary Ecology of Native Fishes, Human-Wildlife Interactions

Jon Sweetman, Ph.D.
Queen's University, 2006
Research Interests: Aquatic Ecology and Environmental Change

Linda Tackett, Ph.D.
University of Southern California, 2014
Research Interests: Norian (and Mesozoic, generally) Paleoecological, Taxonomic, and Environmental Dynamics

Steve E. Travers, Ph.D.
University of California, 1998
Research Interests: Plant Evolutionary Ecology

Cheryl Wachenheim, Ph.D.
Michigan State University, 1994
Research Interests: Eliciting Perceptions and Valuations from Consumers, Firms, Students and Other Stakeholders and Decision Makers

Alexander Wagner, Ph.D.
Oxford University, 1997
Research Interests: Lattice Boltzmann, Spinodal Decomposition, Viscoelasticity, Drop Deformation and Break-up in a Shear Flow, Wetting, Non-equilibrium Thermodynamics, Complex systems

Dennis Wiesenborn, Ph.D.
Rice University, 1989
Research Interests: Refining, Fractionation and Conversion of Fats and Oils from Plants, Process Modeling for Biofuels and Renewable Products

Scott Wood, Ph.D.
Princeton University, 1985
Research Interests: Environmental Geochemistry, Radioactive Waste Disposal

Brian D. Wisenden, Ph.D.
University of Western Ontario, 1993
Research interests: Behavioral Ecology of Fishes, Chemical Ecology of Predator-Prey Interactions, Parental Care and Mating Systems

Environmental Engineering

Department Information

- **Interim Department Chair:**
  Xuefeng (Michael) Chu, Ph.D.
- **Graduate Program Coordinator:**
  Kalpana Katti, Ph.D.
- **Department Location:**
  201 Civil and Industrial Engineering Bldg.
- **Department Phone:**
  (701) 231-7244
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Civil and Environmental Engineering offers a graduate program leading to a Master of Science degree in environmental engineering. The M.S. degree in environmental engineering is offered through a program designed to advance the technical knowledge, competence, and interdisciplinary understanding of the students and to prepare them for entering or advancing within the environmental engineering profession.

The graduate curriculum in environmental engineering offers courses designed to prepare the student with engineering fundamentals as applied to the environment. To complement the major area of study, additional courses are often selected from other disciplines. Students without a B.S. degree in civil engineering will take remedial undergraduate courses to gain an appropriate background in civil engineering.

Admissions Requirements

To be admitted to the graduate Master of Science program in environmental engineering, the applicant must meet the Graduate School requirements (p. 1086).

Financial Assistance

Research and/or teaching assistantships may be available. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference (and TOEFL results for international applicants) must be submitted to The Graduate School. Additional eligibility requirements for teaching assistantships can be found on the Graduate School website.

The Master of Science degree thesis is a scholarly document prepared by the student which is based on research performed. The research topic is chosen by the student in consultation with his or her adviser. The student and adviser together prepare a plan of study to meet the needs of the individual student. The program contains a minimum of 30 credits of graduate-level material, of which the thesis can count 6 to 10 credits. An overall GPA of 3.0 or better must be maintained. An oral defense of the research-based thesis and comprehensive academic subject matter is required.

A student entering the environmental engineering Master of Science degree program without an undergraduate engineering degree will be required to satisfy the undergraduate requirements for mathematics, basic science, and engineering sciences in addition to the Master of Science requirements.

Achintya N. Bezbaruah, Ph.D.
University of Nebraska-Lincoln, 2002
Research Interests: Environmental sensors, Recalcitrant and micro pollutants, Contaminant fate and transport, Small community water and wastewater treatment, Environmental management

Xuefeng (Michael) Chu, Ph.D.
University of California, Davis, 2002
Research Interests: Watershed Hydrologic and Environmental Modeling, Overland Flow and Infiltration, Integrated Modeling of Flow and Contaminant Transport

Wei Lin, Ph.D.
State University of New York at Buffalo, 1992
Research Interests: Water and Wastewater Treatment, Hazardous Waste Management

G. Padmanabhan, Ph.D. (Emeritus)
Purdue University, 1980
Research Interests: Stochastic Hydrology, Water Resource Systems, and Hydrologic Modeling

Eakalak Khan, Ph.D. (adjunct)
University of California, Los Angeles, 1997
Research Interests: Water and Wastewater Quality, Water and Wastewater Treatment, and Storm Water and Non-point Source Pollution

Robert Zimmerman, Ph.D. (adjunct)
North Dakota State University, 1991
Research Interests: Water and Wastewater Treatment, Solid Waste

Exercise Science and Nutrition

Department Information

- **Program Director:**
  Kyle Hackney, Ph.D.
- **Department Location:**
  Bentson Bunker Fieldhouse
- **Department Phone:**

(701)231-6737

- **Department Web Site:**
  www.ndsu.edu/hnes/phd_in_exercise_science_and_nutrition/
- **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.
- **Degrees Offered:**
  Ph.D.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5

Program Description

The Department of Health, Nutrition and Exercise Sciences (HNES) offers a doctoral program in Exercise Science and Nutrition. Exercise Science and Nutrition are traditionally separate disciplines that strive to improve human health or human performance. Combined, the two form a strong and natural approach to improve well-being. Exercise Science and Nutrition includes the study of energy systems, nutrient intake, behavior motivation, and the physiology and mechanics of movement. Faculty are scholars in community nutrition, nutrition across the lifespan, clinical nutrition, exercise science, biomechanics, and physical activity and health. Prevention and treatment of obesity, improving physical activity, and building community-based health enhancements across the lifespan are strengths of the HNES faculty.

Program Objectives

The purpose of the program is to train doctoral students in Exercise Science and Nutrition. The program requires coursework and activities that will produce professionals with strong skills in research, teaching, grant writing, and service who will be competitive and productive in their careers. These professionals will have a strong understanding of both Exercise Science and Nutrition that will enable them to assume positions of leadership in research and teaching in community, government, university or other professional agencies and organizations.

Students will:

1. Acquire ability, knowledge, and research skills in Exercise Science and Nutrition
2. Conduct original research in Exercise Science and Nutrition
3. Gain experience with classroom teaching
4. Be prepared as professionals in Exercise Science and Nutrition

Career Opportunities

A doctorate in Exercise Science and Nutrition offers a wide array of career opportunities. Graduates of the program can expect to work for governmental and human service agencies, for-profit and not-for-profit research organizations, as well as in university-level education and research positions. A unique and attractive aspect to this degree is that it can prepare students to work in either nutrition or exercise science academic units upon graduation. Graduates of this program are equipped to meet the needs of changing regional, national, and global populations as related to their health and well-being.

Admission Requirements

Of the qualified PhD applicants we receive, we expect to admit up to five students per year, based on the capacity of our current faculty. In addition to the core faculty members in HNES who will advise students and participate in this program, there are faculty inside and outside of the department whose research interests mesh well with the program.

Applicants with a Master's degree:

- Completion of a Master's degree from an accredited university in a field closely related to Nutrition, Health, Dietetics, Kinesiology, or Exercise Science.
- Cumulative graduate GPA of 3.00 or higher.
- GRE exam scores in the upper 50th percentile for the Verbal, Quantitative, and Writing portions are given priority admission.
- At least one graduate course in statistics and one course in research methods, with grades of B or higher in each.
- A completed thesis or research paper.
- Agreement to be advised by current HNES graduate faculty member.

Applicants without an earned Master's degree:

- Completion of a Bachelor's degree from an accredited university in a field closely related to Nutrition, Health, Dietetics, Kinesiology, or Exercise Science.
- Cumulative undergraduate GPA of 3.0 or higher.
- GRE exam scores in the upper 50th percentile for the Verbal, Quantitative, and Writing portions are given priority admission.
- At least one statistics course or research methods course with grades of B or higher.
- Agreement to be advised by current HNES graduate faculty member.

Financial Assistance

Graduate Assistantships are available for up to 20 hours a week based on faculty need and available funding. Assistantships are renewable on a yearly basis dependent upon student performance. Assistantship awards also include full tuition remission regardless of residency. Students are typically provided shared offices, computers, and access to printers, and support staff. Assistantships typically begin the week before fall semester classes and continue through finals week of spring semester. Summer is not included in most assistantship awards.

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 727	Physical Activity Epidemiology	
Electives (up to 6 credits outside of HNES)		18
HNES 652	Nutrition, Health and Aging	
HNES 655	Sports Nutrition	
HNES 703	Graduate Biomechanics of Sport and Exercise	
HNES 704	Psychological Foundation of Sport & Physical Activity	
HNES 710	Introduction to Research Design and Methods in HNES	
HNES 721	Health Promotion Programming	
HNES 724	Nutrition Education	
HNES 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 777	Scholarly Writing and Presenting in HNES	
HNES 790	Graduate Seminar	
HNES 791	Temporary/Trial Topics	
Research Practicum (minimum of 3 credits, may be waived with significant evidence of research experience based on committee approval)		3-6
HNES 894	Practicum/Internship	
Teaching Experience (minimum of 3 credits, may be waived with significant evidence of teaching experience based on committee approval)		3-6
HNES 892	Graduate Teaching Experience	
Dissertation (must encompass at least two seperate semesters)		15
HNES 899	Doctoral Dissertation	
Total Credits (minimum)		60

Students Entering with a Bachelor's Degree

Code	Title	Credits
Research Core		21
STAT 725	Applied Statistics	
HNES 710	Introduction to Research Design and Methods in HNES	
HNES 777	Scholarly Writing and Presenting 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 727	Physical Activity Epidemiology	
Electives (up to 6 credits outside of HNES)		33
HNES 652	Nutrition, Health and Aging	
HNES 655	Sports Nutrition	
HNES 703	Graduate Biomechanics of Sport and Exercise	
HNES 704	Psychological Foundation of Sport & Physical Activity	
HNES 721	Health Promotion Programming	
HNES 724	Nutrition Education	
HNES 743	Obesity Across the Lifespan	
HNES 754	Assessment in Nutrition and Exercise Science	
HNES 760	Skeletal Muscle Physiology	
HNES 761	Physiological and Fitness Assessment in Exercise Science	
HNES 790	Graduate Seminar	
HNES 791	Temporary/Trial Topics	
Research Practicum (9-12 credits, may be waived with significant evidence of research experience based on committee approval)		9-12
HNES 894	Practicum/Internship	
Teaching Experience (3-6 credits, may be waived with significant evidence of teaching experience based on committee approval)		3-6
HNES 892	Graduate Teaching Experience	
Dissertation (must encaompass at least two semesters)		15
HNES 899	Doctoral Dissertation	
Total Credits (minimum)		90

Ardith Brunt, Ph.D.
Iowa State University, 1999
Research Interests: Nutrition, Gerontology

Bryan Christensen, Ph.D.
University of Kansas, 2000
Research Interests: Biomechanics, Sports Psychology, Strength and Conditioning

Shannon David, Ph.D.
Ohio University, 2013
Research Interests: Patient Clinician Relationship, Quantification of Intervention Outcomes

Joe Deutsch, Ph.D.
North Dakota State University, 2007
Research Interests: Physical Education Teacher Education, Coaching

Kara Gange, Ph.D.
North Dakota State University, 2010
Research Interests: Therapeutic Modalities, Diagnostic Ultrasound

Julie Garden-Robinson, Ph.D.
North Dakota State University, 1994
Research Interests: Nutrition, Food Safety

Nikki German, Ph.D.
North Dakota State University, 2008
Research Interests: Athletic Training

Kyle Hackney, Ph.D.
Syracuse University, 2013
Research Interests: Skeletal Muscle, Sarcopenia, Muscle Inactivity, Ergogenic Aids

Jenny Linker, Ph.D.
University of Illinois Urbana-Champaign, 2011

Research Interests: Comprehensive School Physical Activity Programs, Physical Education Teacher Preparation

Katie Lyman, Ph.D.
University of South Florida, 2014
Research interests: Kinesio Tape®, Manual Medicine, Emergency Medicine

Yeong Rhee, Ph.D.
Oklahoma State University, 1999
Research Interests: Chronic Disease Prevention, Immune Function, Functional Foods

Sherri Nordstrom Stastny, Ph.D.
North Dakota State University, 2007
Research Interests: Nutrition, Gerontology

Bradford N. Strand, Ph.D.
University of New Mexico, 1988
Research Interests: Physical Education Curriculum and Instruction, Fitness Education, Sport Sociology

Donna J. Terbizan, Ph.D.
The Ohio State University, 1982
Research Interests: Exercise Physiology, Fitness, Wellness, Exercise Science, Chronic Disease Change

Extension Education

Department Information

- **Program Coordinator:**
  Adam Marx, Ph.D.
- **Program Coordinator:**
  David Ripplinger, Ph.D.
- **Department Location:**
  School of Education, FLC 210
- **Department Phone:**
  (701) 231-7921
- **Application Deadline:**
  April 1 for fall semester and December 1 for spring semester.
- **Degrees Offered:**
  M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

Extension Education offers graduate study leading to the M.S. and M.Ed. degrees. Specialized training in an area of interest is required.

Admission Requirements

In addition to the Graduate School's required application materials, the program requires 1) a statement of purpose that addresses the question, "How will this degree help me achieve my professional goals?" 2) a letter from a faculty member/specialist expressing their willingness and ability to mentor the candidate in their area of interest.

Admission is only considered after all required application materials have been received and reviewed.

This program requires completion of a minimum of 31 credits.

Code	Title	Credits
Core Courses		13
H&CE 646	Extension Education	
H&CE 724	Program Development In Vocational Education	
H&CE 756	Program Development and Evaluation	
EDUC 750	Reflective Practice and Research in Education	

EDUC 851	Adult Learning (or EDUC 882 or EDUC 853)	
Research Methods		6
EDUC 702	Statistics In Educational Research	
or STAT 725	Applied Statistics	
EDUC 883	Survey Research (or similar)	
Major/Concentration*		6
Capstone		6
H&CE 798	Master's Thesis (M.S. degree students)	
H&CE 794	Practicum/Internship (Action Research/Creative Project - M.Ed. degree students)	
Total Credits		31

Adam A. Marx, Ph.D.
University of Missouri, 2014
Research Interests: Adolescent Career Decision-Making, Student Engagement, Teacher Development

David Ripplinger, Ph.D.
North Dakota State University, 2011
Research Interests: Production Economics and Marketing

Family and Consumer Science Education

Department Information

- **Department Chair:**
  Chris Ray, Ph.D.
- **Graduate Coordinator:**
  Mari Borr, Ph.D.
- **Department Location:**
  School of Education, FLC 210
- **Department Phone:**
  (701) 231-7921
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  M.S., M.Ed.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

Students have the option of pursuing a Master of Education (M.Ed.) or Master of Sciences (M.S.) degree in Family and Consumer Sciences Education. Advanced work may be taken in FCSE, Career and Technical Education, Extension, and curriculum design and development.

The NDSU programs in education are accredited by National Council for Accreditation of Teacher Education and are approved by the ND Education Standards and Practices Board. Changes in national and state legislation, standards, or rules can affect academic program requirements.

Option A

This program is designed for a person who already has a bachelor's degree in a Family and Consumer Sciences related area and would like to work toward obtaining a teaching license. Upon completion, the program provides the pedagogy requirements for a Family and Consumer Sciences teaching certificate. Depending on the individual's bachelor's degree, there will most likely be several content courses that will need to be taken as well to meet licensing requirements. Licensing also involves state mandated tests. Student teaching is included in this program. This program is offered through the Great Plains Interactive Distance Education Alliance. All courses in this master's degree are offered online and are taught by faculty at several different universities. For more information, please see:http://www.hsidea.org/programs/fcsed/.

NOTE: Earning an academic/professional degree does not necessarily lead to state credential or licensure. People seeking licensure may need to meet additional requirements such as tests and additional coursework. Potential and current students should consult with the appropriate academic program coordinator for advice about licensure, certification, or credentialing after communicating with the appropriate state official.

Option B

This program is designed to provide persons who currently hold a teaching degree in Family and Consumer Sciences with an expanded background in Family and Consumer Sciences Education and related content areas. It also examines the broader field of education, with a solid foundation in research methodology. Students are encouraged to complete additional course work in areas of interest. Internships can be incorporated into the program of study and provide an opportunity for students to examine current issues. Candidates should work closely with an adviser.

Qualified students may apply for admission to graduate programs in the School of Education leading to Master of Education (M.Ed.) or Master of Science (M.S.) degrees.

In addition to the Graduate School's required application materials, the program requires submission of a statement of career goals consistent with the five propositions of the National Board of Professional Teaching Standards (NBPTS), http://www.nbpts.org/ as well as reasons for applying to the program. The School of Education reserves the right to obtain additional information about the student's professional competence from qualified professionals.

Those applying to Option A will also need to 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.

Admission is considered only after all required application materials have been received and reviewed. Where appropriate, all international student requirements must be met.

Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data. A student must meet all requirements for full admission.

Financial Assistance

Graduate assistantships are available in the School of Education. Applications are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. Students must be accepted into the Graduate School before they are eligible for an assistantship.

All enrollments in Education courses before the student files a graduate plan of study must be approved by the adviser. The School of Education will evaluate graduate courses taken prior to filing the graduate plan of study when the student's plan of study is being considered. Only those courses approved by the School of Education may be included on the final plan of study leading to the degree.

Master's programs within the School of Education require a minimum of 30 semester credits (minimums vary by academic program). The Master of Science (M.S.) degree requires a disquisition. The Master of Education (M.Ed.) degree is a non-disquisition, practitioner-oriented degree. Programs vary on requiring a written comprehensive exam or a portfolio/oral.

Option A Program (Master of Education)

Code	Title	Credits
Education Courses		9
EDUC 751	Students and Their Learning	
EDUC 755	Exceptional Learners in the Secondary School Classroom	
EDUC 775	Content Area Reading	
Major Concentration		21
H&CE 668	Methods of Teaching Family and Consumer Sciences I: Techniques	
H&CE 682P	Methods of Teaching Family and Consumer Sciences II: Professional Practices	
H&CE 740	Vocational Philosophy and Policy	
H&CE 771	Human Relations for Educators	
H&CE 773	Occupational Programs in Family and Consumer Science	
H&CE 774	Teaching Family and Consumer Science with Technology	
H&CE 776	Research Design in Family and Consumer Sciences	
Field Experiences		11
H&CE 687P	Student Teaching	
H&CE 794	Practicum/Internship (with H&CE 668 & H&CE 682P)	
Total Credits		41

Option B Program (Master of Science or Master of Education)

Code	Title	Credits
Core Courses		15
EDUC 750	Reflective Practice and Research in Education	3

EDUC 751	Students and Their Learning	3
EDUC 752	Curriculum Design and Delivery	3
EDUC 753	Managing/ and Monitoring Learning	3
EDUC 702	Statistics In Educational Research	3
Major/Concentration		15-24
Choose from the following:		
H&CE 667	Advising Family, Career, and Community Leaders of America	
EDUC 775	Content Area Reading	
H&CE 724	Program Development In Vocational Education (non -GPIDEA only)	
H&CE 740	Vocational Philosophy and Policy	
H&CE 772	Curriculum Development in Family and Consumer Sciences	
H&CE 773	Occupational Programs in Family and Consumer Science (through GPIDEA only)	
H&CE 774	Teaching Family and Consumer Science with Technology	
H&CE 776	Research Design in Family and Consumer Sciences (through GPIDEA only)	
H&CE 777	Evaluation in Family and Consumer Sciences (through GPIDEA only)	
H&CE 778	Administration of Family and Consumer Sciences Programs (through GPIDEA only)	
H&CE 779	Techniques of Supervision in Family and Consumer Sciences (through GPIDEA only)	
H&CE 787	Issues In Education	
H&CE 790	Graduate Seminar	
H&CE 795	Field Experience	
Research Paper (as approved by adviser)		3-10
H&CE 794	Practicum/Internship (Action Research)	
H&CE 798	Master's Thesis	6-10
Total Credits		33-49

Mari Borr, Ph.D.
University of North Dakota, 2005
Research Interests: Qualitative Research, Family and Consumer Science Education, Adolescent Development, Experiential Learning, and Professional Development Evaluation

Food Safety

Program and Application Information

The program is currently undergoing reorganization into a Master of Public Health (MPH). Entry into the MPH program is anticipated for fall semester of 2019. Applications will not be accepted before February 2019. Additional information will be posted as it becomes available

Graduate School
Email: ndsu.grad.school@ndsu.edu
Phone: (701) 231-7033
Fax: (701) 231-6524

Master of Public Health Program Description

The Food Safety educational program at NDSU was founded in 2001 to help meet the increasing need for individuals with food safety expertise in government, business, and academia. NDSU graduate faculty who participate in the food safety programs are from multiple colleges, and cover several areas of expertise including microbiological sciences, communication, public health, food and nutrition, and plant sciences.

As our food system becomes more globalized and complex, it is increasingly important for public health professionals to engage consumers and members of the food industry including farmers, food processors, and food service workers. Monitoring and preventing the spread of foodborne disease, disseminating and enforcing key laws or regulations, and education the public on safe food handling practices are top priorities. These priorities can be achieved through utilization of innovative methods in the areas of molecular microbiology, biotechnology, science-based risk assessment and management, hygiene principles, food safety laws and regulations, and active surveillance programs. The NDSU MPH degree with a specialization in Food Safety will provide students with the necessary skills and knowledge to become vital frontline members working to keep our population and food systems safe and secure.

Students have the flexibility to focus assignments and choose at least two electives based on their interests and professional goals. Topics of potential interest include: disease diagnosis and detection, prevention of disease spread in food systems, public health policy, and emergency

responses to emerging food security threats. Application of these topics all build upon the food safety specialization curriculum and MPH foundational core course.

Students will take the required foundational Master of Public Health courses (https://www.ndsu.edu/publichealth/curriculum), including Biostatistics, Epidemiology, Public Health Management and Policy, Environmental Health, Community Health Leadership, and Social and Behavioral Sciences in Public Health. In addition, students will be required to complete the Master of Public Health practicum and a master's paper—each focused on Food Safety topics in Public Health. The 18-credit specialization curriculum is described below.

Genomics and Bioinformatics

Department Information

- **Program Director:**
  Phillip McClean, Ph.D.
- **Email:**
  Phillip.McClean@ndsu.edu
- **Department Location:**
  Plant Sciences, Loftsgard Hall
- **Department Phone:**
  (701) 231-8443
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

Genomics and Bioinformatics is an interdisciplinary graduate program that involves faculty from nine departments. Advanced research and study will focus on either functional or computation genomics. The program is designed to provide both M.S. and Ph.D. students the necessary skills and intellectual background to work cooperatively with others in a research area that takes a systems-wide approach to the study of the organization and expression of the many genes and their products expressed in an organism. Exposure to modern techniques and instrumentation will prepare the student for success in both industrial and academic careers.

Research

The student is required to perform original research in an area of genomics. This will be under the direction of the student's major adviser. To promote cross-disciplinary research, the student is encouraged to collaborate with a student in the other track. This does not apply to M.S. students pursuing the Comprehensive Study Option.

It is the intent of the program to admit students in either of two tracks. The Functional Genomics track will be for students interested in the generation and application of genomic information. The Computational Bioinformatics track is intended for students interested in using computer science and statistical approaches to analyze large amounts of genomic data.

The Genomics graduate program is open to qualified graduates of universities of recognized standing. The Graduate School minimum for the TOEFL examination applies. In addition, the following are the requirements to be admitted with full standing.

Functional Genomics track: a B.S. degree with courses in genetics, physiology, biochemistry; an upper-division statistics class; an introductory biology class emphasizing molecular biology; and minimum undergraduate GPA of 3.0.

Computational Bioinformatics track: a B.S. degree with courses in calculus, comparative computer languages, data structures, an upper-division statistics class, an introductory biology class emphasizing molecular biology, and minimum undergraduate GPA of 3.0.

Students can be accepted conditionally into either track without meeting the course or GPA requirements, but will be required to meet those requirements while in residency.

Adviser and Graduate Committee

During the first year, the student will form a graduate committee and submit the Plan of Study to the Graduate School. The committee must include the student's major adviser, at least one other faculty member of the Genomics and Bioinformatics program, and a third member from outside the student's home college. For Ph.D. students only, a fourth member of the committee serves as the Graduate School Representative (GSR). The GSR

must be a full member of the graduate faculty, AND be either a tenured faculty member outside the committee chair's/co-chairs' home department(s) OR a faculty member outside the primary college of the committee chair/co-chairs. For this interdisciplinary program, the GSR must ALSO be outside of the program. Additionally, the GSR must be clear of any conflicts of interest with either the student or the committee chair/co-chairs. Examples of possible conflicts of interest may include budgetary relationships, family or financial, personal relationships, or research and/or publication relationships between the GSR and either the student or the committee chair.

Ph.D. Program

FUNCTIONAL GENOMICS OPTION

- Ph.D. Core Courses 13 credits
- Support Courses (required unless on incoming transcript) BIOL 859 Evolution , PLSC 631 Intermediate Genetics, STAT 726 Applied Regression and Analysis of Variance
- Electives minimum of 15 credits from the Physiology, Gene Expression, Genetics and Computational Elective areas; one course from each of the Physiology, Gene Expression, Genetics elective areas is required
- Research to 90 credits total **(NOTE: a minimum of 15 didactic credits must be 700-level courses)**

BIOINFORMATICS OPTION

- Ph.D. Core Courses 13 credits
- Support Courses (required unless on incoming transcript) PLSC 731 Plant Molecular Genetics, STAT 661 Applied Regression Models, CSCI 796 Special Topics
- Electives - minimum of 15 credits; a minimum of three courses must be from the Computational area and a minimum of one course must be from either the Physiology, Gene Expression or Genetics Elective areas
- Research to 90 credits total **(NOTE: a minimum of 15 didactic credits must be 700-level courses)**

M.S. Program - Thesis Option

FUNCTIONAL GENOMICS OPTION

- M.S. Core Courses 11 credits
- Electives- minimum of 9 credits from the Physiology, Gene Expression, and Genetics areas; a minimum of one course must be selected from each of two of these areas
- Research to 30 credits total

BIOINFORMATICS OPTION

- M.S. Core Courses 11 credits
- Electives - minimum of 9 credits; a minimum of one course must be from the Physiology, Gene Expression or Genetics Elective areas; the remainder of the courses must be from the Computational area
- Research to 30 credits total

M.S.Program - Comprehensive Study Option

FUNCTIONAL GENOMICS OPTION

- M.S. Core Courses 11 credits
- Electives- minimum of 15 credits from the Physiology, Gene Expression, and Genetics areas; a minimum of one course must be selected from each of two of these areas
- Masters Paper to minimum of 30 credit total

BIOINFORMATICS OPTION

- M.S. Core Courses 11 credits
- Electives - minimum of 15 credits; a minimum of two courses must be from the Physiology, Gene Expression or Genetics Elective areas; the remainder of the courses must be from the Computational area

Masters Paper to minimum of 30 credit total

Examinations

1. **Qualifying Exam (Ph.D. only):** This exam consists of written and oral portions. The student will complete a written exam that emphasizes the application of materials presented in the core courses. The members of the genomics graduate program will submit these questions. The oral exam will be administered by the student's graduate committee and will focus on material beyond the core courses that are specific to the research of the student. Upon completion of the qualifying exam, the student will be accepted as a Ph.D. candidate.
2. **Final Exam (M.S. and Ph.D.):** The final exam will be an oral defense of the student's research results. The student's graduate committee will administer the exam.
3. **Comprehensive Study Option Paper (M.S. only):** M.S. students pursuing the Comprehensive Study Option will be required to complete an in-depth paper of a specific topic relevant to Genomics. The paper will be reviewed and accepted by the student's graduate committee.

Code	Title	Credits
Core Courses		11 (M.S.) - 13 (Ph.D.)
PLSC 611	Genomics	
CSCI/MATH/STAT 732	Introduction To Bioinformatics	
PLSC/BIOC 721	Genomics Techniques	
796 Current Topics in Genomics 2 (MS) or 3 cr. (Ph.D.)		
790 Graduate Seminar 1 (M.S.) or 2 (Ph.D.) cr		

Code	Title	Credits
Electives		
Physiology		
ANSC 828	Advanced Reproductive Biology	3
MICR 670	Basic Immunology	3
MICR 680	Bacterial Physiology	3
MICR 781	Advanced Bacterial Physiology	3
PPTH 751	Physiology Of Plant Disease	3
ZOO 660	Animal Physiology	3
ZOO 664	Endocrinology	3
ZOO 682	Developmental Biology	3
ZOO 866	Advanced Animal Behavior	3
Gene Expression		
BIOC 719	Molecular Biology of Gene Expression and Regulation	3
BOT 820	Advanced Cell Biology	3
MICR 775	Molecular Virology	3
PLSC 731	Plant Molecular Genetics	3
Genetics		
BIOL 859	Evolution	3
BIOL 796	Special Topics	3
MICR 682	Bacterial Genetics and Phage	3
MICR 783	Advanced Bacterial Genetics and Phage	3
PLSC 631	Intermediate Genetics (required for Functional Genomics Option)	3
PLSC 741	Cytogenetics	4
PLSC 751	Advanced Plant Genetics	3
PLSC 780	Population Genetics	2
PLSC 781	Quantitative Genetics	2
PPTH 759	Host-Parasite Genetics	3
Computational		
CSCI 724	Survey of Artificial Intelligence	3
CSCI 859	Computational Methods in Bioinformatics	3
CSCI 760	Dynamic Programming	3

CSCI 765	Introduction To Database Systems	3
CSCI 783	Topics In Software Systems	3
CSCI 796	Special Topics (Knowledge Discovery in Biological Data)	3
CSCI 796	Special Topics (Signal Processing and Analysis in Bioinformatics)	3
MATH 684	Mathematical Methods of Biological Processes	3
STAT 650	Stochastic Processes	3
STAT 661	Applied Regression Models (required for Bioinformatics Ph.D. option)	3
STAT 730	Biostatistics	3
STAT 764	Multivariate Methods	3
STAT 796	Special Topics (required for Bioinformatics Ph.D. option)	3

Peter Bergholz, Ph.D.
Michigan State University, 2007
Department: Veterinary and Microbiological Sciences
Research Interest: Bacterial Population and Landscape Genomics

Eugene Berry, Ph.D.
Northeastern University, 1983
Department: Veterinary and Microbiological Sciences
Research Interest: Animal Virology

Xiwen Cai, Ph.D.
Washington State University, 1998
Department: Plant Sciences
Research Interest: Cytogenetics

Michael J. Christoffers, Ph.D.
University of Missouri-Columbia, 1998
Department: Plant Sciences
Research Interest: Weed Molecular Genetics

Anne Denton, Ph.D.
University of Mainz, 1996
Department: Computer Science
Research Interest: Data Mining, Bioinformatics

Justin D. Faris, Ph.D.
Kansas State University, 1999
Department: Plant Sciences
Research Interest: Wheat Molecular Genetics

Nathan Fisher, Ph.D.
University of Michigan, 2006
Department: Veterinary and Microbiological Sciences
Research Interest:Functional Genomics and Gene Exaptation

Timothy Friesen, Ph.D.
North Dakota State University, 2001
Department: Plant Pathology
Research Interest: Host-Pathogen Interactions of Cereals

Jill Hamilton, Ph.D.
University of British Columbia, 2012
Department: Biological Sciences
Research Interest: Plant Evolutionary Genomics

David P. Horvath, Ph.D.
Michigan State University, 1993
Department: Plant Sciences
Research Interest: Perennial Weed Physiology

Rick Jansen, Ph.D.
University of Minnesota, 2009

Department: Public Health
Research Interest: Molecular and Genomic Epidemiology

Zhaohui Liu, Ph.D.
North Dakota State University, 2006
Department: Plant Pathology
Research Interest: Host-Parasite Interactions of Wheat

Phillip E. McClean, Ph.D.
Colorado State University, 1982
Department: Plant Sciences
Research Interest: Plant Molecular Genetics

Steven W. Meinhardt, Ph.D.
University of Illinois, Champaign-Urbana, 1984
Department: Biochemistry and Molecular Biology
Research Interest: Protein Structure/Function

Kendall Nygard, Ph.D.
Virginia Polytechnic Institute and State University, 1978
Department: Computer Science
Research Interest: Bioinformatics

William Perrizo, Ph.D.
University of Minnesota, 1972
Department: Computer Science and Operation Research
Research Interest: Distributed Database Systems, Centralized Database Systems

Birgit Pruess, Ph.D.
Ruhr-Universitat Bochum, 1991
Department: Veterinary and Microbiological Sciences
Research Interest: Microbial Physiology and Gene Regulation

Jack B. Rasmussen Ph.D.
Michigan State University, 1987
Department: Plant Pathology
Research Interest: Molecular Plant/Microbe Interactions

Katie Reindl, Ph.D.
North Dakota State University, 2006
Department: Biological Sciences
Research interest: Cancer cell biology

Saeed Salem, Ph.D.
Rensselaer Polytechnic Institute, 2009
Department: Computer Science
Research Interest: Bioinformatics Analysis of Biological Networks

Vasant A. Ubhaya, Ph.D.
University of California-Berkeley, 1971
Department: Computer Science and Operations Research
Research Interest: Algorithm Analysis, Operations Research

Changhui Yan, Ph.D.
Iowa State University, 2005
Department: Computer Science
Research interest: Computational Bioinformatics

Yarong Yang, Ph.D.
Northern Illinois University, 2010
Department: Statistics
Research interest: Bioinformatics

Gerontology

Department Information

- **Program Coordinator:**
  Susan Ray-Degges, Ph.D.
- **Department Phone:**
  (701) 231-7218
- **Application Deadline:**
  Based on first major requirements.
- **Degrees Offered:**
  Ph.D. Dual Major
- **English Proficiency Requirements:**
  Based on first major requirements.

Program Description

The Doctor of Philosophy (dual-major) option in Gerontology at North Dakota State University provides unique opportunities to study and conduct research in this growing and exciting field. The Gerontology Ph.D. at North Dakota State University (NDSU) is a dual-major linking a discipline based Plan of Study with an interdisciplinary perspective on aging. Depending on your specific area of interest, students will combine academic coursework in a primary major (Developmental Science, Exercise Science and Nutrition, or Occupational and Adult Education) with a secondary dual-major in Gerontology. The mission of the Gerontology Ph.D. is to promote aging-related research and education at North Dakota State University that uses a discipline based perspective that serves to enhance the length and quality of life.

Admission Requirements

Based on first major requirements.

In addition to meeting the requirements for the first major, the following Gerontology requirements must be completed.

Code	Title	Credits
ADHM 705	Environment and Aging	3
HDFS 723	Perspectives in Gerontology	3
HDFS 760	Aging Policy	3
HNES 652	Nutrition, Health and Aging	3
or HNES 726	Nutrition in Wellness	
EDUC 853	Instructional Methods for Adult Learners	3

Other Requirements:

- Dissertation on a Gerontology-related topic.
- Committee chair from the home department.
- At least two committee members from the approved Gerontology faculty list, one who must be from the home program area.

Health, Nutrition and Exercise Science

Department Information

- **Department Head:**
  Yeong Rhee, Ph.D.
- **Graduate Coordinator:**
  Kyle Hackney, Ph.D.
- **Department Location:**
  Bentson Bunker Fieldhouse
- **Department Phone:**
  (701) 231-7474
- **Department Web Site:**
  www.ndsu.edu/hnes/

- **Application Deadline:**
  Exercise/Nutrition Science option: Applications completed by March 15 will be given priority for fall. Leadership in Physical Education and Sport option: April 1; Enrollment is limited to 20 students. M.S. Dietetics (online), GPIDEA: March 1 for summer/ fall and October 15 for spring.
- **Degrees Offered:**
  M.S.
- **Test Requirement:**
  GRE required only Exercise/Nutrition Science option
- **English Proficiency Requirements:**
  TOEFL iBT 79; IELTS 6.5

Program Description

The Department of Health, Nutrition, and Exercise Sciences (HNES) offers graduate study leading to the Master of Science (M.S.) degree in HNES with options in Exercise/Nutrition Science and Leadership in Physical Education and Sport. The HNES department also offers a Master of Science (M.S.) in Dietetics (on line through the Great Plains Interactive Distance Education Alliance), Master of Science (M.S.) in Advanced Athletic Training (http://www.ndsu.edu/hnes/advanced_athletic_training_post_professional) and a Master of Athletic Training (MATrg) (http://www.ndsu.edu/hnes/athletic_training_professional) degree. A Ph.D. degree in Exercise Science and Nutrition (http://www.ndsu.edu/hnes/phd_in_exercise_science_and_nutrition) is also available.

M.S. in Health, Nutrition and Exercise Sciences

Option in Exercise/Nutrition Science

The Exercise/Nutrition Science option prepares the graduate for advanced positions with an emphasis in the areas of physical activity, exercise science, nutrition, and health promotion. The department is devoted to researching and understanding the long-term effects of physical activity and nutrition, and translating this research into effective exercise science and wellness programs for children, adolescents, and adults of all ages. This option is appropriate for athletic trainers, nutrition, and exercise science graduates.

Admission requirements are as follows:

1. Cumulative baccalaureate GPA of 3.0 or better on a 4.0 scale.
2. Graduate Record Examination (GRE).
3. Completion of a Bachelor's degree from an accredited university in field closely related to Nutrition, Dietetics, or Exercise Science.
4. A faculty has agreed to be the applicant's mentor.

Accelerated BS/MS in Dietetics and Nutrition

This is a combined program for undergraduate dietetics students. Students apply for the dietetics program in the spring of their second (sophomore) year and then apply for the accelerated M.S. program in the fall of their third (junior) year. Students in this option will earn a B.S. in Dietetics, an M.S. in Exercise/Nutrition Science, and complete the required 1200 hours of supervised practice to sit for the national Registration Exam for Dietitians. The program is designed to be completed in 5 years. Students who are interested should contact the College of Human Development and Education Academic Advisor located in EML 270 for more information.

Option in Leadership in Physical Education and Sport

The Leadership in Physical Education and Sport (LPES) option is an online program that prepares teachers and coaches to become actively engaged in leadership roles within school systems or professional organizations. This degree prepares students to be master teachers, head coaches, department heads, and activities directors at the interscholastic level; assistant coaches, lecturers, and assistant or lead directors at the intercollegiate level; and to become actively engaged in leadership roles within professional organizations.

Admission requirements are as follows:

1. Cumulative baccalaureate GPA of 3.0 or better on a 4.0 scale.
2. Undergraduate degree in the field of Kinesiology (physical education, coaching, etc.)

A 3.0 is needed to be considered for full acceptance into the LPES program. Applicants with a undergraduate GPA below 3.0 will be considered for conditional acceptance and will have to complete 9 graduate credit hours with grades of at least B to be considered for full standing. Meeting these criteria does not guarantee acceptance.

M.S. in Dietetics (On-line)

The Dietetics program prepares registered dietitians to practice at an advanced level or pursue doctoral study. The Great Plains Interactive Distance Education Alliance program in Dietetics provides opportunities for registered dietitians and registration-eligible dietetic graduates to integrate and

apply principles from the biomedical sciences, human behavior, and management to design and lead effective food and nutrition programs in a variety of settings. This program is fully online (http://www.ndsu.edu/hnes/dietetics_on_line).

In a multi-institution degree program, students (must be registered dietitians or registration-eligible dietetic graduates):

1. Apply and are admitted to one university;
2. Enroll in all courses at that university; and
3. Graduate or receive a certificate from that university.

Ph.D. in Exercise Science and Nutrition

The Department of Health, Nutrition and Exercise Sciences (HNES) offers a doctoral program in Exercise Science and Nutrition. Exercise Science and Nutrition includes the study of energy systems, nutrient intake, behavior motivation, and the physiology and mechanics of movement. Faculty are scholars in community nutrition, nutrition across the lifespan, clinical nutrition, exercise science, biomechanics, and physical activity and health. Prevention and treatment of obesity, improving physical activity, and building community-based health enhancements across the lifespan are strengths of the HNES faculty. Graduates of this program will have a strong understanding of both Exercise Science and Nutrition that will enable them to assume positions of leadership in research and teaching in community, government, university or other professional agencies and organizations.

Admission requirements are as follows:

1) Cumulative baccalaureate GPA of 3.0 or better on a 4.0 scale.

2) Graduate Record Examination (GRE).

3) Completion of a Bachelor's or Master's degree from an accredited university in field closely related to Nutrition, Health, Dietetics, Kinesiology, or Exercise Science.

4) A faculty has agreed to be the applicant's mentor.

In addition to Graduate School admission requirements, the following criteria will be considered at the time of application for admission into graduate study. Admission to a master's degree program is considered ONLY after all required application materials have been received and reviewed. In order to be considered, the applicant must have a Bachelor of Science degree in an HNES related field from an accredited institution, an overall undergraduate GPA of 3.0 on a 4.0 scale, and have submitted all required materials as listed. The GRE is required for the Ph.D. and the M.S. option in Exercise/ Nutrition Science.

During the application process, the applicant must submit an exhibit of his/her written competency through an essay discussing professional philosophy and professional goals.

The Department of Health, Nutrition, and Exercise Sciences reserves the right to obtain additional information about the applicant's professional competence from qualified professionals. Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data.

Financial Assistance

Both research and teaching assistantships may be available. Applications are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference must be received by the Graduate School by the program deadline. The department admits students for fall semester only in the Ph.D. program and the MS Exercise/Nutrition option. Graduate assistants receive a financial stipend for their work, and a full tuition waiver for fall, spring, and summer semesters. Assistantships are available contingent upon current funding and faculty need.

Exercise/Nutrition Science Option

Code	Title	Credits
Required Courses		
HNES 790	Graduate Seminar (Introduction to HNES)	1
HNES 710	Introduction to Research Design and Methods in HNES	3
HNES 777	Scholarly Writing and Presenting in HNES	3
STAT 725	Applied Statistics	3
HNES 713	Graduate Exercise Physiology (Restricted to students enrolled in the Exercise Science/Nutrition Option)	3
HNES 726	Nutrition in Wellness	3
Electives		9
HNES 798	Master's Thesis	6

Leadership in Physical Education and Sport Option

Code	Title	Credits
HNES 700	Research in Physical Education and Sport	3
HNES 701	Leadership and Supervision	3
HNES 704	Psychological Foundation of Sport & Physical Activity	3
HNES 705	Analysis of Sport Skill Instruction and Acquisition	3
HNES 707	Sport in American Society	3
HNES 711	Physical Education Curriculum	3
HNES 712	Principles of Management	3
HNES 714	Legal Liability in HPER	3
HNES 731	Governance in Sport	3
HNES 790	Graduate Seminar	3
HNES 794	Practicum/Internship	1
Total Credits		31

Dietetics Option

A Dietetics graduate candidate must complete a minimum of 36 credit hours to earn a Master of Science degree, 30 of which are didactic. The remaining 6-credits required to complete the degree must follow one of 3 plans.

Plan A – Thesis [if planning on a terminal degree or only recommended if the student is able to travel to NDSU to meet with the major professor].

Plan B – Comprehensive Study - After consulting with the major advisor and selecting a topic, students will carry out planning and completion of this research-based project in frequent interactions with a supervisory committee. The culmination of this project would be a comprehensive report or a manuscript that could be submitted to a journal.

Plan C – This plan would require 36 credits of coursework. Elective graduate courses totaling six credits will be taken from the electives.

Code	Title	Credits
Required Core Courses		9
HNES 710	Introduction to Research Design and Methods in HNES	
HNES 728	Current Issues in Dietetics	
STAT 725	Applied Statistics	
Electives		21
ADHM 635	Cost Controls in Hospitality and Food Service Systems	
ADHM 736	Entrepreneurship in Dietetics	
HNES 642	Community Health and Nutrition Education	
HNES 652	Nutrition, Health and Aging	
HNES 655	Sports Nutrition	
HNES 724	Nutrition Education	
HNES 726	Nutrition in Wellness	
HNES 729	Grant Writing for the Health Professional	
HNES 730	Fundamentals of Leadership	
HNES 732	Foodservice Operation Management	
HNES 733	Food Writing for Professionals	
HNES 734	Foodservice Systems within Healthcare	
HNES 740	Maternal and Child Nutrition	
HNES 741	International Nutrition	
HNES 742	Nutrition: A Focus on Life Stages	
HNES 743	Obesity Across the Lifespan	
HNES 745	Community Health Leadership	
HNES 746	Nutrition and Health Disparities	
HNES 747	Understanding Food Culture	
HNES 750	Advanced Human Nutrition: Macronutrients	

HNES 751	Metabolism of Micronutrients	
HNES 752	Phytochemicals	
HNES 755	Advanced Clinical Nutrition	
HNES 756	Pediatric Clinical Nutrition	
HNES 757	Nutritional Aspects of Oncology	
HNES 758	Clinical Aspects of Nutrition Support	
HNES 759	Nutrition and Immunology	
HNES 798	Master's Thesis	6
or HNES 797	Master's Paper	
Total Credits		36

Ardith Brunt, Ph.D.
Iowa State University, 1999
Research Interests: Nutrition, Gerontology

Bryan Christensen, Ph.D.
University of Kansas, 2000
Research Interests: Biomechanics, Sports Psychology, Strength and Conditioning

Shannon David, Ph.D.
Ohio University, 2013
Research Interests: Patient-Clinician Relationship, Patient Oriented Outcomes

Joe Deutsch, Ph.D.
North Dakota State University, 2007
Research Interests: Physical Education Teacher Education, Youth Sport Coaching

Marty Douglas, Ph.D.
Michigan State University, 2009
Research Interests: Adapted Physical Activity

Kara Gange, Ph.D.
North Dakota State University, 2010
Research Interests: Therapeutic Modalities, Diagnostic Ultrasound

Julie Garden-Robinson, Ph.D.
North Dakota State University, 1994
Research Interests: Nutrition Education, Chronic Disease Prevention, Food Safety/Science

Nikki German, Ph.D.
North Dakota State University, 2008
Research Interests: Athletic Training

Kyle Hackney, Ph.D.
Syracuse University, 2013
Research Interests: Skeletal Muscle, Sarcopenia, Muscle Inactivity, Ergogenic Aids

Jenny Linker, Ph.D.
University of Illinois Urbana-Champaign, 2011
Research Interests: Comprehensive School Physical Activity Programs, Physical Education Teacher Preparation

Katie Lyman, Ph.D.
University of South Florida, 2014
Research interests: Kinesio Tape®, Emergency Medicine, Electromyography

Ryan McGrath, Ph.D.
University of Idaho, 2015
Research Interests: Frailty and Health, Epidemiology of Aging, Physical Activity and Health for Aging Adults and Persons with Disabilities, Disability Prevention

Yeong Rhee, Ph.D.
Oklahoma State University, 1999
Research Interests: Chronic Disease Prevention, Functional Foods

Sherri Nordstrom Stastny, Ph.D.
North Dakota State University, 2007
Research Interests: Nutrition for Healthy Aging

Bradford N. Strand, Ph.D.
University of New Mexico, 1988
Research Interests: Physical Education Curriculum and Instruction, Fitness Education, Sport Sociology

Donna J. Terbizan, Ph.D.
The Ohio State University, 1982
Research Interests: Exercise Physiology, Fitness, Wellness, Exercise Science, Chronic Disease Change

History

Department Information

- **Department Head:**
  Mark Harvey, Ph.D.
- **Graduate Program Director:**
  Bradley Benton, Ph.D.
- **Department Location:**
  422 Minard
- **Department Phone:**
  (701) 231-8654
- **Department Email:**
  ndsu.history@ndsu.edu
- **Department Web Site:**
  ndsuhprs.org/ (http://ndsuhprs.org)
- **Application Deadline:**
  April 1 for assistantship consideration
- **Degrees Offered:**
  Ph.D., M.A., M.S.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL ibt 100; IELTS 7

Program Description

The graduate program in history at North Dakota State University has offered a master's degree program since the Graduate School was founded in 1954. In 2002, a joint program for a Ph.D. in History was instituted between NDSU and the University of North Dakota. A complete program description follows the M.S./M.A. requirements. The graduate faculty also provides instruction to non-history majors in other departments as well as the region's secondary education instructors who require continuing education credits for certification.

The department offers both the Master of Arts and Master of Science degrees in the areas of United States history, modern European history, or world history. Candidates with two years of foreign language study at the baccalaureate level or who have passed a standard foreign language examination meet the requirements for the Master of Arts. Students taking either degree may choose either the thesis or comprehensive study option.

The history graduate program provides a rigorous and highly personalized graduate experience. This experience produces confident people with a sense of achievement. They are ready to contribute as scholars and teachers.

Master's Degree

The Department of History graduate program is open to qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School admission requirements, the applicant must also

- provide a statement of intent that clearly outlines the applicant's interest and purpose for seeking a master's degree in history. The department uses this statement to assess the applicant's ability to organize thoughts, to formulate a plan of academic study, and to complete the graduate program. This statement also enables the department to determine whether North Dakota State University's graduate history program suits the applicant's needs and objectives.

- Submit a substantial paper submitted for an upper-division history class or for a class in the humanities and social sciences. The paper should provide evidence of an applicant's ability to synthesize information, to organize his/her thoughts logically, and to communicate clearly and effectively.
- Take the general Graduate Record Examinations (GRE) and submit these scores before admission to the program. Students admitted to the program generally score an average of 500 on the verbal and quantitative sections of the GRE's. Students scores on the new analytic writing section should be comparable, i.e. 3.5-4.0. The department requires students whose native language is not English to have a minimum TOEFL score of 600 (paper test) or 247 (computer test).

Ph.D.

Preference for admission into the Ph.D. program with full graduate standing will be given to applicants who have a GPA of at least 3.5 in history courses in an earned bachelor's or master's degree.

Applicants shall submit a statement of intent clearly outlining their research interests, potential major adviser, career goals, and purpose for seeking a Ph.D. in History.

Applicants will submit a substantial paper submitted for a class in History to provide evidence of ability to research thoroughly, to interpret and analyze primary and secondary sources, to synthesize information, to organize thoughts logically, and to communicate clearly and effectively.

The GRE examination is required, and preference for admission into the Ph.D. program with full graduate standing will be given to applicants who score a combined total of 1,000 points on the verbal and analytical sections of the GRE aptitude test.

The program requires a student for whom English is not a native language to have a minimum TOEFL score of 600.

Residency Requirements

Students enrolled in the Ph.D. program are required to complete at least one academic year (18 credits minimum) in residence at one campus.

Resident students may qualify for teaching assistantships. Students who have completed an M.A. degree may be assigned full responsibility for undergraduate courses or may be assigned to assist a faculty member in teaching courses.

Students will be required to take some courses from faculty at both campuses but will register at only one university. Some courses will be offered by interactive video network; some will be offered through Internet online systems; some courses will require students to travel to the other campus. Students not residing on one of the cooperating campuses will have to have access to a satisfactory research library for various courses and for dissertation research.

Financial Assistance

The graduate department has graduate assistantships for qualified students. Assistantships are 10-20 hours/week with graduate tuition waiver. Students wishing to apply for a teaching assistantship should express this in writing to the chair of the department. The deadline for assistantship applications is April 1.

The department awards and renews assistantships based on maintenance of good standing in the program and full-time registration during the appointment, demonstration of historical knowledge and good communication skills, progress towards completion of a degree, interest and potential in teaching as a career, financial need, and minority status in cases of equally qualified candidates.

The department awards assistantships for a one-year (10 month) contract period. It renews these assistantships for one additional year pending the availability of funds, progress toward the completion of a degree, and satisfactory job performance.

Master's Degree

Master of Arts

A student selecting the thesis option must complete at least 30 semester credits of graduate work with a minimum of 21 credits in history. Most graduate students in history choose this option. The thesis should reflect original thought and research using primary materials. The department recommends that students intending to continue to a Ph.D. program select this option. Students selecting this track must meet the following requirements:

Code	Title	Credits
HIST 702	Historiography	3
HIST 705	Directed Research (taken during second year)	1
HIST 710	Research Seminar in North American History	3
Select 6 credits of the following (one to be declared the student's major area and the other the minor area):		6
HIST 730	Readings in North American History	

HIST 760	Readings in European History	
HIST 780	Readings in World History	
History course work at 600 level or above		6-9
Course work in approved outside field, at 600 level or above		3
HIST 798	Master's Thesis	8
Total Credits		30

Master of Science Degree

Code	Title	Credits
HIST 702	Historiography	3
HIST 710	Research Seminar in North American History	3
Select 9 credits of the following (one to be declared the student's major area and the other the minor area):		9
HIST 730	Readings in North American History	3
HIST 760	Readings in European History	3
HIST 780	Readings in World History	3
6xx-level or above courses (Up to 3 credits may be taken from outside of the history department.)		12
HIST 797	Master's Paper	3

Ph.D. Degree

Students must satisfactorily complete 90 credits beyond the bachelor's degree. Students entering with an M.A. degree must complete at least 60 additional semester graduate credits. Core course requirements must be met, which include Methods of Historical Research, Historiography, Seminar in the Teaching of History, at least 2 research seminars, and at least 2 readings courses. Students must complete 36 credits with at least 27 credits in History. Students will earn at least 12 credits in one major field. Students must have at least nine hours each in two minor fields; one minor field must be in History.

Students must have a proficiency in two languages other than their native language, or one foreign language and one special research skill such as statistics or computer science.

The program will require at least one academic year in residence at either campus. Students will register at one of the universities that will be the student's academic "home". The student's adviser must be employed at the home university. At least one member of the student's committee must be employed at the other (not home) university. Students will have to take courses at both universities. Students will write three comprehensive examinations in their major and minor fields. The exams will be read and graded by the supervisory committee. Students will complete an oral examination based on the written exams. The oral examination is to be conducted by the supervisory committee.

Students will write a dissertation (up to 24 credits) on an approved topic in consultation with the faculty adviser and the supervisory committee of five faculty. The dissertation must be based on extensive research in primary and secondary sources, must argue an original thesis, and must be defended before the supervisory committee.

The committee will be composed of the faculty adviser who represents the student's field of study and will direct the research and writing of the dissertation. A second member of the committee (second reader) also represents the student's major field of study. A third member of the committee will represent the student's first minor field of study. The fourth member of the committee represents either the student's major field or second minor field. At least one of the four History faculty must be from the cooperating (non-home) university. The Graduate School will appoint the fifth member of the committee.

Code	Title	Credits
HIST 702	Historiography	3
HIST 705	Directed Research	1
HIST 710	Research Seminar in North American History (May be repeated for credit, provided the topics are different.)	3
Readings courses (Any of them may be repeated for credit, provided the topics are different.)		6
HIST 730	Readings in North American History	
HIST 760	Readings in European History	
HIST 780	Readings in World History	

6xx - level or higher courses (At least 3 and no more than 6 of these credits must come from non-HIST courses)		15
HIST 899	Doctoral Dissertation	29

Major Fields

Students will be required to write three comprehensive exams in their major and minor (or outside) fields. The exams will be read and graded by the student's supervisory committee. Students will complete an oral examination based on the written exams. The oral examination is to be conducted by the supervisory committee.

Major Fields:

- Great Plains History
- Rural History
- North American History
- Western European History

Minor Fields:

- Public History
- World History

Ashley Baggett, Ph. D.
Louisiana State University, 2014
Field: Women's History/Gender Studies, 19th century U.S., Southern History

Tracy Barrett, Ph.D.
Cornell University, 2007
Field: East and Southeast Asia, Overseas Chinese

Bradley Benton, Ph.D.
University of California, Los Angeles, 2012
Field: Latin American History, Colonial Mexico; Nahua (Aztec) politics, society, and culture; the early modern Atlantic world; cross-cultural contact and exchange.

John K. Cox, Ph.D.
Indiana University, 1995
Field: Eastern Europe, Russia, Germany, Ottoman Empire

Mark Harvey, Ph.D.
University of Wyoming, 1986
Field: American West, Environmental History, Public History

Thomas D. Isern, Ph.D.
Oklahoma State University, 1977
Field: History and Folklore of the North American Plains, History of Agriculture

Don Johnson, Ph.D.
Northwestern University, 2015
Field: Colonial and Revolutionary America History

Marcela Perett, Ph.D.
The Medieval Institute, University of Notre Dame, 2009
Field: Late Antiquity, Medieval Europe, Renaissance & Reformation

Angela Smith, Ph.D.
Middle Tennessee State University, 2011
Field: Public History, 20th Century American History, Cultural History, Digital History

Human Development and Family Science

Department Information

- **Department Head:**
  Joel Hektner, Ph.D.
- **Graduate Coordinator:**

Elizabeth Blodgett Salafia, Ph.D.

- **Department Location:**
  Evelyn Morrow Lebedeff Hall
- **Department Phone:**
  (701) 231-8268
- **Department Web Site:**
  www.ndsu.edu/hdfs/graduate_studies/hdfs_graduate_programs/
- **Application Deadline:**
  One month prior to the beginning of each term. Applications accepted for fall, spring, and summer.
- **Degrees Offered:**
  M.S., Certificate
- **English Proficiency Requirements:**
  TOEFL iBT 100 (subscores of at least 24 for speaking and 21 for writing); IELTS 7

Program Description

Programs of study leading to a Graduate Certificate or the Master of Science degree are offered in three options: Family Financial Planning, Youth Development, and Gerontology. All of these options are available via a collaborative, inter-institutional program offered through online distance education. Each program requires a capstone practicum experience to complete the M.S. degree. Students can complete the M.S. programs in two to three years and the certificate programs in one calendar year.

The **Family Financial Planning (FFP)** M.S. option is a 36-credit program with a specific curriculum approved by the Certified Financial Planner (CFP) Board of Standards. Graduate certificates (18 credits) are available in Financial Planning and in Financial and Housing Counseling.

The **Gerontology** M.S. option requires 36 credits, and the Graduate Certificate requires 15 credits. An advanced degree in the field of Gerontology can benefit the professional in social work, nursing, counseling, recreation, public policy, long-term care administration, medicine, architecture, interior design, psychology, adult education, and rehabilitation therapy.

The **Youth Development** M.S. option requires 36 credits. Graduate Certificates (13 credits) are available in Youth Development and in Youth Program Management and Evaluation. Youth development is an emerging professional field. It has a positive orientation, meaning its focus is on promoting the positive development of youth, and it is an applied field, with professionals who put developmental research and theory into practice in structuring and implementing programs and services for adolescents.

In addition to the Graduate School's required application requirements, submit the statement of purpose indicating reasons for pursuing graduate study, specifying your special interests within your chosen discipline and including your background preparation in that area. Mention any relevant skills or experience you have acquired. In addition, be sure to address the following, in 500 words or less:

1. How your interest in this field developed.
2. Why you chose our program at NDSU.
3. The experiences you have had (e.g. informal, academic, employment, volunteer) that you see as related to this graduate program or your professional goals.
4. What your professional goals are and how this graduate program will help you accomplish your professional goals.

Family Financial Planning

Code	Title	Credits
HDFS 677	Financial Counseling	3
HDFS 740	Theories & Research in Family Financial Planning I	3
HDFS 762	Retirement Planning, Employee Benefits and the Family	3
HDFS 763	Personal Income Taxation	3
HDFS 765	Insurance Planning for Families	3
HDFS 766	Estate Planning for Families	3
HDFS 769	Financial Planning Case Studies	3
HDFS 770	Fundamentals of Financial Planning	3
HDFS 771	Investing for the Family's Future	3
HDFS 794	Practicum/Internship	6
Choose one		3
HDFS 767	Professional Practices in Family Financial Planning	

HDFS 768	Housing/Real Estate
Total Credits	36

Gerontology

Code	Title	Credits
ADHM 705	Environment and Aging	3
HNES 652	Nutrition, Health and Aging	3
HDFS 682	Family Dynamics of Aging	3
HDFS 721	Adult Development and Aging	3
HDFS 722	Methods and Theories in Gerontology	3
HDFS 723	Perspectives in Gerontology	3
HDFS 729	Professional Seminar in Gerontology	3
HDFS 760	Aging Policy	3
HDFS 794	Practicum/Internship	6
6 additional credits to be approved by the adviser and committee		6
Total Credits		36

Youth Development

Code	Title	Credits
HDFS 710	Foundations of Youth Development	1
HDFS 711	Youth Development	3
HDFS 712	Community Youth Development	3
HDFS 713	Adolescents and Their Families	3
HDFS 714	Contemporary Youth Issues (*)	3
HDFS 715	Youth in Cultural Contexts	3
HDFS 716	Youth Professionals as Consumers of Research	3
HDFS 717	Program Design, Implementation and Evaluation	3
HDFS 718	Administration and Program Management	3
HDFS 719	Youth Policy	3
HDFS 794	Practicum/Internship	5
3 additional credits to be approved by adviser and committee		3
Total Credits		36

Family Financial Planning

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

Code	Title	Credits

Gerontology

Code	Title	Credits
Required Courses		
HDFS 721	Adult Development and Aging	3
HDFS 723	Perspectives in Gerontology	3
Elective Courses- Select 3		9
ADHM 705	Environment and Aging	
HNES 652	Nutrition, Health and Aging	
HDFS 682	Family Dynamics of Aging	
HDFS 760	Aging Policy	
HDFS 790	Graduate Seminar (*)	
Total Credits		15

Youth Development

Code	Title	Credits
HDFS 710	Foundations of Youth Development	1
Select 4 courses from the following:		12
HDFS 711	Youth Development	
HDFS 712	Community Youth Development	
HDFS 713	Adolescents and Their Families	
HDFS 714	Contemporary Youth Issues	
HDFS 715	Youth in Cultural Contexts	
HDFS 719	Youth Policy	
Total Credits		13

Youth Program Management and Evaluation

Code	Title	Credits
HDFS 710	Foundations of Youth Development	1
Select 4 courses from the following:		12
HDFS 714	Contemporary Youth Issues	
HDFS 716	Youth Professionals as Consumers of Research	
HDFS 717	Program Design, Implementation and Evaluation	
HDFS 718	Administration and Program Management	
HDFS 719	Youth Policy	
Total Credits		13

Elizabeth Blodgett Salafia, Ph.D.
University of Notre Dame, 2008
Research Interests: Family and Peer Influences on Adolescents' Disordered Eating Attitudes and Behaviors

Sean Brotherson, Ph.D.
Oregon State University, 2000
Research Interests: Parenting and Fatherhood; Healthy Marriages; Family Stress; Rural Families; Grief and Bereavement; Family Life Education; Family Policy

Thomas Carlson, Ph.D.
Iowa State University, 2000
Research Interests: Narrative Pedagogy; Relational Accountability Approach to Couples Therapy, LGBT Affirmative Therapy Competence among Therapists, And Influence of Spirituality on Clinical Practice and Training

James E. Deal, Ph.D.
University of Georgia, 1987
Research Interests: Personality Development in Children; Relationship Between Individual Development and Family Relationships

Margaret Fitzgerald, Ph.D.
Iowa State University, 1997
Research Interests: Financial Counseling and Planning; Husbands and Wives Who Own and Operate Family Businesses Together; Family Business and Economically Vulnerable/Viable Communities; Gender and Management Issues in Family Business

Heather Fuller, Ph.D.
University of Michigan, 2009
Research Interests: Social Relationships across the Lifespan (E.G. Intergenerational Relationships); Psychological Well-Being in Old Age; Culture and Aging; Migration, Transnationalism and Acculturation; Biculturalism

Joel Hektner, Ph.D.
University of Chicago, 1996
Research Interests: Prevention Programs for Children with Adjustment Problems; Peer Affiliation Patterns and Peer Influences on Children's Behaviors; Family and School Conditions that Facilitate Optimal Experiences (Flow) and Optimal Development; The Experience Sampling Method

Carrie Johnson, Ph.D.
Iowa State University, 2012
Research Interests: Personal Finance for Low-Income and Underserved Populations; Financial Education Impact; Student Loan Debt; Program Delivery Methods and Evaluation; Behavioral Finance across the Lifespan

Christie McGeorge, Ph.D.
University of Minnesota, 2005
Research Interests: Influence of Heterosexism and Homophobia on Clinical Practice and Training, Gender Equity In Therapy, Gender Equity In Higher Education, Feminist Theories, And Societal Perceptions of Single Parents.

Melissa Lunsman O'Connor, Ph.D.
University of South Florida, 2010
Research Interests: Cognitive And Functional Aging In Healthy And Clinical Populations; Older Drivers; Research Methods; Attitudes Toward Dementia; Interventions For Improving Cognition, Health, And Everyday Functioning

Brandy A. Randall, Ph.D.
University of Nebraska-Lincoln, 2002
Research Interests: Relational and Contextual Influences on Adolescents' and Young Adults' Positive and Problem Behaviors

Gregory F. Sanders, Ph.D.
University of Georgia, 1983
Research Interests: Later Life Families; Family Strengths

Meagan Scott, Ph.D.
Oklahoma State University, 2016
Research Interests: Understanding How Changing Trends in Society Influence Youth; Afterschool Training; Positive Youth Development; Professional Development Methods to Better Meet the Needs of 4-H Staff

Rebecca Woods, Ph.D.
Texas A&M University, 2006
Research Interests: Perception and Cognition in Infancy; Object Processing; Multimodal Processing, Adults' Influence on Infant Learning

Industrial and Manufacturing Engineering

Department Information

- **Department Chair:**
  David Grewell, Ph.D.
- **Email:**
  david.grewell@ndsu.edu
- **Department Location:**
  202 Civil & Industrial Engineering Building
- **Department Phone:**
  (701) 231-9818
- **Department Web Site:**
  www.ndsu.edu/ime/
- **Application Deadline:**

International applications due March 1 for fall; August 15 for spring and summer. Domestic applications due one month prior to start of semester. For assistantship consideration, fall applications due March 1; limited spring openings.

- **Degrees Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE - General **
- **English Proficiency Requirements:**
  TOEFL ibT 81 (Speaking 23; Writing 21) IELTS 6.5 (Writing 5.5; Speaking 5.5)

** M.S. - 310 (Verbal + Quantitative) and 160 Quantitative minimum and Analytical Writing score of 4.0 or better

Ph.D. - 310 or better (Verbal + Quantitative) and 160 Quantitative minimum and Analytical Writing score of 4.5 or better

Program Description

The Department of Industrial and Manufacturing Engineering offers graduate studies at both the Master of Science and Doctor of Philosophy levels. A Master of Science degree may be earned in either Industrial Engineering and Management (IE&M) or Manufacturing Engineering (MfgE). The Master of Science degree can be completed through a thesis option or project option. The project option is available only to candidates who have been professionally employed in industrial engineering, manufacturing engineering or a related field and are working in their field at the time of application for admission to graduate study. The IE&M master's programs is designed to equip students with the ability to analyze, design, and manage industrial and business systems as well as to enable students to develop scholarly abilities to further pursue a Ph.D. degree in industrial and manufacturing engineering. Students have an opportunity to conduct research in the development of theoretical concepts and industrial systems.

For more information about our department and programs, please visit our department website at www.ndsu.edu/ime/.

Graduate study in the Department of Industrial and Manufacturing Engineering is open to all qualified baccalaureate graduates from universities and colleges of recognized standing. In addition to the Graduate School requirements, applicants must submit a GRE score.

Financial Assistance

There are a limited number of teaching assistantships available in Industrial and Manufacturing Engineering, which are normally assigned as support for classes with large enrollments and/or heavy laboratory content. Research assistantships are offered when student's capabilities and background experience match the needs of the project. While teaching assistantships are funded through the University, research assistantships are generally funded through externally-funded grants and contracts. In both cases, assistantships are considered as employment, and the graduate student should view these appointments as a job. The student's thesis or dissertation may or may not be in the area of their job duties for the assistantship.

Full assistantships are for half-time employment (20 hours per week). Tuition for all graduate credits, resident or nonresident, are waived for individuals officially appointed as research or teaching assistants. Student fees are not waived. When a student is offered an appointment as a Graduate Research Assistant, the faculty and the department will carry the expectation that the student has made a full commitment to fulfill both the degree requirements and the job responsibilities.

The Master of Science degree in Industrial Engineering and Management or Manufacturing Engineering requires 30 credits of graduate-level study. For the thesis option, of the required minimum 30 credits, at least 21 credits must be didactic courses numbered 601-689, 691, 700-789, and 791, while the research credits (798) must be at least 6, but not more than 10, credits. For the project option, of the required minimum 30 credits, at least 27 credits must be didactic courses numbered 601-689, 691, 700-789, and 791, while the research credits (797) must be at least 3, but not more than 4, credits.

The Doctor of Philosophy degree requires 60 credits beyond the M.S. requirement (90 credits total). Didactic course work must account for at least 27 credits, and of these, 15 credits must be earned in 700-level courses. It is customary for the remainder of the didactic credit requirement to be dedicated directly to the dissertation related topics, either through course preparation or focused research writing.

For either the M.S. or Ph.D., all courses taken outside of the IME Department must be approved in advance by the student's academic adviser. The total courses of study must be approved by the student's academic adviser, thesis committee, and department chair. Students completing graduate degrees within the IME Department are expected to exhibit demonstrable expertise in the core competencies of either industrial engineering or manufacturing engineering. Students whose undergraduate major is in another field may be required to include some or all of the core competencies in their graduate coursework. For further information in this regard, please consult the IME department.

Each new student must have an academic advisor and complete a preliminary thesis or project proposal within six months of beginning graduate studies, and it is recommended that this be completed during the first semester in residence. The proposal, if approved by the IME Graduate Studies Committee, will provide the direction for the remainder of the student's degree work. By the end of the first year in residency, the student must have selected a supervisory committee. This committee will be chaired by the faculty adviser and will provide direction, advice and examination of the student's work and achievement.

Canan Bilen-Green, Ph.D.
University of Wyoming, 1998

Research Interests: Statistical Process Control, Quality Management

Kambiz Farahmand, Ph.D., P.E.
University of Texas, 1992
Research Interests: Ergonomics Design, Layout Planning and Management

Bashir Khoda, Ph.D.
University at Buffalo, 2012
Research Interests: Bio-Manufacturing, Additive Manufacturing

Val R. Marinov, Ph.D.
Technical University of Sofia, 1992
Research Interests: Advanced Packaging for Flexible Microelectronics

Yiwen Xu, Ph.D.
University of Arizona, 2015
Research Interests: Network Reliability and System Reliability Models, Integer Programming, Network Models and Stochastic Programming, Queueing Models

Nita Yodo, Ph.D.
Wichita State University, 2017
Research Interests: Modeling and Optimization of Complex Systems, Predictive Analysis for Failures, Data Driven Decision Making Under Uncertainties

Om Prakash Yadav, Ph.D.
Wayne State University, 2002
Research Interests: Reliability Engineering, Robust Design

International Agribusiness

Department Information

- **Department Chair:**
  William Nganje, Ph.D.
- **Graduate Coordinator:**
  David Ripplinger, Ph.D.
- **Department Location:**
  500 Barry Hall
- **Department Phone:**
  (701) 231-7441
- **Department Web Site:**
  www.ag.ndsu.edu/agecon/
- **Application Deadline:**
  March 1 for fall semester, October 1 for spring semester
- **Degrees Offered:**
  M.S.
- **Test Requirement:**
  GRE or GMAT
- **English Proficiency Requirements:**
  TOEFL iBT 79; IELTS 6.5

Program Description

The International Agribusiness M.S. program offered by the Department of Agribusiness and Applied Economics at North Dakota State University provides both the academic training and the international experience required to excel in an international agribusiness career. The program of study includes course work in applied economics, quantitative methods, and international agribusiness strategy, management, finance, and marketing.

Students are required to have an international experience that may be satisfied by meeting one of three options::

1. The student may participate in an international internship. Both paid and unpaid opportunities exist with international agribusiness companies, with government agencies, or with nonprofit organizations. The semester-long or summer internship can be arranged by the student or in cooperation with NDSU's Office of International Student and Study Abroad Services. Internship programs will be defined by the student and his or her major adviser, and approved by the Graduate Program Committee (GPC) and the student's supervisory committee.

2. Students may participate in graduate courses in business or agribusiness at an international university during a semester-long or summer study abroad program. Study abroad programs will be defined by the student and his or her major adviser, and approved by the GPC and the student's supervisory committee.
3. Students may select at least six additional credits of coursework offered at NDSU related to international business or agribusiness. Courses must be approved by the student's supervisory committee as part of the student's program of study prior to enrollment in the courses.

Students complete the program by writing and defending their comprehensive study papers under the supervision of their graduate committee.

In addition to the Graduate School admission requirements (https://bulletin.ndsu.edu/graduate/admission-information), applicants must have earned a grade of B or higher in intermediate microeconomics and statistics including linear regression, and a grade of C or better in calculus.

Applicants must submit their complete application by March 1 for fall enrollment and October 1 for spring enrollment to guarantee admission and funding consideration. Admission will only be considered for candidates who submit a complete application.

It is desirable that students begin their program in the fall semester, although students may begin their program in the spring.

Financial Assistance

The Department offers assistantships on a competitive basis. Graduate Research Assistantships (GRAs) provide monthly stipends plus tuition waivers. Students must pay a minimal activity fee each semester. Assistantships do not begin until the first semester of full graduate standing when courses that apply for the Master of Science degree are taken.

Most assistantships are half-time (20 hours per week) or one-quarter-time (10 hours per week). Students on assistantship perform research or teaching duties in the Department in return for their stipend. Assistantships are typically limited to 16 months.

Granting assistantships depends on academic performance, departmental needs, and availability of assistantships.

Students pursuing a Master of Science in International Agribusiness must complete all core courses. Students select elective courses (with approval of their adviser and supervisory committee) to fulfill the remaining Graduate School credit requirements. The core requirements assure breadth and competence in key areas of knowledge and professional activity. Students participate in an international internship, a study aboard program, or select six additional credits of course work at NDSU related to international agribusiness. The following courses, or their equivalent, constitute the core of the Master of Science program:

Code	Title	Credits
Core Courses		
AGEC 701	Research Philosophy	1
AGEC 711	Applied Risk Analysis I	3
AGEC 712	Applied Risk Analysis II	3
AGEC 741	Advanced Microeconomics	3
AGEC 744	Agribusiness I: Agricultural Product Marketing and Agribusiness Strategy	3
AGEC 797	Master's Paper	1-10
or AGEC 798	Master's Thesis	
Select a minimum of 6 credits of the following:		6
ECON 610	Econometrics	
ECON 710	Advanced Econometrics	
AGEC 739	Analytical Methods for Applied Economics	
Or other approved quantitative coursework		
Approved Electives		1 - 9
Total Credits		30 (minimum)

A minimum of 30 credits is necessary to complete the M.S. in International Agribusiness. Credits beyond those required courses listed above may be met through a combination of internship credits, courses taken during an international study program, or NDSU international courses approved by the student's supervisory committee.

James Caton, Ph.D.
George Mason University, 2016
Research Interests:Entrepreneurship Agent-based Computational Economics, Market Process Theory, Monetary Economics

William Nganje, Ph.D.
University of Illniois at Urbana-Champaign, 1999

Research Interests: Agriculturel Finance, Food Safety Economics

Erik Hanson, Ph.D.
University of Minnesota, 2016
Research Interests: Agricultural Finance, Farm Management, Marketing and Production Economics

Robert Hearne, Ph.D.
University of Minnesota, 1995
Research Interests: Natural Resource and Environmental Economics

Jeremy Jackson, Ph.D.
Washington University in St. Louis, 2008
Research Interests: Microeconomics, Political Economy, Public Finance

Siew Hoon Lim, Ph.D.
University of Georgia, 2005
Research Interests: Production Economics, Transportation, Industrial Organization

Dragan Miljkovic, Ph.D.
University of Illinois, 1996
Research Interests: Agricultural Prices, International Trade, Agricultural and Food Marketing and Policy

Frayne Olson, Ph.D.
University of Missouri, 2007
Research Interests: Crop Marketing Strategies, Crop Supply Chain Management, Agricultural Contracting, Agricultural Risk Management

Timothy Petry, M.S.
North Dakota State University, 1973
Research interests: Livestock Marketing

David Ripplinger, Ph.D.
North Dakota State University, 2011
Research Interests: Production Economics and Marketing

David Roberts, Ph.D.
Oklahoma State University, 2009
Research Interests: Natural Resource and Environmental Economics, Econometrics, Production Agriculture

David M. Saxowsky, J.D.
The Ohio State University, 1979
Research Interests: Agricultural Law

Saleem Shaik, Ph.D.
University of Nebraska, 1998
Research Interests: Agriculture Policy and Risk Management, Agriculture Production Economics

Anupa Sharma, Ph.D.
Virginia Polytechnic Institute and State University, 2016
Research Interests: Economics, Agriculture Business and Management

Cheryl J. Wachenheim, Ph.D.
Michigan State University, 1994
Research Interests: Agribusiness

Tom Wahl, Ph.D.
Iowa State University, 1989
Research Interests: International Marketing and Trade, Agricultural Trade Policy, Marketing and Price Analysis

William W. Wilson, Ph.D.
University of Manitoba, 1980
Research Interests: Commodity Marketing, Agribusiness, Industrial Organization

Lei Zhang, Ph.D.
University of Texas at Dallas, 2011
Research Interests: Applied Econometrics, Macroeconomics and Monetary Economics, Regional and Urban Economics

Managerial Logistics

Department Information

- **Program Coordinator:**
  Denver Tolliver, Ph.D.
- **Department Chair:**
  Joseph Szmerekovsky, Ph.D.
- **Academic Coordinator:**
  Jody Bohn Baldock
- **Email:**
  jody.bohn.baldock@ndsu.edu
- **Department Location:**
  Upper Great Plains Transportation Institute, Quentin Burdick Building 448
- **Department Phone:**
  (701) 231-7767
- **Department Web Site:**
  www.ndsu.edu/business/departments/tl/
- **Application Deadline:**
  July 1 for fall semester; December 1 for spring semester
- **Degrees Offered:**
  M.M.L - Program online only
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Transportation, Logistics and Finance offers a Master's degree in Managerial Logistics (MML). The degree is awarded through the College of Business in collaboration with the Upper Great Plains Transportation Institute to provide high quality graduate programs for students. The program takes an interdisciplinary approach to transportation and logistics and attracts students with a multitude of backgrounds. The online MML program targets aspiring logisticians, industry professionals, military officers and DOD civilians who want to meet the logistical challenges of the 21st century. A wide range of career opportunities exists in the sectors of the logistics industry, including logistics and supply chain management, operations management, purchasing and demand management, emergency management, consulting, retail, and many more.

Core Competencies

The uniqueness of the Master of Managerial Logistics program is reflected in its core competencies, which are a direct derivative of the Army's National Logistics Curriculum and private industry needs. The following core competencies define a framework for expected outcomes and curricula:

- Supply chain management in the military and private sector
- Extending advanced supply chain planning across the enterprise
- Global supply chain management and the design of international logistics systems
- Change management in a turbulent global environment
- Enterprise resource planning within a global context
- Remote sensing and adaptive logistics planning
- Joint total asset management, logistics, and security through innovative technologies such as RFID, remote sensing, and asset tracking
- Transportation analysis and planning for logistics
- Crisis analysis and rapid logistical response
- Logistics support for homeland security
- Transportation systems security analysis and threats

Admission Requirements

The Master of Managerial Logistics program is open to qualified graduates of universities and colleges of recognized standing. To be admitted with full standing, the applicant must:

1. Hold a baccalaureate degree from an educational institution of recognized learning with a minimum grade point average (GPA) of 3.0 or equivalent. For those with GPAs of 2.99 or less, the applicant must also submit a GMAT/GRE score to be considered for acceptance.
2. Have shown the potential to undertake advanced study as evidenced by prior academic performance and has stated interest in logistics.
3. Submit official transcripts
4. Submit a two-page resume
5. Submit a one-page "Letter of Intent" outlying your reasons for pursuing the Master of Managerial Logistics degree
6. Submit three letters of recommendation
7. Submit online application through the NDSU Graduate School website
8. International applicants whose first language is not English and who do not possess a U.S. bachelor's degree or higher are subject to additional requirements when they apply for admission. They must meet the minimum requirements on measures of general English language proficiency. The accepted measures of language proficiency are the TOEFL ibT 71 and IELTS 6.

Students who do not meet all requirements for admission or have deficiencies in prerequisite course work, but show satisfactory potential for graduate study, may be admitted conditionally. The conditional status may be changed to full graduate standing after the first or second semester of study, based on the student's academic performance.

Apply for Admission

To apply for admission, please visit the Admission Information page (https://bulletin.ndsu.edu/graduate/admission-information).

Degree Requirements

The Master of Managerial Logistics (MML) is an online graduate program and is a non-thesis degree. A minimum of 35 credits is required for the MML. All 35 credits must be completed using the core Transportation & Logistics courses. Students will participate in a capstone experience, culminating all course material, applications, and research skills together in the Case Studies in Logistics course. An overall GPA of 3.0 or higher must be maintained.

Code	Title	Credits
Core Courses (≥ 35 credits)		
TL 711	Logistics Systems	4
TL 715	Introduction to ERP	3
TL 719	Crisis Analysis and Homeland Security	3
TL 721	International Logistics Management	4
TL 723	Advanced Supply-Chain Planning Across the Enterprise	3
TL 725	ERP Configuration	3
TL 727	Organizational Change Management	3
TL 729	Adaptive Planning in Logistics Systems	3
TL 731	Logistics Decision Analysis	3
TL 733	Case Studies in Logistics	3
TL 735	Practical Data Analytics	3

Access Fees

Access fees are designed to reduce out-of-pocket expenses for students and allow us to enhance our program to provide a high-quality education for students. Access fees support adjunct teaching, teaching assistants, instructor training, and course development and improvements. The fees also support students with professional membership fees, attendance at conferences, software and equipment, and other student-initiated activities.

A $350 per credit access fee is assessed to students taking any of the classes listed above. Financial aid can be used to pay for access fees.

Faculty

Raj Bridgelall, Ph.D.
North Dakota State University, 2015
Research Interests: Big Data Analytics, Internet-of-Things (IoT), Cloud Computing; Connected and Autonomous Vehicles (CAV), Shared Mobility, Intelligent Transportation Solutions; Signal processing and mathematical modeling of transportation systems; Remote Sensing with Unmanned Aircraft Systems; Hyperspectral Image Analysis; Radio-frequency identification (RFID); Real-time locating systems (RTLS); Energy Harvesting and massive scale autonomous wireless sensor networks
Department: Transportation and Logistics

Alan Dybing, Ph.D.
North Dakota State University, 2013
Research Interests: Asset management, Energy impacts, Freight transportation, Agricultural transportation, Supply chain management, Transportation economics, Spatial analysis, Transportation systems modeling
Department: Transportation and Logistics

Ranjit Godavarthy, Ph.D.
Kansas State University, 2012
Research Interests: Public transportation in small urban and rural areas, Demand response transit and paratransit research, Bike share research, Roundabouts research, Traffic engineering and operations, Transportation and highway safety
Department: Transportation and Logistics

Jill Hough, Ph.D.
University of California-Davis, 2007
Research Interests: Public transportation in rural and small urban locations, Workforce development, Mobility of the aging, Transportation planning and policy, Intelligent transportation systems
Department: Transportation and Logistics

Michal Jaroszynski, Ph.D.
Florida State University, 2014
Research Interests: Socioeconomic impacts of transportation investments and policies; Travel demand modeling; Transportation funding, finance, and equity; Multimodal transportation systems
Department: Transportation and Logistics

Pan Lu, Ph.D.
North Dakota State University, 2011
Research Interests: Transportation infrastructure management, Freight rail transportation, Multi-mode transportation efficiency, GIS application in transportation, Operations research in transportation, Commercial truck safety, Railway transportation safety, Data mining application in transportation, Transportation resiliency analysis
Department: Transportation and Logistics

Jeremy Mattson, Ph.D.
North Dakota State University, 2017
Research Interests: Public transportation, Transportation economics, Demand modeling, Travel behavior, Built environment
Department: Transportation and Logistics

Diomo Motuba, Ph.D.
North Dakota State University, 2009
Research Interests: Transportation and land use planning, Freight modeling, Transportation economics, Connected automated vehicles, Logistics and supply chain management, Transportation safety
Department: Transportation and Logistics

Joseph Szmerekovsky, Ph.D.
Case Western Reserve University, 2003
Research Interests: Project management and scheduling, Supply chain management and technology, Energy supply chain management, Healthcare logistics
Department: Transportation and Logistics

Denver Tolliver, Ph.D.
Virginia Polytechnic Institute and State University, 1989
Research Interests: Highway systems modeling, Multimodal transportation planning, Freight transportation, Energy and environmental analysis
Department: Transportation and Logistics

Kimberly Vachal, Ph.D.
George Mason University, 2005
Research Interests: Human factors in traffic safety, Healthy community transport, Agricultural and biofuels transportation, CMV safety & security, Containerized and identity preserved grain marketing, Regional economic development
Department: Transportation and Logistics

Master of Athletic Training (MATrg.)

Department Information

- **Department Head:**
  Yeong Rhee, Ph.D.
- **Program Coordinator:**
  Nikki German, Ph.D.
- **Department Location:**
  Bentson Bunker Fieldhouse
- **Department Phone:**
  (701) 231-7474
- **Department Web Site:**
  www.ndsu.edu/hnes/athletic_training_professional/
- **Application Deadline:**
  December 1 for summer admission
- **Degrees Offered:**
  MATrg.
- **English Proficiency Requirements:**
  TOEFL iBT 100; IELTS 7; PTE Academic 68

Program Description

The Master of Athletic Training (MATrg) is a professional program accredited by the Commission on Accreditation of Athletic Training Education (CAATE). The MATrg (41 credits) will prepare students to take the Board of Certification, Inc. (BOC) examination and earn the 'ATC' credential. Didactic courses and clinical experience courses focus on prevention, assessment, treatment and rehabilitation of injuries resulting from physical activity. This is a five-semester program starting in the second eight-week session of the summer term.

Option 1: Five-Year Program. This unique option allows the student to complete a Bachelor of Science in Exercise Science and Master of Athletic Training (MATrg) degree in five years.

- During *years 1-3* students follow the NDSU Exercise Science guidelines and curriculum**.
- Students apply to the MATrg program through the NDSU Graduate School spring semester of the third year (typically Junior standing).
- Accepted students begin the MATrg program in July.
- During *year 4* students complete both Exercise Science ***and*** MATrg courses.The Exercise Science degree is awarded in August.
- During *year 5* students complete MATrg courses. Upon successful completion of all program and Graduate School requirements, the MATrg degree is awarded in May.
- This program is recommended for entering freshmen, student-athletes and transfer students interested in earning an athletic training degree at NDSU.

** Transfer students and students who change majors must follow the Exercise Science policies and curriculum. This may extend the time line for program completion.

Option 2: Two-Year Program. Students who have a conferred Bachelor's degree in a related field will follow Option 2.

- Students apply to the MATrg program through the NDSU Graduate School.
- Accepted students begin the program in July.
- Years 1 and 2 students follow the MATrg Plan of Study for Option 2
- Upon success complete of all program and Graduate School requirements, the MATrg degree is be awarded in May.

Admission requirements are the same for both program options.

- Acceptance into the NDSU Graduate School
- Undergraduate overall GPA of 3.0 on a 4.0 scale
- Research Writing: Students are required to write a research-based position paper making an evidence-based argument for the use of prophylactic tape or bracing. A minimum of two (2) references must be included.
- Documentation of 50 hours of observation completed under the direct supervision of a BOC ATC® in an athletic training room setting. All 50 hours must be completed within one (1) calendar year of application.

- Minimum of “C” or higher in the following college courses:
  - Human Anatomy and Lab (1 semester)
  - Human Physiology and Lab (1 semester)
  - General Physics and Lab (1 semester)
  - General Chemistry and Lab (1 semester)
  - Exercise Physiology and Lab (1 semester)
  - Kinesiology/Biomechanics and Lab (1 semester)
  - Medical Terminology (1 semester)
  - Nutrition (1 semester)

After successful completion of this program (41 credits), the student will be eligible to take the Board of Certification, Inc. (BOC) exam. Certification by the BOC is the entry-level credential. See the **MATrg website** for all necessary information regarding the application process.

Code	Title	Credits
Summer I		
HNES 780	Athletic Training Techniques	3
Fall I		
HNES 775	Therapeutic Modalities	3
HNES 781	Orthopedic Assessment I	4
HNES 794	Practicum/Internship	2
Spring I		
HNES 770	Evidence Based Research and Practice	2
HNES 782	Orthopedic Assessment II	5
HNES 794	Practicum/Internship	2
Summer II		
HNES 794	Practicum/Internship	1
Fall II		
HNES 772	Prevention and Health Promotion in Athletic Training	2
HNES 774	Therapeutic Exercise	3
HNES 776	Non-Orthopedic Assessment	2
HNES 794	Practicum/Internship	2
Spring II		
HNES 773	Athletic Training Capstone	2
HNES 778	Athletic Training Administration and Professional Development	3
HNES 794	Practicum/Internship	2
Total Credits		38

Shannon David, Ph.D., ATC
Ohio University, 2013
Research Interests: Quantification of Intervention Outcomes, Patient- Clinician Relationship

Kara Gange, Ph.D., ATC
North Dakota State University, 2010
Research Interests: Therapeutic Modalities and Diagnostic Ultrasound

Nicole German, Ph.D., ATC
North Dakota State University, 2008
Research Interests: Graston Technique®, Clinical Practice

Katie Lyman, Ph.D., ATC
University of South Florida, 2014
Research Interests: Kinesio Tape®, EMG, Emergency Medicine

Materials and Nanotechnology

Department Information

- **Program Director:**
  Erik K. Hobbie, Ph.D.
- **Email:**
  Erik.Hobbie@ndsu.edu
- **Department Phone:**
  (701) 231-6103
- **Department Web Site:**
  www.ndsu.edu/materials_nanotechnology/
- **Application Deadline:**
  April 1 for fall semester
- **Degrees Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

North Dakota State University offers an interdisciplinary program leading to the Master of Science or Ph.D. degree in Materials and Nanotechnology (MNT). The program includes a series of required MNT core courses; additional elective courses; written and oral preliminary examinations; a doctoral dissertation based on independent, original research in the area of materials and nanotechnology; and a final oral examination of the dissertation.

The program in Nanotechnology and Nanomaterials is open to qualified graduates of universities and colleges of recognized standing. Students with a degree in the disciplines of chemistry, engineering, material science and engineering, physics, polymer science, polymer engineering, or related fields will be considered for admission. Applicants must meet the Graduate School requirements (p. 1086).

Financial Assistance

Students are routinely supported through research assistantships. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. All students who submit complete applications by the appropriate deadlines are considered for assistantships. Exceptional students are also eligible for university fellowships that are awarded on a competitive basis.

By the end of the first academic year, the student will select an academic adviser from among the MNT faculty and arrange for the appointment of a Graduate Advisory Committee. This committee will consist of at least four members of the graduate faculty. This includes the student's major adviser, at least one additional MNT faculty member, and an appointee of the Graduate School.

The plan of study will be prepared by the student, in consultation with the major adviser, by the end of the first year in residence. The plan shall be approved by the student's Graduate Supervisory Committee, the MNT Program Director, and the Graduate School dean. The plan of study must be filed in the Graduate School prior to scheduling the comprehensive written examination.

Master of Science

Materials & Nanotechnology students are able pursue a master's degree under either the Plan A - Master's Thesis or the Plan C - Culminating Experience option. Each option requires a minimum of 30 graduate credits with a cumulative grade point average of 3.0 or better.

The Plan A thesis option represents a more traditional Master of Science degree, with an independent research component in the form of an original thesis that can serve as a foundation for future doctoral work in science or engineering. For the Thesis Option, of the required minimum 30 graduate credits, at least 16 credits must be from approved graduate courses numbered from 601-689, 691, 700-789, and 791 while the research credits (798) must be not fewer than 6 nor more than 10.

The Plan C option is appropriate for working professional students or students who are certain that they do not wish to pursue future graduate work in any field of science or engineering to the level of doctorate. In the context of the MNT program, this option requires a 6-10 credit culminating experience (794) which replaces the research credits (798).

Ph.D.

The Graduate School requires the plan of study for the Ph.D. degree to include not less than 90 semester graduate credits. Of this total, not less than 27 credits must be in courses other than seminar or research credits. Of the 27 course credits, 15 must be at the 700-789 level. The MNT Ph.D. program requires students to complete a series of 7 core courses totaling 17 semester credits. The student will complete additional elective courses to fulfill the Graduate School requirement of 27 semester credits in academic courses. An overall GPA of 3.0 or better must be maintained.

Core Curriculum

Code	Title	Credits
MNT 729	Materials Characterization	3
MNT 730	Nanotechnology and Nanomaterials	3
MNT 732	Physical Properties of Materials	3
MNT 745	Preparing Future Researchers	1
MNT 756	Molecular Modeling	3
MNT 760	Materials Synthesis Processing	3
MNT 790	Graduate Seminar	1

Students must complete at least an additional 12 credits of graduate level coursework. The courses should be chosen by the students in consultation and with the approval of the student's committee.

Suggested courses include the following:

Code	Title	Credits
Microelectronics Focus		
ABEN 682	Instrumentation & Measurements	3
CPM 796	Special Topics	2
CHEM 766	Quantum Chemistry I	4
CHEM 767	Quantum Chemistry II	2
ENGR 780	Electromagnetic Theory	3
ECE 751	Electromagnetic Theory and Applictions	3
IME 627	Packaging for Electronics	3
IME 720	Surface Engineering	3
IME 635	Plastics and Injection Molding Manufacturing	3
MNT 735	Optoelectronics Materials and Processing	3
PHYS 771	Quantum Physics I	3
Biomaterials Focus		
ABEN 758	Applied Computer Imaging and Sensing for Biosystems	3
BIOC 716	Protein and Enzyme Biochemistry	3
BIOC 673	Methods of Biochemical Research	3
CE 725	Biomaterials-Materials in Biomedical Engineering	3
CPM 771	Modern Methods of Polymer Characterization	3
ME 668	Introduction to Biomechanics	3
ME 731	Mechanical Behavior of Materials	3
ME 743	Biomechanics Of Impact	3
ECE 685	Biomedical Engineering	3
ECE 687	Cardiovascular Engineering	3
PSCI 611	Principles of Pharmacokinetics and Pharmacodynamics	3
PSCI 701	Quantative Drug Design	2
Nanomaterials Focus		
CE 641	Finite Element Analysis	3
CE 793	Individual Study/Tutorial	3
CPM 673	Polymer Synthesis	3
CHEM 766	Quantum Chemistry I	4
CHEM 767	Quantum Chemistry II	2
CPM 686	Corrosion and Materials	3
CPM 773	Organic Chemistry Of Coatings	3
CPM 782	Physical Chemistry Of Coatings	3
CPM 796	Special Topics	3
IME 720	Surface Engineering	3
ME 682	Fuel Cell Science and Engineering	3

ME 712	Advanced Finite Element Analysis	3
ME 733	Polymer Nanocomposites	3
ME 734	Smart Materials and Structures	3
PHYS 758	Statistical Physics	3
PHYS 781	Solid State Physics	3
General Materials Science and Engineering Focus		
ABEN 658	Process Engineering for Food, Biofuels and Bioproducts	3
ABEN 644	Transport Processes	3
ME 673	Polymer Engineering	3
CE 641	Finite Element Analysis	3
CE 720	Continuum Mechanics	3
CHEM 732	Advanced Analytical Chemistry	4
CHEM 736	Mass Spectrometry	2
CPM 673	Polymer Synthesis	3
ME 633	Composite Materials Science and Engineering	3
ME 751	Advanced Thermodynamics	3
PHYS 611	Optics for Scientists & Engineers	3
PHYS 781	Solid State Physics	3

Affiliated Faculty

Iskander Akhatov, Ph.D.
Lomonosov University of Moscow, 1983
Research Interests: Fluid Dynamics, Multiphase Systems, Heat and Mass Transfer

Dilpreet Bajwa, Ph.D.
University of Illinois, 2000
Research Interests: Biobased Polymer Composites, Wood Composites, Processing and Characterization, Recycled Materials Utilization, Durability Engineering via Weathering and Degradation Mechanisms

Achintya N. Bezbaruah , Ph.D.
University of Nebraska-Lincoln, 2002
Research Interests: Environmental sensors, Recalcitrant and micro pollutants, Contaminant fate and transport, Small community water and wastewater treatment, Environmental management

Gordon P. Bierwagen, Ph.D.
Iowa State University, 1968
Research Interests: Surface chemistry of coatings materials, corrosion, electrochemistry of coatings, coating lifetime prediction, concentrated random composites

Bret Chisholm, Ph.D.
University of Southern Mississippi, 1993
Research Interests: Combinatorial chemistry methods for coatings, novel organic-inorganic coatings applications, new polyester nanocomposites

Dr. Yongki Choi, PhD
City University of New York, 2010
Research Interests: Nanoparticle based electronics and sensors.

Andrew Croll, Ph.D.
McMaster University, Ontario, 2009
Research Interests: Polymers, Diblock Copolymers, Thin Films, Pattern Formation, Mechanics

Stuart G. Croll, Ph.D.
University of Leeds, 1974
Postdoctoral: National Research Council, Canada
Research Interests: Weathering durability of coatings, physical chemistry and suspension stability, pigmentpolymer interactions, film formation processes, coating and polymer physics

Alan R. Denton, Ph.D.
Cornell University, 1991
Postdoctoral, University of Guelph,1991-94; Technical University of Vienna, 1994-95, Research Center Julich, 1996-98

Research Interests: Soft Condensed Matter Theory, Computational Physic

Daniel L. Ewert, Ph.D.
University of North Dakota, 1989
Research Interests: Biomedical Engineering

Thomas Ihle, Ph.D.
Technical University, 1996
Research Interests: Theory and Simulation of Complex Fluids (Colloids, miroemulsions and Biopolymers).

Long Jiang, Ph.D.
Nanyang Technological University, 2003
Research Interests: Polymer and Polymer Composite Processing, Polymer Processing Machinery and Design, Nanocomposites, Polymers and Composites Derived from Biomass, Functional Composites with Novel Microstructures.

Alan R. Kallmeyer, Ph.D.
University of Iowa, 1995
Research Interests: Theoretical, Computational, and Experimental Solid Mechanics, Fatigue and Fracture of Engineering Materials, Composite Materials

Dinesh Katti, Ph.D.
University of Arizona, 1991
Research Interests: Geotechnical Engineering, Constitutive Modeling of Geologic Materials, Expansive Soils, Multiscale Modeling, Steered Molecular Dynamics, Computational Mechanics,
Nanocomposite, and Bionanocomposites. Computational Biophysics

Kalpana Katti, Ph.D.
University of Washington, 1996
Research Interests: Advanced Composites, Nanomaterials, Biomaterials, Biomimetics, Materials Characterization and Modeling, Analytical Electron Microscopy, and Microspectroscopy, Bone Tissue engineering

Svetlana Kilina, Ph.D.
University of Washington, Seattle, 2007
Research Interests: Photoexcitation process on the organic-inorganic interfaces in hybrid nanostructures: functionalized carbon nanotubes and quantum dots; Non-adiabatic dynamics in hybrid nanostructures: electron-phonon interactions in ligated quantum dots and functionalized carbon nanotubes; Self-assembly of bio-nanomaterials: structural aspects; Transport properties in amorphous conjugated polymers: effect of structural disorder.

Ivan T. Lima Jr., Ph.D.
University of Maryland, 2003
Research Interests: Photonics

Valery R. Marinov, Ph.D.
Technical University of Sofia, 1992
Research Interests: Process Modeling for Machining, Theory of Metal Cutting, Tribological Coatings, Including Nanocomposite Coatings and Deposition Methods, Design for Composites Manufacturing Processes, Packaging for low-cost disposable microelectronics, Direct-write material deposition methods, Laser processing

Sylvio May, Ph.D.
Jena, 1996
Research Interests: Physics of Lipid Membranes, Biophysics

Seth C. Rasmussen, Ph.D.
Clemson University, 1994
Postdoctoral, University of Oregon, 1995–99
Research Area: Inorganic/Organic Materials Chemistry, Chemical History

Jing Shi, Ph.D.,
Purdue University, 2004
Research Interests: Microelectronics
Packaging, Direct Write Material Depositing, Laser Processing for Electronics, RFID Applications, Numerical Modeling of Manufacturing Processes, Computer Integrated Manufacturing

Wenfang Sung, Ph.D.
Chinese Academy of Sciences, 1995;

Postdoctoral, University of Alabama, Birmingham, 1997-1999
Research Area: Organic Materials Chemistry

Chad A. Ulven, Ph.D.
University of Alabama at Birmingham, 2005
Research Interests: Advanced Composites Materials Development, Environmentally Friendly Materials Processing, Nondestructive Evaluation, Impact/High Strain Rate Characterization of
Advanced Materials

Alexander J. Wagner, Ph.D.
University of Oxford, 1997
Postdoctoral MIT, 1998-2000, Edinburgh, 2000-2002
Research Interests: Computational Soft Matter, Phase Separation, Diffusion, Interfaces Physics

Xinnan Wang, Ph.D.
University of South Carolina, 2008
Research Interests: Experimental Biomechanics, Synthesis of Nanomaterials, Nanomechanical Characterization, Nanomanipulation

Dean Webster, Ph.D.
Virginia Polytechnic Institute and State University 1984
Research Interests: Synthesis of high performance polymers, polymerization reactions, crosslinking chemistry, and quantitative structure-property relationship

Xiangfa Wu, Ph.D.
University of Nebraska-Lincoln, 2003
Beijing Institute of Technology, 1998
Research Interests: Nanofabrication and Nanomaterials, Advanced Composites, Fracture and Impact Mechanics

Mathematics

Department Information

- **Department Chair:**
  Benton Duncan, Ph.D.
- **Graduate Coordinator:**
  Indranil Sengupta, Ph.D.
- **Department Location:**
  412 Minard Hall
- **Department Phone:**
  (701) 231-8171
- **Department Web Site:**
  www.ndsu.edu/math
- **Application Deadline:**
  March 1 to be considered for assistantships for fall. Openings may be very limited for spring.
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71; IELTS 6

Program Description

The Department of Mathematics offers graduate study leading to the degrees of Master of Science (M.S.) and Doctor of Philosophy (Ph.D.). Advanced work may be specialized among the following areas:

- algebra, including algebraic number theory, commutative algebra, and homological algebra
- analysis, including analytic number theory, approximation theory, ergodic theory, harmonic analysis, and operator algebras
- applied mathematics, differential equations, dynamical systems,
- combinatorics and graph theory
- geometry/topology, including differential geometry, geometric group theory, and symplectic topology

Beginning with their first year in residence, students are strongly urged to attend research seminars and discuss research opportunities with faculty members. By the end of their second semester, students select an advisory committee and develop a plan of study specifying how all degree requirements are to be met. One philosophical tenet of the Department of Mathematics graduate program is that each mathematics graduate student will be well grounded in at least two foundational areas of mathematics. To this end, each student's background will be assessed, and the student will be directed to the appropriate level of study.

The Department of Mathematics graduate program is open to all qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School requirements (p. 1086), applicants must have earned a cumulative grade point average (GPA) of at least 3.0 or equivalent in all advanced mathematics courses at the baccalaureate level.

Financial Assistance

Teaching assistantships and a small number of research assistantships are available. Graduate tuition is waived for research and teaching assistants.

All students in full standing and, in certain situations, students in conditional status are eligible for assistantships. International students must show proficiency in reading, writing, and speaking English. In particular, they must pass an oral proficiency interview, which is a Test of Spoken English (TSE) prior to receiving a teaching assistantship. This interview is the culmination of the five-week Intensive English Language Program (IELP) available each summer. An indication, but not a guarantee, of being able to pass this interview is a TOEFL score of at least 600 (paper test) or 247 (computer test). All international students applying from outside the United States for a teaching assistantship must expect to take the IELP.

Assistantship applications will be considered at any time. However, opportunities are improved for those received by March 1 preceding the fall semester of intended enrollment.

At least one year of academic work must be spent in residence at NDSU in fulfilling graduate requirements for each graduate degree earned. The M.S. customarily takes two years to complete: the Ph.D. usually last three years beyond the master's. Students must maintain a cumulative GPA of at least 3.0 throughout their graduate career.

Master of Science

The Master of Science degree is offered in two options: the Thesis Option or the Comprehensive Study Option. The Thesis Option emphasizes research and preparation of a scholarly thesis, whereas the Comprehensive Study Option emphasizes a broader understanding of a major area of mathematics.

Departmental Requirements

1. At least 30 credit hours in approved graduate-level mathematics course work, depending on the degree option.
   a. Thesis Option: At least 6 credit hours of MATH 798 Master's Thesis, in addition to at least 18 credit hours in courses numbered 700-789. These 18 credit hours must include six foundational courses.
   b. Comprehensive Study Option: At least 2 credit hours of MATH 797 Master's Paper, in addition to at least 24 credit hours in courses numbered 700-789. These 24 credit hours must include six foundational courses.Subject to the approval of the Supervisory Committee, at most 6 of the required 30 credits may be earned in 600-level mathematics courses (excluding 620, 621, 650, and 651) or in courses outside the Mathematics Department.
2. A grade of Master's Pass in two of the four written preliminary examinations offered by the department. These examinations are offered in four areas: Algebra, Analysis, Applied Mathematics, and Geometry/Topology.
3. Demonstrated proficiency in a computer programming language.
4. A thesis or expository paper written under the supervision of a faculty member and defended at an oral examination administered by the student's supervisory committee.

Timelines

A candidate has three calendar years from the time of enrollment in the Graduate School to complete the Master's degree. Extensions may be granted after review and approval by the Graduate Committee, subject to Graduate School Policy.

Doctor of Philosophy

The Doctor of Philosophy degree is awarded in recognition of high scholarly attainment as evidenced by a period of successful advanced study, the satisfactory completion of prescribed examinations, and the development of an acceptable dissertation covering a significant, original aspect of mathematics.

Departmental Requirements

1. A total of at least 90 credit hours in approved graduate-level mathematics course work, including:
   a. At least 42 credit hours in courses numbered 700-789 or as approved by the Graduate Program Director. These 42 credit hours must include six foundational courses. The advisor should in consultation with the graduate chair ensure that the 42 credit hours contain a broad spectrum of courses (at least 12 credit hours) outside the student's area of emphasis as well as depth in a specific area of mathematics.

   b. At least 3 credit hours of MATH 790 Graduate Seminar.
   c. At least 6 credit hours of MATH 799 Doctoral Dissertation. Subject to the approval of the supervisory committee, at most 12 of the required 42 credit hours may be earned in 600-level mathematics courses (excluding 620,621, 650, and 651) or in courses outside the Mathematics Department. Credits used to satisfy the requirements of a Master's degree at NDSU may be included in the 90 credits hours required for the Ph.D. A student entering the Doctoral program with a Master's degree from another institution need only complete 60 credit hours to complete the Ph.D. degree. Half of these 60 credits must be in courses numbered 700-789 excluding those courses numbered 720, 721, 750, and 751.
2. A grade of Ph.D. Pass in two of the four written preliminary examinations offered by the department. These examinations are offered in four areas: Algebra, Analysis, Applied Mathematics, and Geometry/Topology.
3. Demonstrated reading proficiency of mathematical writing in French, German, or Russian. A student's supervisory committee may require a second foreign language.
4. Demonstrated proficiency in a computer programming language.
5. A passing grade in a preliminary oral examination administered by the student's supervisory committee after completion of the Preliminary Examinations.
6. A dissertation consisting of a written presentation of original and significant research completed by the student under the supervision of a faculty member and defended at an oral examination administered by the candidate's supervisory committee.
7. A dissertation video describing the candidate's research, evaluated by the candidate's supervisory committee.

Timelines

Ph.D. students have 3 years from first enrolling in a 700 level Mathematics course as a graduate student to complete the written Preliminary Examination requirement.

A student advances to candidacy after completion of the preliminary oral examination. All students must advance to candidacy no later than the start of their fourth year in the graduate program of the Department of Mathematics. Extensions may be granted after review and approval by the Graduate Committee, subject to Graduate School Policy.

Azer Akhmedov, Ph.D.
Yale University, 2004
Research Interests: Group Theory, Low Dimensional Topology

Maria Angeles Alfonseca, Ph.D.
Universidad Autonoma de Madrid, Spain, 2003
Research Interests: Fourier Analysis, Partial Differential Equations

Abraham Ayebo,Ph.D.
University of Nevada, Reno, 2010
Research Interests: Mathematics Education

Nikita Barabanov, Ph.D.
University of Kiev, 1979
Research Interests: Differential Equations, Control Theory, Optimization, Neural Networks

Jason Boynton, Ph.D.
Florida Atlantic University, 2006
Research Interests: Algebra

Leo Butler, Ph.D.
Queen's University, 2000
Research Interests: Hamiltonian Mechanics and Geometry

Catalin Ciuperca, Ph.D.
University of Kansas, 2001
Research Interests: Commutative Algebras, Algebraic Geometry

Michael Cohen, Ph.D.
University of North Texas, 2013
Research Interests: Groups,Dynamics Descriptive Set Theory

Dogan Comez, Ph.D.
University of Toronto, 1983
Research Interest: Ergodic Theory, Measureable Dynamics, Operator Theory

Davis Cope, Ph.D.
Vanderbilt University, 1980

Research Interests: Partial Differential Equations, Numerical Methods, Applied Mathematics

Josef Dorfmeister, Ph.D.
University of Minnesota, 2009
Research Interests: Symplectic Topology

Benton Duncan, Ph.D.
University of Nebraska, 2004
Research Interests: Operator Algebras, Noncommutative Functional Analysis, K-theory

Friedrich Littmann, Ph.D.
University of Illinois, Urbana, 2003
Research Interests: Approximation theory, Number theory

William Martin, Ph.D.
University of Wisconsin, 1993
Research Interests: Mathematics Education

Artem Novozhilov, Ph.D.
Moscow State University of Communication Means, 2002
Research Interests: Mathematical Biology

Indranil SenGupta, Ph.D.
Texas A&M University, 2010
Research Interests: Mathematical Finance and Mathematical Physics

Jessica Striker, Ph.D.
University of Minnesota, 2008
Research Interests: Enumerative, Algebraic, Geomentric and Bijective Combinatorics

Abraham Ungar, Ph.D.
Tel-Aviv University, 1973
Research Interests: Differential Equations, Integral Transforms, Wave Propagation, Special Relativity

Mechanical Engineering

Department Information

- **Department Chair:**
  Alan Kallmeyer, Ph.D.
- **Graduate Coordinator:**
  Ghodrat Karami, Ph.D.
- **Department Location:**
  111 Dolve Hall
- **Department Phone:**
  (701) 231-8671
- **Department Email:**
  ndsu.me.gradprogram@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/me/
- **Application Deadline:**
  February 15 for fall semester; September 15 for spring semester. Applications received after the deadline will still be considered, but preference is given to those submitted by the deadline.
- **Degrees Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE (International applicants). Minimum required total (quantitative + verbal): 300; Minimum required quantitative: 155
- **English Proficiency Requirements:**
  TOEFL ibT 79 IELTS 6.5

Program Description

The Department of Mechanical Engineering offers graduate programs leading to the M.S. and Ph.D. degrees. Graduate work may be concentrated in engineering mechanics, fatigue and fracture, biomechanics and biomaterials, thermal engineering, fluid mechanics, energy, controls, and mechatronics, or engineering materials with an emphasis on plastics, composite materials and nanomaterials. Students with a B.S. degree in physics or mathematics may pursue a special graduate program of studies and earn an M.S. degree in Mechanical Engineering.

Admission to the ME program is granted in a competitive process that is based upon consideration of the student's undergraduate GPA, test scores, and area of interest. Students who have graduated from an accredited institution in the United States with a baccalaureate degree in Mechanical Engineering or a closely related field must possess a GPA of 3.0 or greater for consideration of admission at full standing. International students must also provide both the TOEFL (or IELTS) and GRE general test scores before their applications will be considered. Minimum requirements for consideration of admission are 79 on the TOEFL ibT or 6.5 on the IELTS, and 300 on the GRE (combined quantitative and verbal) with a minimum quantitative score of 155.

Financial Assistance

Research and/or teaching assistantships may be available to qualified students. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. The availability of research and teaching assistantships is contingent upon current funding levels.

Mechanical Engineering - M.S.

The minimum total semester credits required for the M.S. degree in Mechanical Engineering is 30. The M.S. degree can be earned with either of two options: the thesis option or the comprehensive study option.

With the thesis option, a student must complete 21-24 credits of graduate courses in mechanical engineering and a master's thesis of 6 to 9 credits of ME 798 Master's Thesis. At the conclusion of the graduate program, the student will be examined orally on the thesis and course work.

With the comprehensive study option, a student must complete 27 credits of graduate courses in mechanical engineering and a master's paper of no more than 3 credits of ME 797 Master's Paper. At the conclusion of the graduate program, the student must pass a comprehensive oral examination on the master's paper and course work.

For more detailed information on the requirements for the M.S. degree, contact the department.

Mechanical Engineering - Ph.D.

The Ph.D. program requires the completion of 90 credit hours of graduate study beyond the baccalaureate degree (60 credits beyond the M.S. degree). In addition to the credit requirements for the M.S. degree, the Ph.D. degree requires a minimum of 24 course credits and a minimum of 24 credits of research-based dissertation. The remaining 12 credits may consist of any approved graduate level credits.

Code	Title	Credits
M.S. Degree		30
Minimum of 24 course credits		24
Minimum of 24 credits of research-based dissertion		24
Any approved graduate level credits		12
Total Credits		90

After the majority of course work has been completed, each student is required to pass a series of written qualifying exams on core subjects. After passing the written exams, an oral preliminary exam will be administered focusing on the student's proposal for the dissertation research. At the conclusion of the Ph.D. program, each student is required to pass a comprehensive oral final examination primarily focused on the dissertation. This exam may also cover material from course work, particularly courses fundamental to the dissertation. For more detailed information on the requirements for the Ph.D. degree, contact the department.

Fardad Azarmi, Ph.D.
University of Toronto, 2008
Research Interests: Thermal Spray Coatings, Thin Film, Multiscale Engineering Analysis, Finite Element Analysis, Failure in Materials, Corrosion, Materials Characterization, High Temperature Materials, Composite Structures, Metal Foams, Functionally Graded Materials

Dilpreet S. Bajwa, Ph.D.
University of Illinois at Urbana-Champaign, 2000
Research Interests: Biobased Polymer Composites, Wood Composites, Processing and Characterization, Recycled Materials, Utilization, Durability Engineering via Weathering and Degradation Mechanisms

Jordi Estevadeordal, Ph.D.
University of Houston, 1996

Research Interests: Advanced Laser Techniques, Thermo-Fluid and Spray Diagnostics, 3D particle Image Velocimetry, Phosphorescence, Infrared Thermography, Filtered Rayleigh Scattering, Bio-Fluid Measurements

Adam Gladen, Ph.D.
University of Minnesota, 2014
Research Interests: Renewable Energy, Solar Thermal Energy, Energy Storage - in particular Thermochemical Energy Storage, Thermodynamics, Solar Thermochemistry, Heat transfer, Radiative Transfer in Participating Media, Solar Reactor Design

Alan R. Kallmeyer, Ph.D.
University of Iowa, 1995
Research Interests: Theoretical, Computational, and Experimental Solid Mechanics, Fatigue and Fracture of Engineering Materials, Composite Materials

Ghodrat Karami, Ph.D.
Imperial College of Science and Technology, University of London, 1984
Research Interests: Multiscale Computational Solid Mechanics, Biomechanics, Cellular Mechanics, Micromechanics Characterization of Composites, Continuum Mechanics, Structural Mechanics, Nonlinear and Large Deformation and Analysis, Thermoelastic Analysis

Sumathy Krishnan, Ph.D.
Indian Institute of Technology, 1995
Research Interests: Solar Heating and Cooling, Concentrated Solar Power, Renewable Energy Integrated Systems

Robert V. Pieri, Ph.D.
Carnegie-Mellon University, 1987
Research Interests: Design, Materials and Nanomaterials Characterization, Instructional Pedagogy, Fracture Mechanics, Measurements, Alternative Energy, and Industrial Support

Majura Selekwa, Ph.D.
Florida A&M University, 2001
Research Interests: Robotics, Machine Intelligence, Soft computing Applications, Numerical Methods and Numerical Optimization, Optimal and Robust Control, Smart Actuation Control Systems, Real-Time Control in Mechatronics

Yildirim Bora Suzen, Ph.D.
Wichita State University, 1998
Research Interests: Computational Fluid Dynamics, Aerodynamics, Modeling of Industrial Transport Processes, Transition and Turbulence Modeling, Active/Adaptive Flow Control, Turbo machinery, Multiprocessor CFD

Annie X.W. Tangpong, Ph.D.
Carnegie Mellon University, 2006
Research Interests: Vibrations and Dynamics, Tribology, Friction Damping in Rotating Structures, Friction Damping in Nano- and Bio-materials

Chad A. Ulven, Ph.D.
University of Alabama at Birmingham, 2005
Research Interests: Advanced Composites Materials Development, Environmentally Friendly Materials Processing, Nondestructive Evaluation, Impact/High Strain Rate Characterization of Advanced Materials

Xinnan Wang, Ph.D.
University of South Carolina, 2008
Research Interests: Experimental Biomechanics, Synthesis of Nanomaterials, Nanomechanical Characterization, Nanomanipulation

Yechun Wang, Ph.D.
University of Maryland, 2007
Research Interests: Microfluidics, Biofluid Mechanics, Computational Fluid Dynamics, Numerical Analysis, and Characterization of Organic Coatings

Xiangfa Wu, Ph.D.
University of Nebraska-Lincoln, 2003
Beijing Institute of Technology, 1998
Research Interests: Nanofabrication and Nanomaterials, Advanced Composites, Fracture and Impact Mechanics

Yan Zhang, Ph.D.
Iowa State University, 2013
Research Interests: Experimental Fluid Dynamics, Advanced Flow Diagnostic Techniques, Wind Engineering and Wind Hazard Mitigation, Bio-Fluid Mechanics and Cariovascular Hemodynamics Modeling

Mariusz Ziejewski, Ph.D.
North Dakota State University, 1986

Research Interests: Impact Biomechanics, Human Body Dynamics, Head and Neck Trauma, Impact Trauma, Human Brain Modeling, Statistical Methods

Merchandising

Department Information

- **Interim Department Head:**
  Rebecca Woods, Ph.D.
- **Graduate Coordinator:**
  Linda Manikowske, Ph.D.
- **Department Location:**
  178 Evelyn Morrow Lebedeff Hall (EML)
- **Department Phone:**
  (701) 231-7352
- **Department Web Site:**
  www.ndsu.edu/dce/degrees/graduate/ms_merch
- **Application Deadline:**
  Applicants should apply at least two months prior to the start of classes each semester.
- **Degrees Offered:**
  M.S., Certificate
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Apparel, Design and Hospitality Management offers graduate study leading to the Master of Science degree or a Graduate Certificate in Merchandising in collaboration with the Great Plains Interactive Distance Education Alliance (GP-IDEA). The Master's degree in Merchandising is an online program offered through Distance and Continuing Education at NDSU. Participating faculty members from the GP-IDEA have jointly developed the merchandising curriculum. Course are taught by faculty within the Alliance from Kansas State University, North Dakota State University, Oklahoma State University, South Dakota State University, and the University of Nebraska-Lincoln.

The master's degree in Merchandising is designed for professionals in a variety of merchandising fields to increase potential for advancing in their careers. Students in this program will learn in-demand skills such as data analysis, problem solving, and critical thinking to identify customer needs and develop effective business strategies. The fully online program allows students to complete course work while maintaining their professional careers.

Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data. A student must meet all requirements for full admission. The following criteria act as guidelines for full acceptance: a cumulative baccalaureate GPA of 3.0 or better on a 4.0 scale, and a GPA of at least 3.25 during the final 30 semester credits of graded undergraduate course work, or a minimum GPA of 3.0 on 10 semester credits of graduate course work.

In completing the application, you are asked to write a statement (500 words or less) identifying and discussing your reasons for applying to this program. Within this statement you are to discuss how learning about diverse perspectives, critical thinking, and effective leadership will enhance your understanding of merchandising.

Recommended Skills and Academic Preparation

Adequate technical skills and access is essential to be successful in an online program. Unlimited web access at high speeds is helpful. Word processing programs that are up-to-date are important, as is knowledge of writing and publishing programs. Familiarity with diverse learning management systems is also helpful. NDSU currently uses Blackboard; other institutions have similar but different programs. An ability to self-motivate and learn independently is necessary for programs where face-to-face interactions are not available.

Financial Assistance

Graduate assistantships are not available since this program is online and facilitated through the Great Plains Interactive Distance Education Alliance and Distance and Continuing Education at NDSU. Students who are full-time (enrolled for six credits or more) may apply for financial aid.

Master of Science

The 36-credit master's degree program consists of ten required 3-credit courses, listed below, as well as a 6-credit comprehensive project required by North Dakota State University. **Course descriptions and tentative schedules are available at** http://www.ndsu.edu/adhm/merchandising/about.html

Code	Title	Credits
ADHM 710	Consumer Behavior in Merchandising	3
ADHM 720	Professional Advancement	3
ADHM 730	Product Design, Develeopment and Evaluation	3
ADHM 740	Promotional Strategies in Merchandising	3
ADHM 750	Retail Theory and Current Practice	3
ADHM 760	Historical and Contemporary Issues in Trade	3
ADHM 770	International Retail Expansion	3
ADHM 775	Research Methods in Merchandising	3
ADHM 780	Financial Merchandising Implications	3
ADHM 785	Strategic Merchandise Planning	3
ADHM 797S	Comprehensive Project (or ADHM 798 or Electives)	6
Total Credits		36

Graduate Certificate

The 12 credit graduate certificate program consists of three required 3-credit courses and one elective 3-credit course, listed below.

Code	Title	Credits
ADHM 710	Consumer Behavior in Merchandising	3
ADHM 720	Professional Advancement	3
ADHM 730	Product Design, Develeopment and Evaluation	3
or ADHM 740	Promotional Strategies in Merchandising	
ADHM 750	Retail Theory and Current Practice	3
Total Credits		12

Microbiology

Department Information

- **Interim Department Head:**
  John McEvoy, Ph.D.
- **Graduate Coordinator:**
  Peter Bergholz, Ph.D.
- **Department Location:**
  Van Es Hall
- **Department Phone:**
  (701) 231-7667
- **Department Web Site:**
  www.ndsu.edu/vetandmicro/
- **Application Deadline:**
  February 15 for fall
- **Degrees Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Veterinary and Microbiological Sciences offers graduate study leading to an M.S. in Microbiology and a Ph.D. in Molecular Pathogenesis. Faculty in the department have expertise in medical microbiology, ecology, genomics, virology, immunology, parasitology, microbial physiology, and food safety. The M.S. in Microbiology emphasizes research methodology and laboratory techniques. The Ph.D. in Molecular Pathogenesis integrates microbial genetics, mechanisms of pathogen-host interaction, and immunology to better understand the molecular basis of disease.

M.S. in Microbiology

A Master's degree in Microbiology at NDSU emphasizes research methodology and laboratory techniques. Student research and academic programs are individually tailored to meet the needs and interests of each student. Graduates are prepared for positions in research or commercial laboratories or for further graduate study. Students shall select a major adviser by the end of the first semester in residence. By the end of the first year in residence, the student and major adviser will select a supervisory committee. Students are encouraged to visit with each faculty member and spend time in each laboratory to acquaint themselves with the department's research programs.

Ph.D. in Molecular Pathogenesis

The Ph.D. in Molecular Pathogenesis encompasses the study of molecular pathogenesis of infectious and non-infectious diseases with an emphasis on zoonotic diseases and public health. The comprehensive doctoral degree in Molecular Pathogenesis integrates the study of microbial genetics, mechanisms of pathogen-host interaction, and cellular immunology to better understand the molecular basis of disease. Doctoral candidates in Molecular Pathogenesis focus on research and utilize the expertise of one or more departmental faculty members. As an outcomes-based program, course work is tailored to the student's training needs and career plans.

In addition to the Graduate School requirements (https://bulletin.ndsu.edu/graduate/admission-information), applicants must have evidence of a strong academic record in the biological sciences. The following science courses are required or recommended:

Biology

- One year of general biology with laboratory (required)
- One course in genetics (required)
- At least one course in cellular biology, cellular physiology, animal physiology, or bacterial physiology (required)
- Microbiology and immunology (recommended)

Chemistry

- One year of general chemistry with laboratory (required)
- Two sequential terms of organic chemistry with a laboratory course (required)
- Biochemistry (required)

Physics

- Two sequential terms of physics with a laboratory (required)

Additional application requirements

The statement of purpose should include the following:

- An explanation of how obtaining a Graduate degree in our program fits your career goals.
- A description of the qualities you possess that will contribute to your success in your chosen field.
- A description of any research experiences you have had. If you have had a research experience, it is important to include a letter of recommendation from your research adviser.
- A list of the areas of research in the department that interest you.

Financial Assistance

The student must first apply to the Graduate School and be accepted in full or conditional status before he/she is eligible for an assistantship. Research and teaching assistantships are contingent upon availability of funds and are awarded competitively. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need.

M.S. in Microbiology

The Master's program requires 24 months of full-time study, completing a minimum of 30 semester credits with an overall GPA of 3.0 or better. Students with inadequate undergraduate training in microbiology will be required to complete undergraduate courses in microbiology in addition to the

required minimum 30 semester credits. The M.S. degree in microbiology requires a research-based thesis, a public seminar of the thesis research, and a final oral defense of the thesis. The supervisory committee administers the oral thesis examination.

Ph.D. in Molecular Pathogenesis

The Ph.D. in Molecular Pathogenesis program is based on defined training outcomes. Degree requirements are in agreement with NDSU Graduate School requirements. The student and major adviser will prepare a plan of study by the end of the first year in residence. The Graduate School requires the plan of study for the Ph.D. degree to include no less than 90 semester graduate credits. Of these 18 credits are in required courses, and the remainder can be tailored to the student's needs. An overall GPA of 3.0 or higher must be maintained. Please refer to the department website for more information on course requirements for this program.

Examinations

Two preliminary examinations must be completed successfully before advancement to candidacy for the doctoral degree. The first, which is generally taken at the end of the first year in residence, examines fundamental areas of knowledge that will be essential for success as a doctoral candidate. The second requires the student to write a research proposal targeted at a program administered by NIH, NSF, or NIFA and defend the proposal in an oral examination. After successful completion of the comprehensive written and oral preliminary examinations, the student will be formally admitted to candidacy for the Doctor of Philosophy degree.

Dissertation Research

In addition to the defense of the written dissertation in the final oral examination, the candidate will present a public seminar based on the dissertation research.

Peter Bergholz, Ph.D.
Michigan State University, 2007
Research Interests: Population Genomics and Evolutionary Ecology

Teresa Bergholz, Ph.D.
Michigan State University, 2007
Research Interests: Functional Genomics of Foodborne Pathogens

Eugene S. Berry, Ph.D.
Northeastern University, 1983
Research Interests: Animal Virology, Molecular Pathogenesis of ss(+) RNA Viruses

Glenn Dorsam, Ph.D.
Virginia Commonwealth University, 1998
Research Interests: Molecular Pathogenesis

Neil W. Dyer, D.V.M., M.S.
Iowa State University, 1991
Research Interests: Studies with *Bacillus anthracis*, Porcine Pneumonia, New Malignant Catarrhal Fever Herpesvirus

Penelope S. Gibbs, Ph.D.
University of Georgia, 2001
Research Interests: Avian *E. coli*, Bacterial Molecular Pathogenesis, Antimicrobial Resistance, Food Safety

John M. McEvoy, Ph.D.
University of Ulster, 2002
Research Interests: *Cryptosporidium* Ecology, Evolution and Host-Parasite Interactions; Environmental Microbiology

Birgit Pruess, Ph.D.
Ruhr-Universitat Bochum, 1991
Research Interests: Global Gene Regulation in Enteric Bacteria, Complex Regulatory Networks

Sheela Ramamoorthy, Ph.D.
Virginia Polytechnic Institute and State University, 2006
Research Interests: Virology and Vaccinology

Jane M. Schuh, Ph.D.
North Dakota State University, 2000
Research Interests: Immunology; Biomedical Significance of the Initiation and Maintenance of Allergic Asthma; The Innate Immune Response in Health and Disease; Murine Models of Human Asthma; *Aspergillus fumigatus*-Induced Immune Response

Molecular Pathogenesis

Department Information

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  John McEvoy, Ph.D.
- **Graduate Coordinator:**
  Peter Bergholz, Ph.D.
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Michigan State University, 2007
Research Interests: Population Genomics and Evolutionary Ecology

Teresa Bergholz, Ph.D.
Michigan State University, 2007
Research Interests: Functional Genomics of Foodborne Pathogens

Eugene S. Berry, Ph.D.
Northeastern University, 1983
Research Interests: Animal Virology, Molecular Pathogenesis of ss(+) RNA Viruses

Glenn Dorsam, Ph.D.
Virginia Commonwealth University, 1998

Research Interests: Molecular Pathogenesis

Neil W. Dyer, D.V.M., M.S.
Iowa State University, 1991
Research Interests: Studies with *Bacillus anthracis*, Porcine Pneumonia, New Malignant Catarrhal Fever Herpesvirus

Penelope S. Gibbs, Ph.D.
University of Georgia, 2001
Research Interests: Avian *E. coli*, Bacterial Molecular Pathogenesis, Antimicrobial Resistance, Food Safety

John M. McEvoy, Ph.D.
University of Ulster, 2002
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Birgit Pruess, Ph.D.
Ruhr-Universitat Bochum, 1991
Research Interests: Global Gene Regulation in Enteric Bacteria, Complex Regulatory Networks

Sheela Ramamoorthy, Ph.D.
Virginia Polytechnic Institute and State University, 2006
Research Interests: Virology and Vaccinology

Jane M. Schuh, Ph.D.
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Research Interests: Immunology; Biomedical Significance of the Initiation and Maintenance of Allergic Asthma; The Innate Immune Response in Health and Disease; Murine Models of Human Asthma; *Aspergillus fumigatus*-Induced Immune Response

Music

Department Information

- **Department Chair:**
  E. John Miller, Ph.D.
- **Graduate Music Coordinator:**
  Jo Ann Miller, D.M.A.
- **Department Location:**
  115 Music Education Building
- **Department Phone:**
  (701) 231-7932
- **Department Web Site:**
  www.ndsu.edu/performingarts/music/graduate/index.html
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  D.M.A., M.M.
- **English Proficiency Requirements:**
  TOEFL iBT 79, IELTS 6.5

Graduate Degrees

Graduate degrees (the Master of Music and the Doctor of Musical Arts) are offered in performance, conducting and music education.

Master of Music Degree (M.M.)

Three tracks are offered: Performance, Conducting and Music Education. The Performance, Choral Conducting and Instrumental Conducting tracks require a minimum of 30 credits; the Music Education track requires a minimum of 32 credits.

The M.M. in performance and conducting is the professional degree in music designed for performers and conductors wishing to augment and refine their skills. The M.M. in Music Education is designed for music teachers who wish to update and increase their practical pedagogical knowledge.

Applications may be completed online at www.ndsu.edu/gradschool. A complete application will include three recommendations, transcripts and a scholarly writing example. Applicants should notify the graduate music coordinator, jo.miller@ndsu.edu, (jo.miller@ndsu.edu) of their intention to apply. For applicants in performance and conducting, an on-campus visit and audition are required. Following acceptance into the masters program, applicants will complete a diagnostic exam, which will be used by their advisers to plan appropriate coursework.

All coursework must be passed with a minimum grade of B. Comprehensive written examinations in the student's primary area and in music academic studies must be passed near the end of or after coursework. The final oral examination (administered by the student's committee) occurs after the written comprehensive exam.

Conductors and performers will prepare a recital as their capstone experience. Those in the music education track will complete a written practicum. Both experiences will be planned with guidance by the candidate's committee. The committee will include three graduate faculty members: the adviser, a representative from music academic studies, and at least one other music faculty member.

Master of Music in Music Education Degree

This degree is designed to be completed in three summers or in a combination of summers and the academic year. Students must register for a least six credits per calendar year until all degree requirements are completed. Classes are offered both online and on campus. Course-work can be focused in elementary, choral/vocal, or instrumental music education. No thesis is required; rather, students will complete a four-credit practicum. The practicum will be agreed upon and planned jointly by the student and his/her adviser. Comprehensive written examinations must be passed near the end of or after coursework. The final oral examination (administered by the student's committee) occurs after the written comprehensive examination.

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

The D.M.A. is the terminal professional practical degree in music, designed for performers and conductors wishing to acquire the highest performance abilities. Graduates will have attained the academic qualifications generally accepted for teaching at the college level.

Entering students in the vocal performance track are expected to have appropriate language proficiencies in French, German, and Italian. Remedial work may be required upon recommendation of the adviser and committee.

Recitals and a final written project are planned in conjunction with the candidate's committee, which consists of at least three graduate faculty members: the adviser, a representative from academic studies, and at least one other member at large.

All course work must be passed with a minimum grade of B. Qualifying examinations in the student's primary focus area and in academic studies must be passed near the end of or after course work, and prior to a final oral examination by members of the candidate's committee. All D.M.A. graduates must have reading proficiency in at least one foreign language. For some, an alternative such as a computer language or other research skill, if appropriate to the student's focus area, may be substituted. This proficiency will be determined and assessed by the candidate's committee. Further, students in Choral Conducting must demonstrate appropriate proficiency in foreign language diction.

Two tracks are offered: Performance and Conducting. Each track requires a minimum of 90 credits beyond the baccalaureate degree (93 for the D.M.A. in choral conducting). Students entering the program with an approved master's degree or its equivalent may apply credits toward the D.M.A. The graduate music faculty will determine the viability and number of transfer credits.

Additional information about graduate study at the Challey School of Music may be found at www.ndsu.edu/performingarts/music/graduate/.

Doctor of Musical Arts in Vocal Performance

Code	Title	Credits
MUSC 709	Graduate Ensemble (1,1,1,1,1,1,1,1,1,1)	
MUSC 731	Applied Study (4,4,4,4,4,4)	
MUSC 748	Music Bibliography/Research Methods	
MUSC 780	Recital (4,4,4)	
MUSC 789	D.M.A. Thesis	
Credits		52
History/Theory		14
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	

MUSC 744	20th Century Music History	
Pedagogy		6
MUSC 721	Advanced Vocal Pedagogy	
Literature		9
MUSC 767 & MUSC 768 & MUSC 769	Vocal Literature I-Baroque/Classical and Vocal Literature II-Romantic and Vocal Literature III-20Th Century/Contemporary	
Electives (In consultation with adviser)		9
Total Credits		90

Doctor of Musical Arts in Instrumental Performance

Code	Title	Credits
MUSC 709	Graduate Ensemble (1,1,1,1,1,1,1,1,1,1)	
MUSC 731	Applied Study (4,4,4,4,4,4)	
MUSC 748	Music Bibliography/Research Methods	
MUSC 780	Recital (4,4,4)	
MUSC 789	D.M.A. Thesis	
Credits		52
History/Theory		14
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Pedagogy/Literature (Minimum six credits in each)		15
MUSC 722	Applied Instrumental Pedagogy	
MUSC 764	Applied Instrumental Literature	
Electives (in consultation with adviser)		9
Total Credits		90

Doctoral of Musical Arts in Piano Performance

Code	Title	Credits
MUSC 709	Graduate Ensemble (1,1,1,1) *	
MUSC 731	Applied Study (4,4,4,4,4,4)	
MUSC 732	Applied Collaborative Study (2,2)	
MUSC 748	Music Bibliography/Research Methods	
MUSC 780	Recital (4,4,4)	
MUSC 789	D.M.A. Thesis (1,1,1,1)	
Credits		50
History/Theory**		14
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 734	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	

MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Pedagogy/Literature		15
MUSC 643	Keyboard Literature	
MUSC 723	Advanced Piano Pedagogy	
MUSC 724	Topics in Piano Pedagogy	
MUSC 770	Topics in Keyboard Literature	
Electives (in consultation with adviser)		11
Total Credits		90

* At least 3 credits of MUSC 790 must be earned while in residence at NDSU.
** At least one course must be taken from MUSC 611-734; at least one course must be taken from MUSC 740-744

Doctor of Musical Arts in Collaborative Piano

Code	Title	Credits
MUSC 731	Applied Study (4,4,4,4,2,2) At least 4 semesters of MUSC 731 must be taken in residence during the DMA program	
MUSC 748	Music Bibliography/Research Methods	
MUSC 750	Studies in Collaborative Piano (2,2,2,2)	
MUSC 780	Recital (3,3,3,3)	
MUSC 789	D.M.A. Thesis (1,1,1,1)	
Credits		46
History/Theory *		14
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Pedagogy/Literature		6
MUSC 643	Keyboard Literature	
MUSC 723	Advanced Piano Pedagogy	
MUSC 724	Topics in Piano Pedagogy	
MUSC 770	Topics in Keyboard Literature	
Vocal or Instrumental Specialization **		16-19
GERM 101	First-Year German I	
FREN 101	First-Year French I	
MUSC 642	Opera Literature	
MUSC 705	Graduate Diction Survey I	
MUSC 706	Graduate Diction Survey II	
MUSC 709	Graduate Ensemble	
MUSC 764	Applied Instrumental Literature	
MUSC 767	Vocal Literature I-Baroque/Classical	
MUSC 768	Vocal Literature II-Romantic	
MUSC 769	Vocal Literature III-20Th Century/Contemporary	
Electives (in consultation with adviser)		9
Total Credits		91-94

Doctor of Musical Arts in Conducting

Code	Title	Credits
MUSC 709	Graduate Ensemble (1,1,1,1,1,1,1)	
MUSC 731	Applied Study (4,4,4,4,4)	
MUSC 748	Music Bibliography/Research Methods	
MUSC 780	Recital (4,4,4)	
MUSC 789	D.M.A. Thesis	
Credits		44
History/Theory		14
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Literature		6-12
MUSC 760	Medieval/Renaissance Choral Literature	
MUSC 761	Baroque Choral Literature	
MUSC 762	Classical/Romantic Choral Literature	
MUSC 763	Contemporary Choral Literature	
or MUSC 765	Band Literature:History and Development	
MUSC 766	Band Literature:Chamber Music,Other Genres	
Cognate Courses determined with advisor from Conducting, Music Education, Academic Studies and Performance		14
Electives (in consultation with adviser)		12
Total Credits		90-96

Master of Music in Music Theory Pedagogy

Course List

Music Theory Core

Code	Title	Credits
Required Core Courses		16
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 735	Classroom Pedagogy	
MUSC 736	Music Theory Pedagogy	
MUSC 794	Practicum	
Choose one of the following:		3
MUSC 611	Form and Analysis	
MUSC 734	Analytical Techniques	
Music Core		
74x History (Choose based on availability in course rotation)		3
MUSC 748	Music Bibliography/Research Methods	2
Electives (in consultation with adviser)		6
Total Credits		30

Overview of Program:

The primary purposes of the MM option in Music Theory Pedagogy are (1) to add to the breadth of the experiences for our graduate students and (2) to make them more attractive candidates in their job searches, especially those seeking teaching positions in higher education. The current job market in higher education prioritizes depth of knowledge and experience in more than a single specialty area. Often, this means extensive knowledge and experience in music history and/or music theory. Further, the most successful applicants on the academic job market have not only experience teaching music theory or music history, but also a relevant academic credential. This new program would allow enrolled students to advance their knowledge of music theory and their marketability in teaching the undergraduate theory sequence.

This degree track is designed for students who wish to expand their professional marketability by preparing performers/conductors for the many university positions that involve both performance and classroom teaching. The MM in Music Theory Pedagogy option will primarily be pursued by students jointly with another MM option or DMA in Performance or Conducting, though it has enough unique required courses to be granted as a single degree.

Master of Music in Music Education Degree

Code	Title	Credits
Music Education Core		9
MUSC 701	Psychology Of Music	
MUSC 703	Foundations of Music Education	
MUSC 790	Graduate Seminar	
Music Core		10
MUSC 702	Graduate Theory Survey	
MUSC 704	Graduate Music History Survey	
MUSC 731	Applied Study	
Music Electives		9
MUSC 713	Advanced Choral Music Methods	
MUSC 714	Advanced Elementary Music Methods	
MUSC 715	History of Choral Literature	
MUSC 765	Band Literature:History and Development	
MUSC 766	Band Literature:Chamber Music,Other Genres	
Other Music History, Theory, Literature or Pedagogy (to be determined with adviser)		9
MUSC 794	Practicum	4

Master of Music in Instrumental Performance

Code	Title	Credits
Required Courses		21-23
MUSC 709	Graduate Ensemble (3 credits)	
MUSC 722	Applied Instrumental Pedagogy (2-3 credits)	
MUSC 731	Applied Study (8 credits)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 764	Applied Instrumental Literature (2-3 credits)	
MUSC 780	Recital (4 credits)	
Theory		3
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
History		3
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	

Electives (in consultation with adviser)	1-2
Minimum Total Credits	30

Master of Music in Piano Performance

Code	Title	Credits
Required Courses		17
MUSC 709	Graduate Ensemble (3 credits)	
MUSC 731	Applied Study (8 credits)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 780	Recital (4 credits)	
One course to be taken from each of the following areas:		
Literature		2-3
MUSC 643	Keyboard Literature	
MUSC 770	Topics in Keyboard Literature	
Pedagogy [2-3]		
MUSC 623	Piano Pedagogy I	
MUSC 624	Piano Pedagogy II	
MUSC 723	Advanced Piano Pedagogy	
MUSC 724	Topics in Piano Pedagogy	
Theory		3
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
History		3
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Electives (in consultation with adviser)		1-2
Minimum Total Credits		30

Master of Music in Collaborative Piano

Code	Title	Credits
Required Courses		25
MUSC 705	Graduate Diction Survey I (3 credits)	
MUSC 731	Applied Study (10 credits)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 750	Studies in Collaborative Piano (6 credits)	
MUSC 764	Applied Instrumental Literature (1 credit)	
MUSC 780	Recital	
One course to be taken from each of the following areas:		
Theory		3
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
History		3
MUSC 740	Medieval/Renaissance Music History	

MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Total Credits		31

Master of Music in Vocal Performance

Code	Title	Credits
Required Courses		19-20
MUSC 709	Graduate Ensemble (3 credits)	
MUSC 721	Advanced Vocal Pedagogy (2-3 credits)	
MUSC 731	Applied Study (8 credits)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 780	Recital (4 credits)	
One course to be taken from each of the following areas:		
Theory		3
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
History		3
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Literature		
MUSC 767	Vocal Literature I-Baroque/Classical	3
MUSC 768	Vocal Literature II-Romantic	3
MUSC 769	Vocal Literature III-20Th Century/Contemporary	3
Electives (in consultation with adviser)		1-2
Minimum Total Credits		30

Master of Music in Choral Conducting

Code	Title	Credits
Required Courses		14
MUSC 709	Graduate Ensemble (2 credits)	
MUSC 721	Advanced Vocal Pedagogy (2 credits)	
MUSC 731	Applied Study (8 credits)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 780	Recital (4 credits)	
Theory (One course)		3
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
History (One course)		3
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	

MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Literature (Two courses)		6
MUSC 760	Medieval/Renaissance Choral Literature	
MUSC 761	Baroque Choral Literature	
MUSC 762	Classical/Romantic Choral Literature	
MUSC 763	Contemporary Choral Literature	
Minimum Total Credits		30

Master of Music in Instrumental Conducting

Code	Title	Credits
Required Courses		18
MUSC 709	Graduate Ensemble (2 credits)	
MUSC 731	Applied Study (Conducting 8 credits)	
MUSC 731	Applied Study (Instrument 8 credits)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 780	Recital (4 credits)	
Theory (One course)		3
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
History (One course)		3
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Literature		6
MUSC 765	Band Literature:History and Development	
MUSC 766	Band Literature:Chamber Music,Other Genres	
Minimum Total Credits		30

Jeremy Brekke, D.A., Associate Professor

Robert W. Groves, Ph.D., Professor

Sigurd Johnson, D.M.A., Associate Professor

Robert J. Jones, D.M.A., Professor

Cassie Keogh, D.M.A., Assistant Professor

Mariane Lemieux, D.M.A., Assistant Professor

Kyle Mack, D.A., Associate Professor

Jo Ann Miller, D.M.A., Professor

John Miller, Ph.D., Professor

Charlette Moe, D.M.A., Assistant Professor

Warren Olfert, Ph.D., Professor

Matthew Patnode, D.M.A., Professor

Michael Weber, D.M.A., Professor

Tyler Wottrich, D.M.A., Assistant Professor

Natural Resources Management

Department Information

- **Program Director:**
  Shawn DeKeyser, Ph.D.
- **Email:**
  Edward.Dekeyser@ndsu.edu
- **Department Location:**
  School of Natural Resource Sciences, Morrill Hall 205
- **Department Phone:**
  (701) 231-8180
- **Department Web Site:**
  www.ndsu.edu/nrm/
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  Ph.D., M.S., MNRM
- **Test Requirement:**
  GRE required for international students applying to the M.S. or Ph.D. program.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

Natural Resources Management (NRM) in the School of Natural Resource Sciences prepares students for the environmental challenges of the 21st century. The Master of Natural Resources Management (MNRM), Master of Science (M.S.) and the Doctor of Philosophy (Ph.D.) NRM degrees are interdisciplinary and offer a broad, systems- based approach toward managing natural resources. NRM graduates are prepared to compete for and be productive in jobs where issues reach beyond a single discipline or subject area. They have the skills necessary to address problems from a sustainable social-ecological perspective.

Through the NRM graduate program, students gain a breadth of knowledge in relevant planning, analysis and management.

In cooperation with the following NDSU academic programs and departments, students select a curriculum and an adviser from one of these participating units:

- Agribusiness and Applied Economics
- Agricultural and Biosystems Engineering
- Biological Sciences (Botany and Zoology)
- Civil Engineering
- Communications
- Entomology
- Plant Sciences
- Range Sciences
- Earth and Climate Science
- Geosciences
- Soil Science
- Sociology/Anthropology/Emergency Management
- Veterinary and Microbiological Sciences

The educational objective of the NRM graduate program is to provide formal education in a chosen specialty area, introductions to other subject areas, appropriate course work in analytical methods, and research and writing experiences in the general area of natural resource management. Problem recognition, definition, analysis and resolution, along with critical thinking are the ultimate learning objectives.

Admissions Requirements

The graduate program in Natural Resources Management is open to qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School requirements, applicants may be recommended or required to take the GRE general exam. Consult with the NRM Program Director.

Financial Assistance

Both research and teaching assistantships may be available through the participating academic units. Application for financial aid must be made directly to a department. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research. Limited scholarships are available.

To qualify for the MNRM degree, the candidate must satisfactorily complete a minimum of 32 semester credits of course work in his/her selected curriculum, and an oral presentation based on an NRM topic of the candidate's choice.

To qualify for the M.S. degree, the candidate must satisfactorily complete a minimum of 30 semester units in his/her selected curriculum, an oral examination, and a thesis or comprehensive study paper.

To qualify for the Ph.D. degree, the candidate must satisfactorily complete a course of study of no less than 90 semester credits (including 30 semester credits from the M.S. degree or equivalent), both a written and an oral preliminary examination, a research-based dissertation, and an oral defense of the dissertation. In addition, the candidate presents final public seminar based on the dissertation research. For more specific information, please refer to the Natural Resources Management Graduate Student Guidelines available on the NRM Web site (http://www.ndsu.edu/nrm).

NRM program courses are offered by NRM and the other participating academic units. These include:

- Agribusiness and Applied Economics
- Agricultural and Biosystems Engineering
- Agricultural Systems Management
- Anthropology
- Biology
- Botany
- Civil Engineering
- Communication
- Computer Science
- Economics
- Entomology
- Geosciences
- Industrial and Manufacturing Engineering
- Mathematics
- Microbiological Sciences
- Philosophy
- Plant Pathology
- Plant Sciences
- Political Science
- Range Science
- Sociology
- Soil Science
- Statistics
- Zoology

Adnan Akyuz, Ph.D.
Assistant Professor/Climatologist
University of Missouri-Columbia, 1994

Francis Casey, Ph.D.
Professor of Soil Science
Iowa State University, 2000

Amitava Chatterjee, Ph.D.
Assistant Professor of Soil Science

University of Wyoming, 2007

Larry J. Cihacek, Ph.D.
Associate Professor of Soil Science
Iowa State University, 1979

Dennis Cooley, Ph.D.
Professor of Philosophy
University of Rochester, 1995

Edward (Shawn) DeKeyser, Ph.D.
Associate Professor of Range Science
North Dakota State University, 2000

Tom DeSutter, Ph.D.
Associate Professor of Soil Science
Kansas State University, 2004

Gary A. Goreham, Ph.D.
Professor of Sociology
South Dakota State University, 1985

Christina Hargiss, Ph.D.
Assistant Professor of Natural Resources Management
North Dakota State University, 2009

Robert Hearne, Ph.D.
Associate Professor of Agricultural Economics
University of Minnesota, 1995

Xinhua Jia, Ph.D.
Associate Professor of Agricultural and Biosystems Engineering
University of Arizona, 2004

Chiwon W. Lee, Ph.D.
Professor of Plant Sciences
Purdue University, 1977

Wei Lin, Ph.D.
Associate Professor of Civil and Environmental Engineering
University of Buffalo, 1992

Zhulu Lin, Ph.D.
Assistant Professor of Agriculture and Biosystems Engineering
University of Georgia, 2003

Rodney G. Lym
Professor of Plant Sciences
University of Wyoming, 1979

Mark Andrew Meister, Ph.D.
Associate Professor of Communication
University of Nebraska, 1997

Jack E. Norland, Ph.D.
Associate Professor of Natural Resources Management
North Dakota State University, 2008

G. Padmanabhan, Ph.D.
Professor of Civil Engineering,
Purdue University, 1980

Deirdre Prischmann-Voldseth, Ph.D.
Associate Professor of Entomology
Washington State University, 2005

David A. Rider, Ph.D.
Professor of Entomology
Louisiana State University, 1988

David Ripplinger, Ph.D.
Assistant Professor of Agribusiness and Applied Economics
North Dakota State University, 2012

David Roberts, Ph.D.
Assistant Professor of Agribusiness and Applied Economics
Oklahoma State University, 2009

Kevin Sedivec, Ph.D.
Professor of Range Science
North Dakota State University, 1994

Halis Simsek, Ph.D.
Assistant Professor of Agriculture and Biosystems Engineering
North Dakota State University, 2012

Dean D. Steele, Ph.D.
Associate Professor of Agricultural and Biosystems Engineering
University of Minnesota, 1991

Joseph D. Zeleznik
Extension Forester
Michigan State University, 2001

Nursing

Department Information

- **Department Chair:**
  Carla Gross, RN, Ph.D.
- **Department Location:**
  D113 SGC Building, 1919 N. University Drive
- **Department Phone:**
  (701) 231-5692
- **Department Web Site:**
  https://www.ndsu.edu/nursing/
- **Application Deadline:**
  Doctor of Nursing Practice, February 15 for BSN to DNP fall admission. BSN to DNP requires a March interview.
- **Degrees Offered:**
  D.N.P - FNP
- **English Proficiency Requirements:**
  TOEFL iBT 79; IELTS 6.5

Program Description

The Doctor of Nursing Practice degree, a clinical doctorate, is offered in the Family Nurse Practitioner specialty. The program includes advanced nursing courses, support courses, clinical practica and clinical disquisition.

Guidelines provided by the American Association of Colleges of Nursing (AACN) and the National Organization of Nurse Practitioner Faculties (NONPF) are utilized in the curriculum. The graduate nursing program is accredited by the Commission on Collegiate Nursing Education (CCNE).

1. Baccalaureate degree in nursing from a nationally accredited nursing program.
2. Undergraduate coursework in research and health assessment.
3. Current unencumbered RN licensure
4. Completed application to the Graduate School.

   a. Three references: two from professional colleagues that address clinical competence and potential for graduate education, and one other reference.
   b. Written narrative of professional experience and future goals.
5. Interviews required for applicants on either the first or second Friday and Saturday of March.

1. Family Nurse Practitioner/Doctor of Nursing Practice: A minimum of 86 (DNP) semester credits.
2. A maximum of nine graduate semester credits (with a grade of B or better) completed within seven years previous to admission, may be transferred from other regionally accredited colleges or universities with the consent of the student's supervisory committee.
3. Clinical Dissertation

Code	Title	Credits
Core Course Requirements		
NURS 701	Theoretical Perspectives of the Discipline	
NURS 702	Ethics and Health Policy in Nursing	
NURS 704	Nursing Research/Evidence Based Practice	
NURS 706	Health Care Delivery Systems, Financing and Informatics	
Family Nurse Practitioner Requirements (DNP)		
NURS 715	Advanced Community Assessment	
NURS 810	Health Promotion and Disease Prevention	
NURS 812	Advanced Health Assessment	
NURS 812P	Assessment Practicum	
NURS 814	Advanced Pathophysiology I	
NURS 816	Advanced Pathophysiology II	
NURS 820	Advanced Practice Roles	
NURS 830	Clinical Applications	
NURS 831	Advanced Pharmacology I	
NURS 832	Advanced Pharmacology II	
NURS 833	Family Primary Care I:Assessment and Management	
NURS 833P	Family Primary Care:Residency I	
NURS 834	Family Primary Care II:Assessment and Management	
NURS 834P	Family Primary Care:Residency II	
NURS 835	Family Primary Care III: Assessment and Management	
NURS 835P	Practicum IV: FNP Role Integration	
NURS 836P	Practicum V: FNP Role Integration	
NURS 850P	Family Primary Care: Specialty Practicum	
NURS 880		
STAT 725	Applied Statistics	
NURS 899S	Clinical Dissertation	
Total Credits		86

Mykell Barnacle, DNP, FNP
North Dakota State University, 2008

Kelly Buettner-Schmidt, Ph.D., RN, FAAN
University of New Mexico, 2013

Kara Falk, DNP, FNP
Montana State University, 2016

Donna Grandbois, Ph.D., RN
North Dakota State University, 2008

Carla Gross, Ph.D., RN
North Dakota State University, 2012

Dean Gross, Ph.D., FNP
Rush University, 1998

Loretta Heuer, Ph.D., FAAN
University of North Dakota, 1995

Tina Lundeen, DNP, FNP
North Dakota State University, 2010

Allison Peltier, DNP, FNP
North Dakota State University, 2015

Heidi Saarinen, DNP, FNP
North Dakota State University, 2010

Molly Secor-Turner, Ph.D.
University of Minnesota, 2008

Shila Thompson, Ph.D., RN
South Dakota State University, 2012

Pharmaceutical Sciences

Department Information

- **Department Chair:**
  Jagdish Singh, Ph.D.
- **Department Location:**
  102 Sudro Hall
- **Department Phone:**
  (701) 231-7661
- **Department Web Site:**
  www.ndsu.edu/pharmsci/
- **Application Deadline:**
  March 15 for fall semester and October 1 for spring semester, if positions are available.
- **Degrees Offered:**
  Ph.D.
- **Test Requirement:**
  GRE (300 or more)
- **English Proficiency Requirements:**
  TOEFL ibT 90; IELTS 6.5

Program Description

The Department of Pharmaceutical Sciences offers graduate study leading to the Doctor of Philosophy degree. Advanced work may be selected from pharmaceutics, pharmacokinetics, pharmacology, and medicinal chemistry.

The pharmaceutical sciences curriculum consists of a core of courses involving both basic and pharmaceutical sciences. In addition, students will select courses that will prepare them to be competent scientists in their fields.

Admissions Requirements

The Department of Pharmaceutical Sciences graduate program is open to all qualified graduates of recognized universities and colleges. In addition to the Graduate School requirements, the applicant must have adequate preparation in pharmacy or a biological or physical science related to pharmaceutical sciences.

Financial Assistance

Graduate assistantships are available. To be considered for an assistantship, the student must have completed a Graduate School application, be accepted by the department, and submit a formal letter to the department chair requesting an assistantship.

The Doctor of Philosophy program requires the completion of 30 semester credits of letter-graded course work with a GPA of 3.0 or better. Of the 30 credits, at least 18 credits must be at 700 level. Candidates defend their dissertations. Candidates for the Ph.D. will be required to take an examination directed at determining competency in the pharmaceutical sciences.

The department requires the following core courses:

Code	Title	Credits
PSCI 611	Principles of Pharmacokinetics and Pharmacodynamics	3
PSCI 670	Pharmacokinetics	3
PSCI 790	Graduate Seminar	1-3
BIOC 701	Comprehensive Biochemistry I	4
BIOC 702	Comprehensive Biochemistry II	4
STAT 725	Applied Statistics	3

Amanda Brooks, Ph.D.
University of Wyoming, 2006
Postdoctoral: University of California San Diego, 2006-2007; University of Utah, 2008-2010
Assistant Research Professor, 2011-2014
Research interests: Biomimetics, Recombinant Protein Expression for Biomedical Devices, Controlled Drug Delivery to Combat Antibiotic Resistance

Yagna Jarajapu, M.Pharm., Ph.D.
University of Strathclyde, 1998
Glasgow Caledonian University, 2002
Postdoctoral: University of Florida and Wake Forest University 2003-2008
Research Interests: ACE2/Angiotensin-(1-7) and Bone Marrow Progenitor Cells in Diabetes

Estelle Leclerc, Ph.D.
University Paris XI, 1994
Postdoctoral: ETH-Zurich, 1994-1998; The Scripps Research Institute, 1998-2003
Junior Group Leader Children's Hospital Zurich, 2004
Research Assistant Professor Florida Atlantic University, 2005-2009
Research Interests: Biopharmaceutics

Sanku Mallik, Ph.D.
Case Western Reserve University, 1992
Postdoctoral: California Institute of Technology, 1993-95
Research Interests: Synthetic medicinal chemistry

Stephen T. O'Rourke, Ph.D.
University of Wisconsin, 1985
Postdoctoral: Mayo Clinic and Foundation, 1985-87
Research Interests: Vascular Pharmacology

Steven Qian, Ph.D.
The University of Iowa, 1999
Postdoctoral: National Institute of Environmental Health Science (NIEHS, NIH) 2000-2004
Research Interests: Roles of Lipid Derived and Protein-Derived Free Radical Metabolites in All Kinds of Health Related Problems

Jagdish Singh, Ph.D.
Banaras Hindu University, 1982
Postdoctoral: University of Otago, New Zealand, 1985-88; University of California–San Francisco, 1992-94
Research Interests: Novel Dosage and Drug Delivery Systems, Biopharmaceutics

Kristine Steffen, Pharm.D., Ph.D.
North Dakota State University, 2002
North Dakota State University, 2007
Postdoctoral: Neuropsychiatric Research Institute, 2007-2009
Research Interests: Pharmacokinetics, Bariatric Surgery, Eating Disorder and Obesity Pharmacotherapy

Chengwen Sun, M.D., Ph.D.
Norman Bethune University of Medical Sciences, 1988
Norman Bethune University of Medical Sciences, 1996
Postdoctoral: Department of Physiology, Medical College of Wisconsin, 1996-2000
Research Interests: Central Blood Pressure Control and Hypertension Gene Therapy

Sathish Venkatachalem, Ph.D.
University of Madras, 2003

Postdoctoral: University of Western Ontario, 2004-2006
Research Interests: Human Lung Diseases (Asthma, Chronic Obstructive Pulmonary Disease and Pulmonary Hypertension)

Stefan Vetter, Ph.D.
Swiss Institute of Technology (ETH) Zurich,1998
Postdoctoral: The Scripps Research Institute, 2000-2005
Research Interest: Medicinal Protein Biochemistry

Physics

Department Information

- **Department Chair:**
  Sylvio May, Ph.D.
- **Graduate Coordinator:**
  Alan Denton, Ph.D.
- **Department Location:**
  218 South Engineering
- **Department Phone:**
  (701) 231-8974
- **Department Web Site:**
  www.ndsu.edu/physics/
- **Application Deadline:**
  For U.S. students, one month before registration; for international students, March 1 for fall semester and September 1 for spring/summer semester.
- **Degrees Offered:**
  Ph.D., M.S., Accelerated M.S.
- **Test Requirement:**
  GRE (general and subject recommended)
- **English Proficiency Requirements:**
  RA-TOEFL iBT 79, IELTS 6; TA- TOEFL iBT 81 (Speaking 23, Writing 21), IELTS 7 (Speaking 6, Writing 6)

Program Description

The Department of Physics offers graduate study leading to the M.S. and Ph.D. degrees. Advanced work may involve specialized training in the following areas: biophysics, computational physics, condensed matter, nanomaterials, physics education research, polymer physics, soft matter physics, and statistical mechanics.

Research and academic programs are tailored to meet individual needs and interests. New students are strongly urged to visit faculty members to discuss research opportunities soon after their arrival.

Admissions Requirements

The Department of Physics graduate program is open to all qualified graduates of universities and colleges of recognized standing.

Financial Assistance

Prospective students must apply to the Graduate School and be accepted in full or conditional status before being eligible for an assistantship in the Department of Physics.

Generally, graduate students are supported during the academic year by either teaching assistantships or research assistantships. The 2018-2019 academic year stipend is $18,500 for 9 months. Additional support during the summer is also possible. Graduate tuition (but not student fees) is fully waived for all teaching assistants and research assistants.

Research Equipment

NDSU's Materials and Nanotechnology Center is located in the Research and Technology Park. The Center is equipped with two state-of-the-art wet labs, a synthesis lab, optical characterization facilities (optical/NIR fluorescence microscopy, laser-scanning confocal microscopy, and light scattering/reflectometry), and surface characterization facilities (nano-indentation and atomic-force microscopy). There are seven fume hoods in the lab space, as well as a number of synthesis tools, including a Beckman Coulter Optima L-80 XP Ultracentrifuge. We also have access to state-of-the-art chemical synthesis facilities in the Departments of Chemistry and Biochemistry and Coatings and Polymeric Materials, including a Photo Emissions

Tech Model SS50AAA Solar Simulator equipped with a Keithley 2400 Series Source meter. NDSU's Center for Computationally Assisted Science and Technology (CCAST) provides large-scale computing resources to NDSU users.

The Graduate Coordinator or Chair shall assign to each incoming graduate student a temporary advisor, who shall assist in the selection of courses. During the first semester, the student is expected to discuss potential projects for thesis research with faculty members. By the beginning of the second semester, the student must have a permanent research supervisor. By the end of the second semester, the student must have filed a plan of study, selected a thesis topic, and secured two additional faculty members for the Advisory Committee.

Master of Science

Code	Title	Credits
Physics courses number 601-689 or 700-789		16
PHYS 790	Graduate Seminar	1
PHYS 798	Master's Thesis	6-10

Each student must earn at least 30 graduate credits, numbered 601-798, of which:

- at least 10 credits are Physics courses numbered 601-689 or 700-789;
- at least 16 credits are didactic courses numbered 601-689 or 700-789;
- between 6 and 10 credits are Physics 798 (Master's Thesis);
- at least one credit must be Physics 790 Graduate Seminar.

Students are required to attend all seminars and colloquia.

Accelerated Master of Science

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 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

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, 485/685, and 486/686 while fulfilling the requirements for the bachelor's degree.
- Between 6 and 8 credits are PHYS 798 (Master's Thesis), with the goal to publish a paper based on the thesis research, although this is not a requirement to graduate.
- At least one credit is PHYS 790 Graduate Seminar.

Doctoral Degree

Code	Title	Credits
Required Courses		16
PHYS 752	Mathematical Methods in Physics I	
PHYS 758	Statistical Physics	

PHYS 761	Electromagnetism	
PHYS 771	Quantum Physics I	
PHYS 781	Solid State Physics	
PHYS 790	Graduate Seminar	
Letter-graded courses (no more than 12 cr in non-physics courses)		27
PHYS 899	Doctoral Dissertation	
Total credits		90

Credits used to satisfy the requirements for the M.S. degree may be included in the total. Students are required to attend all seminars and colloquia.

Comprehensive Examination

By the end of their fourth semester, students:

- submit a report that summarizes their research results so far and details a research plan for the rest of their research work;
- give a talk about their research accomplishments and plans; and
- must pass an oral examination by the Advisory Committee to confirm doctoral candidacy.

Students who pass the comprehensive examination and, at the time of the exam, have completed 30 credits (16 of which are didactic) will earn a master's degree and be eligible to participate in commencement that semester. Students should choose the Ph.D. + master's option from the drop-down menu on the Doctoral Degree Plan of Study and on the Request to Schedule Examination. After students have passed the comprehensive examination, they should complete the Exit Survey and the Degree Application. A link to these items will be emailed to them by the Graduate School.

If the student fails the comprehensive examination, she/he will be given the opportunity to repeat the examination in the next semester (this examination can be repeated only once). Alternatively, the student may elect to work for a master's degree instead.

Students should submit their doctoral thesis for examination at the end of their fourth year

Dissertation Video

Doctoral students are required to submit a three-minute video summarizing their dissertation research for a lay audience. The video should be produced, with guidance from the thesis supervisor, during the final semester of study and presented to the supervisory committee at the final defense.

For the comprehensive and final examinations, students must submit the appropriate forms to the Graduate School.

Warren Christensen, Ph.D.
Iowa State University, 2007
Postdoctoral: University of Maine, 2007-2009
Research Interests: Physics Education Research, Student Content Understanding, Curriculum Development

Yongki Choi, Ph.D.
The City University of New York, 2010
Postdoctoral: University of California Irvine, 2010-2014
Research Interests: Nano-Bio-physics, Nano-electronics, Single-Molecule science

Andrew Croll, Ph.D.
McMaster University, 2009
Postdoctoral: University of Massachusetts, 2008-2010
Research Interests: Polymers, Diblock Copolymers, Thin Films, Pattern Formation, Mechanics

Alan R. Denton, Ph.D., Graduate Coordinator
Cornell University, 1991
Postdoctoral: University of Guelph, 1991-94; Technical University of Vienna, 1994-95, Research Center Julich, 1996-98
Research Interests: Soft Condensed Matter Theory, Computational Physics

Eric Hobbie, Ph.D.
University of Minnesota, 1990
Research Interests: Nanotechology, Nanoparticles, Polymers, Optics and Rheology

Andrei Kryjevski, Ph.D.
University of Washington, 2004
Research Interests: First-Principles Numerical Techniques for Fermi Systems, Electronic Structure of Nanoparticles

Mila Kryjevskaia, Ph.D.

University of Washington, 2008
Research Interest: Physics Education

Sylvio May, Ph.D., Department Chair
Friedrich-Schiller University, 1996
Research Interests: Physics of Lipid Membranes, Biophysics

Orven Swenson, Ph.D.
Air Force Institute of Technology, 1982
Research Interests: Laser Materials Processing, Optics Education

Alexander J. Wagner, Ph.D.
University of Oxford, 1997
Postdoctoral: MIT, 1998-2000, Edinburgh, 2000-2002
Research Interests: Computational Soft Matter, Phase Separation, Diffusion, Interfaces Physics

Emeritus

Ghazi Q. Hassoun, Ph.D.
University of Minnesota, 1963
Postdoctoral: University of Michigan, 1963-65
Research Interests: Foundations of Quantum Mechanics

Daniel M Kroll, Ph.D.
University of Chicago, 1973
Research Interests: Theoretical and Computational Modeling of Complex Fluids and Biomembranes

Charles A. Sawicki, Ph.D.
Cornell University, 1975
Postdoctoral; Cornell University, 1975-79
Research Interests: Acoustics, Biophysics, Geophysics

Mahendra K. Sinha, Ph.D.
Pennsylvania State University, 1961
Postdoctoral: National Research Council (Ottawa), 1964-66
Research Interests: Field Emission and Field-Ion Microscopy Adjunct

Adjunct Faculty

Stuart Croll, Ph.D.
University of Leeds, 1974
Research Interests: Weathering Durability, Film Formation, Internal Stresses In Films, Modern Art Conservation, and History of Paint Technology

Eric M. Foard, Ph.D.
North Dakota State University, 2013
Research Interests: Theoretical, Computational, Soft Matter, and Phase Separation Physics

Kenneth Lepper, Ph.D.
Oklahoma State University, 2001
Research Interests: Applied Solid State Physics (geologic materials) and Materials Characterization

Konstantin Pokhodnya, Ph.D.
Moscow Institute of Science and Technology, 1977
Research Interests: Materials, Thin Film Fabrication, Spintronics

Plant Pathology

Department Information

- **Department Chair:**
  Jack Rasmussen, Ph.D.
- **Department Location:**
  Walster Hall
- **Department Phone:**
  (701) 231-8362

- **Department Web Site:**
  www.ag.ndsu.edu/plantpath/
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 79; IELTS 6.5

Program Description

The Department of Plant Pathology offers graduate study leading to the M.S. and Ph.D. degrees. Advanced degrees may involve specialized training in the following areas: host-parasite genetics, molecular biology and genomics, epidemiology, tissue culture, soil and seed-borne diseases, microbial ecology, and integrated disease management.

Student research and academic programs are tailored to individual needs and interests.

Five graduate faculty members are housed in the Northern Crops Science Laboratory located on campus. This relationship provides additional opportunities for research and consultation.

The Department of Plant Pathology graduate program is open to all qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School requirements (p. 1086), the applicant must have adequate preparation in Plant Pathology or Biology.

Financial Assistance

Research assistantships and part-time positions are available in the department. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference must be submitted. In addition to these materials, international applicants must also submit TOEFL scores. These items must be submitted to the Graduate School.

Master of Science

Completion of a Master of Science degree is dependent on the completion of 30 semester hours in Plant Pathology or approved courses from related departments. Not less than 10 credits must reflect research in the desired area. No minor area of study is required with an MS degree, but a minor may be elected.

Doctor of Philosophy

Completion of a Doctor of Philosophy degree is dependent on the completion of 60 semester hours beyond the MS degree or 90 credits total. Courses may include Plant Pathology or approved courses from related departments. Not less than 10 credits must reflect research in the desired area. A minor area of study is required with a PhD degree. Options are available in plant science, agronomy, plant breeding, microbiology, entomology and others.

Robert Brueggeman, Ph.D.
Washington State University, 2009
Research Interests: Barley Disease Resistance Gene Characterization and Deployment, Molecular Mechanisms of Host-Pathogen Interactions

Luis del Rio, Ph.D.
Iowa State University, 1999
Research Interests: Epidemiology of Plant Diseases, Chemical and Biological Control of Fungal Diseases, Management of Canola Diseases

Andrew Friskop, Ph.D.
North Dakota State University, 2013
Research interests: Extension Plant Pathology, Chemical Control, Corn Diseases, Small Grain Diseases, IPM

Neil C. Gudmestad, Ph.D.
North Dakota State University, 1982
Research Interests: Ecology and Epidemiology of Plant Pathogenic Bacteria, Foliar Diseases of Potato

Mohamed Khan, Ph.D.
Clemson University, 1998
Research Interests: Sugarbeet Management

Janet J. Knodel, Ph.D.

North Dakota State University, 2005
Research Interests: Extension Entomology, IPM of Field Crop Insects, Insect-Disease Surveys, Emerging Insects, Chemical Control

Zhaohui Liu, Ph.D.
North Dakota State University, 2006
Research interests: Molecular biology and genetics of host-pathogen interactions in wheat leaf spot diseases

Samuel Markell, Ph.D.
University of Arkansas, 2007
Research Interests: Extension Plant Pathology, Rust Diseases, IPM, Emerging Diseases, Chemical Control

Steven W. Meinhardt, Ph.D.
University of Illinois, 1984
Research Interests: Structure/Function Relationships in Enzymes and Toxins

Berlin D. Nelson, Ph.D.
Washington State University, 1979
Research Interests: Oilseed Diseases, Biological Control, Mycology

Jack B. Rasmussen, Ph.D.
Michigan State University, 1987
Research Interests: Molecular Biology and Role in Disease of Pathogen-Produced Toxins, Genetics of Resistance to Cereal Rust Diseases

Gary A. Secor, Ph.D.
University of California-Davis, 1978
Research Interests: Potato Diseases Management and Control, Biotechnology for Cultivar Improvement

Julie Sherman Pasche, Ph.D.
North Dakota State University, 2012
Research Interests: Pulse Crop and Dry Bean disease management, fungicide efficacy and resistance management, pathogen detection and diversity

Shaobin Zhong, Ph.D.
North Dakota State University, 2000
Research Interests: Fusarium Head Blight of Wheat, Fungal Biology and Genetics, Genomics and Functional Genomics of Host-Pathogen Interaction in Cereal Crops

Adjunct

Timothy L. Friesen, Ph.D.
USDA/ARS
North Dakota State University, 2001
Research Interests: Host Parasite Interactions of Foliar Diseases of Cereals

Michael C. Edwards, Ph.D.
USDA/ARS
Cornell University, 1983
Research Interests: Virology, Cereal Virus Diseases

Rubella Goswami, Ph.D.
University of Minnesota, 2005
Research Interests: Pathogen Interactions, Fungal Biology, Molecular Biology and Genomics

Thomas J. Gulya, Ph.D.
USDA/ARS
Iowa State University, 1978
Research Interests: Downy Mildew, Rust, Phomopsis Stem Canker, Sclerotinia Wilt of Sunflower

Michael Wunsch, Ph.D.
Cornell University, 2010
Research Interests: Varietal Disease Resistance, Fungicide Efficacy and Timing, and Use of Cropping Systems t

Plant Sciences/Horticulture

Department Information

- **Department Head:**
  Richard Horsley, Ph.D.
- **Graduate Coordinator:**
  Edward Deckard, Ph.D.
- **Department Location:**
  166 Loftsgard Hall
- **Department Phone:**
  (701) 231-7971
- **Department Web Site:**
  www.ag.ndsu.edu/plantsciences/
- **Application Deadline:**
  International applications are due May 1st for Fall and August 1 for Spring. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  Ph.D. (Plant Sciences only), M.S.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Plant Sciences offers graduate studies leading to the M.S. degrees in Cereal Science, Plant Sciences, and Horticulture, and to a Ph.D. degree in Cereal Science or Plant Sciences, with an optional Program of Emphasis in Plant Breeding and Genetics. Specialized academic and research training in Plant Sciences is available in plant breeding and genetics, weed science, biotechnology, and field and forage crop production and management. Areas of specialization in Horticulture and Forestry include breeding and genetics, biotechnology, physiology, propagation, sports and urban turfgrass management, and production and management of horticultural crops such as woody plants, potatoes, vegetables, and herbaceous ornamentals. Areas of specialization in Cereal Science may involve research in the areas of carbohydrates, enzymes, legumes, and other northern-grown crops; barley malting and brewing; wheat milling, baking, and pasta processing. Each study area is designed to provide students with comprehension of the discipline and of relevant regional and global-community social issues.

The Department of Plant Sciences is located in Loftsgard Hall, which provides a state-of-the-art facility for interdisciplinary research in plant sciences, ranging from basic studies and biotechnology to the more traditional applied areas. Facilities for cereal science research are located in Harris Hall. These facilities include analytical laboratories for grain quality research, baking, milling, malting and brewing, and pasta and noodle processing. State-of-the-art greenhouses and extensive growth chamber facilities are also available, as are 100 acres of field research land adjacent to the Plant Science Complex. An additional 500 acres of research land are located near the North Dakota State University campus. A horticultural farm only 25 miles west of campus has an extensive arboretum. Excellent supporting disciplines located nearby, or in the Plant Science Complex, include Soil Science, Botany, Food Safety, Biochemistry and Molecular Biology, Entomology, and Plant Pathology. The Department of Plant Sciences encourages interdisciplinary research, and students frequently tailor their research program to meet their interests by working with faculty in one or more of the supporting disciplines.

Graduate student numbers per faculty member are limited, so the student gets adequate personal attention and works closely with their adviser in research. Final selection of the adviser will be made on the basis of the student's interest, availability of space in the researcher's laboratory, and a common desire of the student and professor to work together.

The Department of Plant Sciences graduate programs are open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full status to the program, the applicant must meet the Graduate School admission requirements.

Students who do not meet all requirements for admission, but show potential for successful graduate study, may be admitted under a conditional status. Evidence must be provided, showing that the applicant's potential is not adequately reflected by his/her record.

Financial Assistance

Research assistantships (half-time) are provided on a competitive basis, usually based on scholarship and potential to undertake advanced study and research. As of the 2017-18 academic year, the annual stipend generally is $17,000 for an M.S. candidate and $18,200 for a Ph.D. candidate, but this may vary based on the research project. Graduate tuition is waived for all students with research assistantships. A limited number of graduate fellowships are available. The information provided for the application to the Graduate School is also used to assign available assistantships to applicants. The Department of Plant Sciences also has numerous annual scholarships of $500 to $1000 each for outstanding Plant Sciences graduate students.

Master of Science The M.S. program (Thesis Option) requires completion of at least 30 credits; this includes 10 credits of thesis research. The Ph.D. program requires completion of at least 90 credits; this includes 30 credits for an earned M.S. degree (Thesis Option) and 20 additional research credits. For each M.S. or Ph.D. candidate, a plan of study will be developed in the first year that meets the disciplinary requirements as well as the individual needs of the student. The faculty adviser and other members of the student's supervisory/advisory and examining committee assist in developing of the plan of study as well as the student's research plan. An M.S. Program (Comprehensive Study Option) is also offered in Plant Sciences. This option requires completion of at least 30 credits, including 3 credits of a Master's Paper.

Candidates for the M.S. degree normally satisfy all requirements within a two-year period, and Ph.D. candidates normally require three additional years. For M.S. candidates, an oral examination of academics related to the discipline and the research-based thesis is required. The Ph.D. candidates are required to pass a preliminary written and oral examination of academics related to the discipline and a final oral defense of a research-based dissertation. A B.S. to Ph.D. program is permitted for students who meet higher admission requirements.

Code	Title	Credits
Plan A - Thesis Option		30
600-700 level courses including 3 credits of PLSC 724 or equivalent		19
16 of which must be in didactic courses approved for graduate credit numbered 600-689 and 700-789		
PLSC 790	Graduate Seminar	1
PLSC 798	Master's Thesis	10
Plan B - Comprehensive Study Option		30
600-700 level courses including 3 credits of PLSC 724 or equivalent		27
At least 21 of the 30 credits must be in didactic courses approved for graduate credit numbered 600-689 and 700-789		
PLSC 790	Graduate Seminar	1
PLSC 797	Master's Paper	3

See information in Graduate Bulletin

Marisol Berti, Ph.D.
North Dakota State University, 2007
Research Interests: Forage and Biomass Crop Production

Chris M. Boerboom, Ph.D.
University of Minnesota, 1989
Research Interests: Weed Science

Xiwen Cai, Ph.D.
Washington State University, 1998
Research Interests: Wheat Genetics

Bingcan Chen, Ph.D.
University of Massachusetts, 2012
Research Interests: Cereal and Food Chemistry

Michael J. Christoffers, Ph.D.
University of Missouri-Columbia, 1998
Research Interests: Weed Science/Genetics

David Wenhao Dai, Ph.D.
North Dakota State University, 2001
Research Interests: Woody Plant Physiology, Biotechnology

Edward L. Deckard, Ph.D.
University of Illinois, 1970
Research Interests: Crop Physiology

Elias M. Elias, Ph.D.
North Dakota State University, 1987
Research Interests: Durum Wheat Breeding, Genetics

Kenneth F. Grafton, Ph.D.
University of Missouri, 1980
Research Interests: Dry Bean Breeding, Genetics

Greta Gramig, Ph.D.
University of Wisconsin-Madison
Research Interests: Weed Biology and Ecology

Andrew J. Green, Ph.D.
Kansas State University, 2016
Research Interests: Hard Red Spring Wheat, Genetics

Clifford A. Hall III, Ph.D.
University of Nebraska, Lincoln, 1996
Research Interests: Phytochemical Stability in Food Systems, Pulse Utilization and Quality, Flaxseed, Chemical Food Safety, Effect of Processing on Food Safety Issues

Harlene Hatterman-Valenti, Ph.D.
Iowa State University, 1993
Research Interests: High-Value Crop Production

Theodore C. Helms, Ph.D.
Iowa State University, 1986
Research Interests: Soybean Breeding, Genetics

Richard D. Horsley, Ph.D.
North Dakota State University, 1988
Research Interests: Barley Breeding, Genetics

Kirk A. Howatt, Ph.D.
Colorado State University, 1999
Research Interests: Weed Science, Annual Weeds

Burton L. Johnson, Ph.D.
North Dakota State University, 1993
Research Interests: Crop Production

Thomas J. Kalb, Ph.D.
Virginia Polytechnic Institute & State University, 1988
Research Interests: Extension Horticulture

Herman J. Kandel, Ph.D.
North Dakota State University, 1995
Research Interests: Crop Production

Chiwon W. Lee, Ph.D.
Purdue University, 1977
Research Interests: Vegetables, Floriculture, Biotechnology

Deying M. Li, Ph.D.
Iowa State University, 2001
Research Interests: Sports Turf Management

Xuehui Li, Ph.D.
University of Georgia, 2009
Research Interests: Statistical Genomics

Rodney G. Lym, Ph.D.
University of Wyoming, 1979
Research Interests: Weed SciencePerennial Weeds

Frank A. Manthey, Ph.D.
North Dakota State University, 1985
Research Interests: Durum Wheat Quality, Pasta/Noodle Processing

G. Francois Marais, Ph.D.
North Dakota State University, 1979
University of Stellenbosch, 1992
Research Interests: Hard Red Winter Wheat Breeding, Genetics

Phillip E. McClean, Ph.D.
Colorado State University, 1982
Research Interests: Dry Bean Genetics, Biotechnology

Esther E. McGinnis
University of Minnesota, 2013
Research Interests: Extension Horticulture, Native Plants, Perennial Hardiness, Floriculture

Michael S. McMullen, Ph.D.
University of Minnesota, 1976
Research Interests: Oat Breeding, Genetics

Rebekah Oliver, Ph.D.
North Dakota State University, 2006
Research Interests: Genetics

Juan Osorno, Ph.D.
North Dakota State University, 2006
Research Interests: Dry Edible Bean Breeding

Thomas Peters, Ph.D.
North Dakota State University, 1990
Research Interests: Sugarbeet Agronomy, Weed Science

Mukhlesur Rahman, Ph.D.
University of Manitoba, 2007
Research Interests: Canola Breeding

Joel K. Ransom, Ph.D.
University of Minnesota, 1982
Research Interests: Small Grains

Jiajia Rao, Ph.D.
University of Massachusetts, 2013
Research Interests: Food Chemistry, Ingredient Technology

Andy Robinson, Ph.D.
Purdue University, 2012
Research Interests: Potato Production

Paul B. Schwarz, Ph.D.
North Dakota State University, 1987
Research Interests: Malting Barley Quality

Kalidas Shetty, Ph.D.
University of Idaho, 1989
Research Interests: Food Safety

Senay Simsek, Ph.D.
Purdue University, 2006
Research Interests: Hard Spring Wheat Quality

Asunta L. Thompson, Ph.D.
University of Idaho, 1998
Research Interests: Potato Breeding

Anuradha Vegi, Ph.D.
North Dakota State University, 2008
Research Interests: Teaching Techniques

Todd West, Ph.D.
Southern Illinois University, 2004
Research Interests: Woody Plant Improvement

Qi Zhang, Ph.D.
Kansas State University, 2007

Research Interests: Turfgrass Stress Physiology

Alan J. Zuk, Ph.D.
Kansas State University, 2005
Research Interests: Sports and Urban Turfgrass Management

Adjunct and Affiliate

James V. Anderson, Ph.D.
Virginia Polytech Institute, 1990
Research Interests: Plant Biochemistry

James Beaver, Ph.D.
University of Illinois, 1980
Research Interests: Dry Bean Genetics

Patrick M. Carr, Ph.D.
Montana State University, 1989
Research Interests: Sustainable Agriculture

Wun Shaw Chao, Ph.D.
University of California-Davis, 1996
Research Interests: Perennial Weeds

Linda Dykes, Ph.D.
Texas A&M University, 2008
Research Interests: Food Science and Technology

Justin D. Faris, Ph.D.
Kansas State University, 1999
Research Interests: Wheat Molecular Genetics

Michael E. Foley, Ph.D.
University of Illinois, 1982
Research Interests: Weed Biology

Shana M. Forster, Ph.D.
North Dakota State University, 2017
Research Interests: Crop Production

Jose G. Franco, Jr., Ph.D.
Texas A&M University, 2015
Research Interests: Agroecology, Sustainable Food Systems

Karen L. Fugate, Ph.D.
Ohio State University, 1995
Research Interests: Sugarbeet Physiology

Russell Gesch, Ph.D.
Texas A&M University, 1995
Research Interests: Physiology of Oilseed Crops

Darrin Haagenson, Ph.D.
Purdue University, 2001
Research Interests: Crop Physiologyand Ecology

David P. Horvath, Ph.D.
Michigan State University, 1993
Research Interests: Perennial Weed Physiology

Brent Hulke, Ph.D.
University of Minnesota, 2007
Research Interests: Flax and Sunflower Genetics

Brian Jenks, Ph.D.
University of Nebraska, Lincoln, 1996

Research Interests: Integrated Weed Management

Blaine Johnson, Ph.D.
University of Nebraska, 1986
Research Interests: Quantitative Genetics

Edward C. Lulai, Ph.D.
North Dakota State University, 1978
Research Interests: Potato Physiology

Kevin McPhee, Ph.D.
University of Idaho, 1995
Research Interests: Pulse Crops

Grant Mehring, Ph.D.
North Dakota State University, 2016
Research Interests: Agronomy; Wheat and Corn Research

Mohamed Mergoum, Ph.D.
Colorado State University, 1991
Research Interests: Hard Red Spring Wheat Breeding

Jae-Bom Ohm, Ph.D.
Kansas State University, 1996
Research Interests: Grain Science

Michael Ostlie, Ph.D.
Colorado State University, 2012
Research Interests: Weed Science

Timothy Porch, Ph.D.
Cornell Univisery, 2012
Research Interests: Dry Bean Breeding and Genetics

Lili Qi, Ph.D.
Nanjing Agricultural University, 1997
Research Interests: Wheat Genetics

Susan Raatz, Ph.D.
University of Minnesota, 1996
Research Interests: Human and Clinical Nutrition

Gerald J. Seiler, Ph.D.
North Dakota State University, 1980
Research Interests: Sunflower and Sugarbeet Germplasm

Jochum Wiersma, Ph.D.
University of Minnesota, 1995
Research Interests: Small Grains

Steven S. Xu, Ph.D.
North Dakota State University, 1994
Research Interests: Hard Red Spring Wheat Development

Psychological Clinical Science

Department Information

- **Department Chair:**
  Mark Nawrot, Ph.D.
- **Department Location:**
  232 B2 Minard Hall
- **Department Phone:**
  (701) 231-7065
- **Department Web Site:**

www.ndsu.edu/psychology/graduate_programs/psychological_clinical_science/

- **Application Deadline:**
  January 15
- **Degrees Offered:**
  Ph.D.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL ibT 100; IELTS 7

Program Description

The primary purpose of this program is to prepare students for careers in academic or research settings. Thus, a major emphasis is on research training. We hope to train researchers who will contribute to psychological knowledge through the investigation of clinically relevant issues, including basic research on the nature, etiology, and course of health related problems or psychological disorders, as well as applied research which investigates the prevention and treatment of health and mental health problems.

When making admission decisions, grades, GRE scores, research experience, letters of recommendation (preferably from faculty who can comment on your research skills and academic potential), and the personal statement are considered. To the extent that an applicant has a strong background in psychology, including course work in statistics, research methods, abnormal psychology, and personality, and good research experience, this will be an advantage.

Applicants who already have a master's degree will be judged by the same criteria. For applicants with a master's degree, credit towards the doctorate will depend on how well previous course work matches with the program requirements.

Campus visits or interviews are not required, although the department may arrange for a visit via phone or internet video with top candidates.

Applications are due by January 15 in order to receive full consideration for admission in the upcoming academic year. Admission decisions will be made by mid-March. Applications are reviewed once a year and students are admitted for fall semester only.

Students are required to gain a breadth of knowledge in the foundations of psychology through courses in biological, cognitive, and social bases of behavior. Course work in research methods and statistics, assessment, psychopathology, health, and interventions comprise the clinical portion of the curriculum.

Practicums at local hospitals, clinics, and mental health agencies provide supervised experience in service delivery and applied research. This is a full-time program and will take five years, including internship, to complete.

Code	Title	Credits
Evaluation and Intervention		13
Four courses cover content related to the history of clinical psychology, ethics, psychopathology, and current empirically supported approaches to assessment and treatment.		
PSYC 755	Empirically Supported Interventions I	
PSYC 756	Empirically Supported Interventions II	
PSYC 770	Testing and Assessment	
Choose one course on current theories and research on psychopathology with a focus either on adulthood or childhood.		
PSYC 672	Advanced Psychopathology	
PSYC 673	Child Psychopathology and Therapy	
PSYC 758	Diversity in Clinical Psychology	
PSYC 795	Field Experience (Clinical Training)	
PSYC 794	Practicum/Internship	
Fundamentals of Psychology and Breadth		9
One course from each of three core categories to include an option for the biological basis of behavior, the cognitive basis of behavior, and the social basis of behavior. These courses are for breadth. Students may choose the particular courses and may take additional elective courses to supplement their knowledge and research skills in Health, Social, Cognition, or Vision.		
Biological Basis of Behavior		
PSYC 660	Sensation & Perception	
PSYC 665	Psychobiology	
PSYC 686	Neuropsychology	
PSYC 718	Visual Neuroscience	

Cognitive Basis of Behavior		
PSYC 661	Memory and Knowledge	
PSYC 664	Attention & Thinking	
PSYC 720	Advanced Topics in Cognitive Neuroscience	
Social Basis of Behavior		
PSYC 653	Organizational Psychology	
PSYC 670	Experimental Social Psychology	
PSYC 771	Social/Health Psychology Research	
PSYC 787	Advanced Social Psychology and Health	
Research Traning		
PSYC 793	Individual Study/Tutorial	
PSYC 798	Master's Thesis	
or PSYC 899	Doctoral Dissertation	
Three courses on research methods		
PSYC 640	Experimental Methods	
PSYC 761	Applied Research Methods	
PSYC 762	Advanced Research Methods and Analysis	
PSYC 790	Graduate Seminar (8 total credits)	
Teaching Requirement		4
One course and seminar in college teaching.		
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences	
PSYC 791	Temporary/Trial Topics	
PSYC 794	Practicum/Internship	

Keith Donohue, Ph.D.
Florida State University, 2011
Field: Clinical; Substance Abuse, Research Methods, and Teaching

Robert Dvorak, Ph.D.
University of South Dakota, 2012
Field: Clinical; Self-Regulation, Health, and Addiction

Kathryn Gordon, Ph.D.
Florida State University, 2008
Field: Clinical; Disordered Eating, Suicidal Behavior

Clayton Hilmert, Ph.D.
University of California at San Diego, 2003
Field: Health/Social; Stress, Psychophysiology, and Health

Leah Irish, Ph.D.
Kent State University, 2011
Field: Health/Social; Health Behaviors, Sleep, Stress

Michael D. Robinson, Ph.D.
University of California Davis, 1996
Field: Social/Personality Affective Processes

Paul D. Rokke, Ph.D.
University of Houston, 1985
Field: Clinical; Psychopathology

Psychology

Department Information

- **Department Chair:**
  Mark Nawrot, Ph.D.
- **Department Location:**

232 B2 Minard

- **Department Phone:**
  (701) 231-7065
- **Department Web Site:**
  https://www.ndsu.edu/psychology/graduate_programs/
- **Application Deadline:**
  January 15
- **Degrees Offered:**
  Ph.D.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL iBT 79, IELTS 6.5

Program Description

The Department of Psychology at North Dakota State University grants both M.S. and Ph.D. degrees. We have three doctoral programs that prepare students for research and academic careers: Psychological Clinical Science, Visual and Cognitive Neuroscience, and Health/Social Psychology.

Doctoral Programs

Students enter one of three Ph.D. programs: Psychological Clinical Science, Visual and Cognitive Neuroscience, or Health/Social Psychology. These areas represent the strengths of the department's faculty in experimental research, as well as three of the most active and cutting-edge areas in the field of psychology. The program accommodates approximately 20 students, with approximately 4 new Ph.D. degrees awarded each year. Training in the program includes course work in the student's area of emphasis, as well as methods courses, breadth requirements, and research experience under the supervision of a faculty mentor. Training and experience in college-level teaching is an important part of all three programs. Student support is available through teaching assistantships, research assistantships, and teaching stipends.

Admissions Requirements

The Department of Psychology graduate programs are open to qualified graduates of universities and colleges of recognized standing. Applications are due by January 15 in order to receive full consideration for admission in the upcoming academic year. However, applications will be considered after this date to the extent that space in the program is still available.

Financial Assistance

Students are routinely supported through research and teaching assistantships. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. All students who submit complete applications to the program by the appropriate deadlines are considered for assistantships. There is not a separate application for financial aid. Doctoral students are eligible for university fellowships that are awarded on a competitive basis.

1. Complete a master's degree in Psychology. This may be done at NDSU or elsewhere.
2. Complete at least 90 hours of graduate credit, including those completed for the master's degree;
3. 60 or more of these credits must be earned at NDSU. At least 30 credit hours must be in approved didactic courses, and at least 18 of these must be at the 700 level.
4. Complete quantitative and research methods courses.

Code	Title	Credits
PSYC 640 & PSYC 762	Experimental Methods and Advanced Research Methods and Analysis	6
PSYC 761	Applied Research Methods (for Health/Social)	3

5. Complete core courses in the specific program area:

Code	Title	Credits
Health & Social Psychology		
PSYC 733	Social Judgment	3
PSYC 771	Social/Health Psychology Research	3
PSYC 782	Emotions	3
PSYC 787	Advanced Social Psychology and Health	3
Visual & Cognitive Neuroscience:		

Select three of the following:		9
PSYC 718	Visual Neuroscience	
PSYC 720	Advanced Topics in Cognitive Neuroscience	
PSYC 727	Advanced Topics in Visual Perception	
PSYC 731	Fundamental Processes in Cognition	
PSYC 760	Research Methods in Visual and Cognitive Neuroscience	
PSYC 764	Advanced Topics in Attention	
Psychological Clinical Science:		
PSYC 755	Empirically Supported Interventions I	4
PSYC 756	Empirically Supported Interventions II	4
PSYC 770	Testing and Assessment	3
PSYC 672	Advanced Psychopathology	3
or PSYC 673	Child Psychopathology and Therapy	
PSYC 758	Diversity in Clinical Psychology	3
PSYC 794	Practicum/Internship	1-8
PSYC 795	Field Experience	1-15

6. Complete three (for Psychological Clinical Science), two (for Health/Social students), or one (for Visual & Cognitive Neuroscience students) breadth courses at the graduate level from area outside specialty track (which can include approved courses from other departments).
7. Complete Psyc 790 (graduate seminar and colloquium series) each semester.
8. Participate in a continued program of research apprenticeship with at least one faculty member and, accordingly, enroll in Psyc 793 each semester for 1-5 credits.
9. Teach one undergraduate course under the supervision of a faculty member, after completion of COMM 702 Introduction to College Teaching in the Humanities and Social Sciences, or STEM 810 Teaching College Science.
10. Complete a major area paper to serve as the comprehensive exam for Ph.D. candidacy. The area paper will be a comprehensive literature review of the student's area of research and will include an oral defense.
11. Complete the dissertation. The student will defend a written proposal before a faculty committee, conduct an original research project, and complete a comprehensive written report on the project. The student will complete a final oral defense before the same committee.

Benjamin J. Balas, Ph.D.
Massachusetts Institute of Technology, 2007
Field: Brain and Cognitive Sciences

Barbara Blakeslee, Ph.D.
University of California, Santa Barbara, 1983
Field: Biopsychology, Vision Science

Martin D. Coleman, Ph.D.
University of Sussex, 2005
Field: Emotion and Decision Making

Erin Conwell, Ph.D.
Brown University, 2009
Field: Cognitive and Linguistic Sciences

Keith F. Donohue, Ph.D.
Florida State University, 2011
Field: Clinical Psychology; Alcohol, Research Methods, Teaching

Robert D. Dvorak, Ph.D.
The University of South Dakota, 2012
Field: Clinical Psychology; Selfregulation, Health-Risk Behaviors, & Ecological Momentary Assessment

Kathryn H. Gordon, Ph.D.
Florida State University, 2008
Field: Clinical Psychology, Eating Disorders, Suicidal Behavior

Clayton J. Hilmert, Ph.D.
University of California, San Diego, 2003
Field: Health and Social Psychology; Stress Psychophysiology, Cardiovascular Health, and Pregnancy

Verlin B. Hinsz, Ph.D.
University of Illinois, 1983
Field: Social and Industrial/Organizational; Small Group Performance, Group Decision Making

Leah Irish, Ph.D.
Kent State University, 2011
Field: Health and Social Psychology, Health Behaviors, Sleep, Stress

Jeffrey S. Johnson, Ph.D.
University of Iowa, 2008
Field: Visual Cognitive Neuroscience

Linda Langley, Ph.D.
University of Minnesota, 1998
Field: Cognitive Neuroscience, Cognitive Aging, Attention

Kevin D. McCaul, Ph.D.
University of Kansas, 1978
Field: Social Psychology; Health Behavior, Applied Social Psychology

Mark E. McCourt, Ph.D.
University of California, Santa Barbara, 1982
Field: Biopsychology, Vision Science; Visual Psychophysics, Neuropsychology

Mark Nawrot, Ph.D.
Vanderbilt University, 1991
Field: Visual Neuroscience; Neural Mechanisms for Perception of Depth and Motion, Eye Movements, Alcohol

Michael D. Robinson, Ph.D.
University of California, Davis, 1996
Field: Social/Personality Affective Processes

Paul D. Rokke, Ph.D.
University of Houston, 1985
Field: Clinical Psychology; Psychopathology

Clay Routledge, Ph.D.
University of Missouri-Columbia, 2005
Field: Health and Social Psychology

Laura E. Thomas, Ph. D.
University of Illinois, 2008
Field: Embodied cognition, Links between action, perception, and cognition

David A. Wittrock, Ph.D.
State University of New York at Albany, 1990
Field: Clinical Psychology; Behavioral Medicine, Headache, Stress, Appraisal and Coping

Adjunct

Terence W. Barrett, Ph.D.
University of North Dakota, 1989
Field: Counseling; Issues in Therapy, Forensic Psychology

Scott G. Engel, Ph.D.
North Dakota State University, 2003
Field: Health and Social Psychology; Obesity and Eating Disorders

Holly Hegstad, Ph.D.
University of North Dakota, 1999
Field: Clinical Psychology; Anxiety and Mood Disorders

Jessica T. Kaster, Ph.D.
University of South Dakota, 2004
Field: Clinical Psychology; Child Psychopathology, Assessment

H. Katherine O'Neill, Ph.D.
University of North Dakota, 1991
Field: Clinical Psychology; Psychopathology, Addiction, Anxiety

Jennifer A. Redlin, M.S.
North Dakota State University, 1999
Field: Clinical and Behavioral Psychology

Public Health

Department Information

- **Department Vice Chair:**
  Abby Gold, Ph.D.
- **Program Coordinator:**
  Stefanie Meyer
- **Department Location:**
  Research Park Building 2
- **Department Phone:**
  (701) 231-6549
- **Department Web Site:**
  www.ndsu.edu/publichealth/
- **Application Deadline:**
  March 1, 2019
- **Degrees Offered:**
  MPH
- **Test Requirement:**
  GRE The PCAT/MCAT are acceptable substitutes for the GRE requirement. Applicants who wish to substitute MCAT scores for the GRE must include the MCAT score validation .pdf with application.
- **English Proficiency Requirements:**
  TOEFL ibT 90; IELTS 6.5

Program Description

Public health is defined as the practice of helping members of society live healthier, longer lives. Public health is both an art and a science, and is practiced by multidisciplinary teams of professionals whose training spans a wide array of medical, social, and physical sciences. Public health focuses on the general health of communities through efforts to monitor the spread of diseases, initiatives, (both clinical and policy- oriented) to prevent disease and disability, and by promoting healthy lifestyles through education and community engagement.

The program focuses on rural health, health promotion and prevention, disease state management, and related activities of interest to North Dakota public health care practitioners and policy makers. Specializations include American Indian public health, public health in clinical systems, health promotion, and management of infectious diseases.

A admission decisions are based upon full review of all information in the application in order to ensure fairness and to balance the limitations of any single element of the application. Strong preference for admission will be given to applicants with at least one year of practical experience in their field, including practical field experience gained within an academic program.

Minimum Program Admission Requirements

In addition to the Graduate School admission requirements, applicants must have adequate preparation in a field related to public health and show potential to undertake advanced study, research and practical training as evidenced by previous academic accomplishment and experience.

The Admissions Committee will invite selected applicants for an interview on the basis of the Committee's review of all submitted application materials.

Final decisions will be made after all interviews are completed. Satisfactory completion of a background check is required prior to admission.

Policy on Transfer of Credit

A limited amount of graduate work completed at a regionally accredited North American institution prior to, or after matriculation in the program, may be applied toward the MPH. Graduate work is considered for transfer only on an individual basis and only after the student has completed satisfactory

work in the program. Transfer credits approved by the student's adviser, course instructor, Program Director, and the Dean of the Graduate School will be included in the Program of Study for the MPH degree and recorded on the transcript.

The basic purpose of the transfer policy is to ensure that transferred work is of comparable content, level, timeliness, and quality to that of NDSU's and included on a master's degree program of study. The following policies are generally applicable to the acceptance of the graduate work for transfer:

- The work must have been undertaken at an accredited North American institution.
- The student must have been enrolled at that institution as a graduate student
- The work must have received graduate credit at the institution where it was earned.
- The student must have earned a grade of B or better.
- The work must be less than seven years old at the time the MPH degree is awarded.

The maximum amount of transfer credit that will be accepted toward the MPH degree is nine (9) semester credit hours.

Code	Title	Credits
Required Coursework		
PH 704	Public Health Management and Policy	3
PH 720	Environmental Health	3
PH 731	Biostatistics	3
PH 741	Social and Behavioral Sciences in Public Health	3
PH 745	Community Health Leadership	3
PH 751	Essentials in Epidemiology	3
PH 794	Practicum	3
PH 789	Integrative Learning Experience (Integrative Learning Experience)	3
Specialization Courses (select from below)		18
Total Credits		42

American indian public health option

Code	Title	Credits
PH 771	American Indian Health Policy	3
PH 772	American Indian Health Equity	3
PH 773	Social and Cultural Determinants in Indian Health	3
PH 774	Research Issues in Tribal Communities	3
Elective Courses		6

Management of Infectious Diseases Option

Code	Title	Credits
PH 735	Principles of Infectious Disease Management I	3
PH 736	Principles of Infectious Disease Management II	3
PH 752	Advanced Topics in Epidemiology	3
PH 755	Integrating Primary Care and Public Health	3
Electives		6

Community Health Sciences OPTION

Code	Title	Credits
PH 700	Preventing and Managing Chronic Illness	3
PH 725	Promoting Health through Policy, System and Environment	3
PH 755	Integrating Primary Care and Public Health	3
NURS 715	Advanced Community Assessment	3
Elective Courses		6

Dietetics accelerated masters

Please see attachments for required documentation to start an accelerated bachelor's to master's option. This has been approved by Dietetics and the MPH curriculum committee.

*Master's Paper

The PH master's paper is a requirement for graduation for students in the Master of Public Health (MPH) Program. This is an opportunity to work on public health projects under the direction of faculty and community public health practitioners or researchers. The goal is to synthesize, integrate and apply the skills and competencies acquired in the PH Program to a public health problem. Completion of the PH master's paper requires both written and oral components.

Practicum/Internship

Concepts and competencies learned from PH coursework are integrated through a minimum of 240 hours practicum that provides an opportunity to apply knowledge in a practice setting. A wide range of settings and opportunities are available and are individually tailored to assure competence in general PH and specialization-specific skills. The practicum is designed to meet student goals, specialization criteria, and the needs of the agencies or institutions involved. The practicum is selected by the student in consultation with faculty and approved by the adviser. This experience is usually completed in the student's final term in the program and often results in the capstone project written report and presentation. However, students may register for 1 to 3 credits, repeated up to 3 times if appropriate.

All work must be approved in advance by the PH program. Students cannot receive credit for past work experience.

For more information about PH specializations, please visit the PH website http://www.ndsu.edu/publichealth/specializations/.

Each certificate option is 18 credits and may be completed in one academic year.

Code	Title	Credits
American Indian Public Health		
PH 704	Public Health Management and Policy	3
PH 771	American Indian Health Policy (The drop down options did not have PH 755 listed)	3
PH 772	American Indian Health Equity	3
PH 773	Social and Cultural Determinants in Indian Health	3
PH 774	Research Issues in Tribal Communities	3
PH 775	Case Studies in Indian Health	3
General Public Health		
PH 704	Public Health Management and Policy	3
PH 731	Biostatistics	3
PH 741	Social and Behavioral Sciences in Public Health	3
PH 720	Environmental Health	3
HNES 745	Community Health Leadership	3
PH 751	Essentials in Epidemiology	3
Health Systems Leadership		
PH 704	Public Health Management and Policy	3
PH 731	Biostatistics	3
PH 751	Essentials in Epidemiology	3
PH 755	Integrating Primary Care and Public Health	3
Infection Prevention		
PH 704	Public Health Management and Policy	3
PH 755 Integrating Primary Care and		
PH 735	Principles of Infectious Disease Management I	3
PH 736	Principles of Infectious Disease Management II	3
PH 751	Essentials in Epidemiology	3

American Indian Public Health

Donna Grandbois, RN, Ph.D.
Donald Warne, M.D., M.P.H.
Andrea Huseth, Ph.D.
Siobhan Wescott, M.D., M.P.H

Community Health Sciences

Molly Secor-Turner, Ph.D.
Mark Strand, Ph.D., CPH

Abby Gold, Ph.D., M.P.H., R.D.
Mary Larson, Ph.D., M.P.H., R.D., C.D.E.

Management of Infectious Diseases

Paul Carson, M.D.
Teresa Bergholz, Ph.D.
Rick Jansen, Ph.D.

Range Science

Department Information

- **Director, School of Natural Resource Sciences:**
  Frank Casey, Ph.D.
- **Interim Program Leader:**
  Ryan Limb, Ph.D.
- **Department Location:**
  201 Morrill Hall
- **Department Phone:**
  (701) 231-7582
- **Department Web Site:**
  www.ndsu.edu/range/
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Range Science program in the School of Natural Resource Sciences offers graduate study leading to M.S. and Ph.D. degrees. Advanced work may involve specialized training in the following areas: rangeland ecology, fire ecology, plant community dynamics, restoration of ecosystem services, ecosystem reclamation, and wildlife population dynamics in rangelands.

Student research and academic programs are tailored to individual student needs and interests. Interdisciplinary approaches to range science programs are fostered.

The Range Science graduate program is open to all qualified graduates of universities and colleges of recognized standing that meet the Graduate School requirements (p. 1086).

Financial Assistance

Research assistantships are available. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research. To be considered for an assistantship, a completed Graduate School application, official transcripts, three letters of reference, and a TOEFL score for international applicants must be submitted to the Graduate School no later than April 15.

Each student must choose an adviser, usually based upon area of academic and research interest, within the first program year. By the end of the first year of residence, the student must have selected an advisory/supervisory committee and have an approved graduate plan of study, including a research proposal. The advisory/supervisory committee advises the student and administers the graduate exams to the student. Students are referred to the Range Science Graduate Student Handbook for information regarding additional requirements.

Master of Science Program

The range science program has two options for the M.S. degree: the thesis option and the comprehensive study option. The M.S. program requires completion of 30 semester credits of approved graduate and letter-graded course work with an overall GPA of 3.0 or better. The M.S. candidates are required to take an oral examination which covers both the research and academic subject matter covered in their program.

Candidates for the M.S. normally complete their degree requirements in two years.

Code	Title	Credits
Plan A - Thesis Option		30
Didatic Courses (numbered 601-689, 691; 700-789, 791; 800-889, 891)		16
Additional Credits		2
RNG 798	Master's Thesis	6-10

Code	Title	Credits
Plan B - Comprehensive Study Option		30
Didatic Courses (numbered 601-689, 691; 700-789, 791; 800-889, 891)		21
Additional Credits		6-8
RNG 797	Master's Paper	1-3

Doctoral Program

The Ph.D. program requires the completion of 90 semester credits (or the equivalent) of graduate approved and letter graded course work with an overall GPA of 3.0 or better. Candidates for the Ph.D. are required to take a preliminary written and oral examination directed toward the academic subject matter of their chosen discipline and a final defense of a research based thesis.

Candidates for the Ph.D. generally complete their degree requirements in three to four years.

Code	Title	Credits
Master's to Ph.D.		60
Didactic coursework (numbered 601-689, 691; 700-789,791; 800-889, 891)		15
Additional courses		30-44
RNG 899	Doctoral Dissertation	1-15

Code	Title	Credits
Bachelor's to Ph.D.		90
Didactic coursework (numbered 601-689, 691; 700-789,791; 800-889, 891)		27
15 of these credits must be at the 700 or 800 level		
Additional courses		48-62
RNG 899	Doctoral Dissertation	1-15

Torre J. Hovick, Ph.D.
Oklahoma State University, 2014
Research Interests: Global change, Avian Ecology, Fire Ecology, Rangeland Management

Ryan F. Limb, Ph.D.
Oklahoma State University, 2008
Research Interests: Fire Ecology, Plant Community Ecology, Grassland Disturbance & Restoration Ecology, Invasive Species Ecology & Management

Devan A. McGranahan, Ph.D.
Iowa State University, 2011
Research Interests: Fire behavior and ecology, plant community ecology, fire and grazing management, and effects of global environmental change in rangeland ecosystems worldwide

Kevin K. Sedivec, Ph.D.
North Dakota State University, 1994
Research Interests: Plant Community Ecology, Grazing and Wildlife Interaction, Reclamation of Energy Developed Lands, Range Nutrition, Range Monitoring

Adjunct Faculty

Benjamin Geaumont, Ph.D.
North Dakota State University, 2009
Hettinger Research and Extension Center
Research Area/Activity: Interactions Between Agriculture, Wildlife, and the Environment

John Hendrickson, Ph.D.

Texas A&M University, 1996
USDA, Mandan, ND
Research Area/Activity: Rangeland Ecology and Management

Chris Schauer, Ph.D.
Oregon State University, 2003
Hettinger Research Extension Center
Research Area/Activity: Nutritional Management of Grazing Livestock

Lance Vermeire, Ph.D.
Texas Tech University, 2002
USDA-ARS Fort Keogh, Miles City, MT
Research Area/Activity: Grazing Ecology, Prescribed Fire, Drought Effects on Rangelands

Rhetoric, Writing and Culture

Department Information

- **Department Chair:**
  Elizabeth Birmingham, Ph.D.
- **Graduate Coordinator:**
  Verena Theile, Ph.D.
- **Department Location:**
  318 Minard Hall
- **Department Phone:**
  (701) 231-7143
- **Department Web Site:**
  www.ndsu.edu/english/graduate_programs/phd_degree/
- **Application Deadline:**
  February 1
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL ibt 100; IELTS 7

The Rhetoric, Writing and Culture Ph.D. degree program is open to all qualified graduates of universities and colleges of recognized standing. The Ph.D. in Rhetoric, Writing and Culture provides students with employable skills in the area of professional and technical communication. This innovative and regionally unique program invites students to work at the intersection of rhetorical, textual, and cultural studies. The number of positions available in technical communication significantly surpasses the number of new Ph.D.s produced each year by a sizable margin. Graduates from NDSU's program may pursue careers as:

- professors in universities or colleges;
- training and development specialists, user-experience experts, and human-computer interaction specialists in industry;
- technical, scientific, or professional writers and editors in research and development organizations, high-tech companies, non-profit organizations, or government agencies.

Hands-on experience is essential to our program. The Rhetoric, Writing and Culture Ph.D. requires six credits of experiential learning. Students can work with professors or mentors in disciplinary writing. Others opt to intern for non-profits or local industries.

NDSU offers opportunities for students in the Ph.D. program to teach discipline-specific writing, such as writing in the sciences, writing for engineers, and writing in business and finance. Ph.D. students are eligible for Presidential Doctoral Graduate Fellowships.

To be admitted with full status to the program, the applicant must fulfill all of the requirements set out below.

- In most cases, applicants are expected to have completed a Master of Arts or Science, but exceptional candidates may be admitted directly out of the Bachelor's degree
- Have completed a BA, BS, MA, or MS from an accredited educational institution.
- Have a minimum cumulative grade point average (GPA) of 3.5.

Conditional admission may be granted to students who do not meet all requirements for admission or have deficiencies in prerequisite course work, but demonstrate potential for graduate study. Such students may be required to take additional courses to address deficiencies in prerequisite course work.

In addition to the Graduate School required materials, applications must include:

- an academic writing sample, not to exceed 20 pages, that reflects the student's academic or professional interests and that demonstrates the student's critical and analytical abilities
- A statement of purpose that includes the following:
  - coursework you plan to complete in the program
  - faculty members with whom you wish to study
  - research you plan to pursue
  - a sense of what you hope to do once you have completed a Ph.D. degree in English
  - how your education and/or life experience have prepared you for graduate work
- official transcripts from all previous undergraduate and graduate institutions
- a letter stating your interest in and qualifications for a teaching assistantship.

Preferred additional materials:

- Practical and / or Professional writing sample not to exceed 10 pages

Financial Assistance

Teaching assistantships are available and awarded based on the applicant's scholastic record and letters of recommendation. Students need to apply to the Graduate School to be considered for admission in the Department of English and before they are eligible for an assistantship. Letters of interest for teaching assistantships, detailing prior experience (if applicable) and qualifications, need to be submitted as part of the application to the program.

Teaching assistantships are reviewed and renewed annually based on academic and professional performance, as well as funding. The annual stipend is $14,000, which is in addition to tuition waivers (including summer) for the duration of the degree program; TAs are responsible for books and fees. In rare cases, teaching fellowships may be granted to advanced doctoral students who have passed their comp exams and completed their course work. Scholarships (https://www.ndsu.edu/english/scholarshipsandfellowships) are available through the Department, the College, the Graduate School, and the University.

The Ph.D. program requires 90 credits beyond the baccalaureate degree and a minimum of 60 graduate credits taken beyond the M.A. and at NDSU.

- Students must take a minimum of 30 credits at the 700- or 800-level.
- English 764: Teaching Strategies is required of all Graduate Teaching Assistants who have not taken a similar class elsewhere.
- Students must take 48 of 60 credits at NDSU from within the Department of English.
- Students with a master’s degree in another discipline may be required to complete additional graduate course work in specific areas of English, as specified by their adviser and supervisory committee.
- No more than 10 credits may be transferred into the program.

Anastassiya Andrianova, Ph.D.
City University of New York, 2011
Field: British Romantic and Victorian Literature, Drama, Translation, Pedagogy, Postcolonial Literature, Slavic Literature, Animal Studies

Lisa R. Arnold, Ph.D.
University of Louisville, 2011
Field: Rhetoric and Composition, Writing Program Administration, History of Writing Instruction

Elizabeth Birmingham, Ph.D.
Iowa State University, 2000
Field: Rhetoric and Professional Communication, Gender Studies, Architectural History, Theory, and Criticism

Kevin Brooks, Ph.D.
Iowa State University, 1997
Field: Rhetoric and Professional Communication, Computers and Composition, Writing Program Administration

Muriel Brown, Ph.D., Emerita
University of Nebraska, 1971
Field: Medieval Literature, Modern Drama, Women's Studies

Sean Burt, Ph.D.

Duke University, 2009
Field: Ancient Jewish Literature, Genre Theory, Ancient Hebrew Poetry, Poetics, Horror Literature & Theory

Gordon Fraser, Ph.D.
University of Connecticut, 2015
Field: Nineteenth-Century and Early American Literature; American Studies; Nationalism and Revolution

Adam Goldwyn, Ph.D.
City University of New York, 2010
Field: Medieval Studies, Medieval Greek World, Influence of Ancient Greek Culture in the Middle Ages

Alison Graham Bertolini, Ph.D.
Louisiana State University, 2009
Field: Contemporary American Literature, Literature of the Southern United States, Women's Literature, Contemporary Ethnic and Postcolonial Literature

Linda L. Helstern, Ph.D., Emerita
Southern Illinois University-Carbondale, 2001
Field: Native American Literature, Modernism, Contemporary Poetry, Literature and the Environment

R.S. Krishnan, Ph.D., Emeritus
University of Nebraska, 1981
Field: Restoration and 18th-Century British Literature, Postmodern Theories, British Novel, Postcolonial Literature

Bruce Maylath, Ph.D.
University of Minnesota, 1994
Field: International Technical Communication, Rhetoric and Composition, Linguistics

Robert O'Connor, Ph.D., Emeritus
Bowling Green State University, 1979
Field: Romantic Literature, Science Fiction and Fantasy

Kelly Sassi, Ph.D.
University of Michigan, Ann Arbor, 2008
Field: English Education, Composition and Rhetoric, Native American Literatures, Culturally Responsive Pedagogy

Dale Sullivan, Ph.D., Emeritus
Rensselaer Polytechnic Institute, 1988
Field: Rhetoric Theory and History, Rhetoric of Science, Rhetoric of Religion, Technical Communication

Amy Rupiper Taggart, Ph.D.
Texas Christian University, 2002
Field: Writing and Rhetoric, Pedagogy, Literacy Studies

Verena Theile, Ph.D.
Washington State University, Pullman, 2006
Field: 16th/17th Century Literature, Shakespeare, Early Modern Drama, European Literature, Literary Theory, Science Fiction and Fantasy, Film and Adaptation Studies

Emily D. Wicktor, Ph.D.
Kansas, 2010
Field: 19th Century British Literature and Culture, particularly Victorian Sexuality and Sexual History; Rhetoric, Composition, and Pedagogy; Literary Theory; Modern British and American Drama; Research Methods and Methodology

Sociology

Department Information

- **Interim Department Chair:**
  Jeff Bumgarner, Ph.D.
- **Graduate Coordinator:**
  Pamela Emanuelson, Ph.D.
- **Department Location:**
  Minard 428
- **Department Phone:**

(701) 231-8657

- **Department Email:**
  ndsu.soc.anth@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/socanth
- **Application Deadline:**
  For full consideration, applications must be received by February 15 for fall semester and September 15 for spring semester
- **Degrees Offered:**
  M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Sociology and Anthropology offers the M.S. degree in Sociology. This program is based on the principle that graduate level education in Sociology is a desirable preparation for a growing number of career orientations. Sample positions that our graduates have obtained include research analyst, instructor and human service worker. The precise plan of study for each student will be established in consultation with the academic adviser with the student's career goal in mind.

The focus of graduate education in Sociology is directed toward both the development of applied sociologists and the advanced training of those seeking to pursue a doctoral degree. Students may elect to take courses in a specialty area, or they may pursue a background in general sociology. Areas of specialization include medical sociology/gerontology and community development.

The Sociology graduate program provides students with the opportunity to expand their background and perspectives in research methods and theory. Consequently, the first year of the program is designed to expose students to theory and both quantitative and qualitative research methods.

Two program options are available for students. In the thesis option, students work on a research-based thesis. Students typically test theoretical assumptions using primary or secondary data. The comprehensive study option is designed for students who wish to combine their studies with some type of specialized field experience. Students electing this option are required to complete a comprehensive study paper related to their internship, such as evaluating a program.

Students in the Sociology graduate program benefit from a favorable faculty-to-student ratio.

Admissions Requirements

The Department of Sociology and Anthropology graduate program is open to qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School requirements (p. 1086), the applicant must have earned a cumulative grade point average in all courses of at least 3.0 or equivalent and a grade point average of 3.2 or higher in sociology.

Financial Assistance

Teaching assistantships are available to qualified applicants. Research assistantships may also be available, contingent on faculty research funds. Applicants for assistantships are considered on the basis of scholarship and potential to undertake advanced study and research. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference must be received by the Graduate School no later than February 15.

Students must complete a minimum of 30 credits and a master's thesis for the thesis option, or a minimum of 35 credits and a paper for the comprehensive study option. An oral defense of the thesis or the paper is required.

Requirements for the M.S. degree in sociology are as follows:

1. Successfully complete

Code	Title	Credits
SOC 723	Social Theory	3
SOC 700	Qualitative Methods	3
SOC 701	Quantitative Methods	3

2. Complete an additional 21 credits (including thesis) or 26 credits (including comprehensive study).
3. Complete a research-based thesis or comprehensive study paper, and pass an oral defense of the thesis or paper administered by the student's supervisory committee.

Gina Aalgaard Kelly, Ph.D.

University of Minnesota, 2007
Research Interests: Medical Sociology, Aging/Social Gerontology, Quantitative Methods

Pamela Emanuelson, Ph.D.
University of South Carolina, 2008
Research Interests: Small Group Processes, Social Psychology, Mathematical Sociology. Economic Sociology, Sociopolitical Evolution

Gary A. Goreham, Ph.D.
South Dakota State University, 1985
Research Interests: Rural Sociology, Community, Family, Research Methods, Sociology of Religion, Sociology of Agriculture

Christina D. Weber, Ph.D.
SUNY–Buffalo, 2005
Research Interests: Social Theory, Feminist Theory, Sociology of Gender, Memory and Trauma Studies, Social Change

Christopher M. Whitsel, Ph.D.
Indiana University, 2009
Research interests: Social Inequality, Research Methods, Global Comparative Sociology, Post-Soviet Central Asia

Michael J. Yellow Bird, Ph.D.
University of Wisconsin, 1994
Indigenous Tribal Studies, Social Welfare, Social Work

Software Engineering

Department Information

- **Department Head:**
  Kendall E. Nygard, Ph.D.
- **Graduate Coordinator:**
  Gursimran Walia, Ph.D.
- **Department Location:**
  258 QBB
- **Department Phone:**
  (701) 231-8562
- **Department Email:**
  gradinfo@cs.ndsu.edu
- **Department Web Site:**
  cs.ndsu.edu/
- **Application Deadline:**
  February 1 for fall admission; September 1 for spring admission* No summer admission for any Software Engineering Program
- **Degrees Offered:**
  Ph.D., M.S., M.S.E, Certificate
- **Test Requirement:**
  GRE (M.S. and Ph.D. only)
- **English Proficiency Requirements:**
  TOEFL iBT 79; IELTS 6.5

**Spring admissions are given only occasionally, depending on funding and faculty interest. If there are no spring openings, spring applicants are automatically considered for the subsequent fall semester.*

Program Description

Software Engineering is focused on the application of systematic, disciplined, and quantifiable approaches to the development, operation, and maintenance of software systems. Inclusive of computer programming but going well beyond, Software Engineering is concerned with methodologies, techniques, and tools to manage the entire software life cycle, including development of requirements, specifications, design, testing, maintenance, and project management. The advent of Software Engineering is a natural result of the continuous quest for software quality and reusability, and the maturing of the software development industry.

The Department of Computer Science offers a Graduate Certificate in Software Engineering, Master of Software Engineering, Master of Science in Software Engineering, and Ph.D. in Software Engineering. The programs are designed to appeal to both full-time students and software professionals who are employed and wish to pursue a program part time. The Master of Software Engineering is a course work only program while the Master of

Science in Software Engineering is a course work, comprehensive examination and research program. For additional information, see cs.ndsu.edu or contact the Computer Science Department at (701) 231-8562 or gradinfo@cs.ndsu.edu.

In addition to the Graduate School requirements (p. 1086), applicants must fulfill the program requirements listed below:

Certificate

1. B.S. or equivalent degree from an educational institution of recognized standing, including 12 semester hours or equivalent of Computer Science or Software Engineering courses from an educational institution of recognized standing, or at least one year full-time professional software engineering experience;
2. Programming skill in a modern higher level programming language, preferably C++, C#, or Java;
3. A 2.85 (on a 4.0 scale) GPA in previous course work.

Master of Software Engineering

1. Bachelor's level (B.S., B.A., Sc.B., etc.) degree from an educational institution of recognized standing;
2. Ability to design and implement a program consisting of several interacting classes that might total approximately 100 executable statements;
3. International Students require a minimum TOEFL ibT of 79 or an IELTS of 6.5.
4. A 3.0 (on a 4.0 scale) GPA in previous coursework. Conditional admission may be given with a 2.7 or higher GPA and professional experience.

Master of Science

1. Four year or longer B.S. or equivalent degree from an educational institution of recognized standing with at least a 3.0 grade point average on a 4.0 grade point scale. Eighteen semester hours or equivalent in Computer Science from an educational institution of recognized standing, or at least 2 years of full-time professional software engineering experience. Full time professional experience may offset the GPA requirement at the rate of 0.1 in GPA for each 18 months of such experience to a maximum of 0.3 in GPA;
2. Programming skill with one modern higher level programming language, preferably C++, C#, or Java.
3. A 3.0 (on a 4.0 scale) GPA in all previous coursework.

Doctor of Philosophy

1. Four year or longer B.S. or equivalent degree from an educational institution of recognized standing with at least a 3.25 grade point average (GPA) on a 4.0 grade point scale. Eighteen semester hours or equivalent in Computer Science from an educational institution of recognized standing, or at least 3 years of full-time professional software engineering experience. Significant full-time professional software development experience may offset this GPA requirement at the rate of 0.1 in GPA for each 2 years of such experience to a maximum of 0.4 in GPA. If the applicant has an M.S. or equivalent degree from an educational institution of recognized standing, the GPA in that degree should be at least 3.35 on a 4.0 scale.
2. Programming skill in at least 1 higher level programming language, preferably C++, C#, or Java.

Graduate Certificate

Code	Title	Credits
CSCI 713	Software Development Processes	3
Select two of the following:		6
CSCI 714	Software Project Planning and Estimation	
CSCI 715	Software Requirements Definition and Analysis	
CSCI 716	Software Design	
CSCI 717	Software Construction	
CSCI 718	Software Testing and Debugging	
CSCI 848	Empirical Methods in Software Engineering	3
Total Credits		12

Masters of Software Engineering

Code	Title	Credits
Core Courses - 15 Credits		
CSCI 713	Software Development Processes	
CSCI 715	Software Requirements Definition and Analysis	

CSCI 716	Software Design
CSCI 718	Software Testing and Debugging
CSCI 848	Empirical Methods in Software Engineering
Electives - 15 Credits	
CSCI 714	Software Project Planning and Estimation
CSCI 717	Software Construction
CSCI 724	Survey of Artificial Intelligence
CSCI 736	Advanced Intelligent Systems
CSCI 765	Introduction To Database Systems
CSCI 834	Knowledge Based Systems
CSCI 846	Development of Distributed Systems
CSCI 847	Software Complexity Metrics
Total Credits - 30	

Master of Science

Code	Title	Credits
Core Courses		12
Students must complete the core within five semesters of their entering the program.		
CSCI 713	Software Development Processes	
CSCI 715	Software Requirements Definition and Analysis	
or CSCI 718	Software Testing and Debugging	
CSCI 716	Software Design	
CSCI 765	Introduction To Database Systems	
Six credits (not part of the core) from:		6
CSCI 714	Software Project Planning and Estimation	
CSCI 715	Software Requirements Definition and Analysis	
CSCI 717	Software Construction	
CSCI 718	Software Testing and Debugging	
CSCI 845	Formal Methods for Software Development	
CSCI 846	Development of Distributed Systems	
CSCI 847	Software Complexity Metrics	
CSCI 848	Empirical Methods in Software Engineering	
Other Computer Science or Computer Engineering courses selected with and approved by the student's graduate advisory committee. (six - thesis students) or three (paper students)		3-6
CSCI 790	Graduate Seminar (in software engineering areas (1 credit each), approved by adviser)	3
Research Component*		3-6
CSCI 797	Master's Paper	
or CSCI 798	Master's Thesis	
Total Credits		33

Students seeking an option in cybersecurty must take 9 credits from the below list. No more than 3 credits can be from CSCI 790.

Code	Title	Credits
CSCI 676	Computer Crime & Forensics	3
CSCI 793	Individual Study/Tutorial (cybersecurity focus)	1-5
CSCI 791	Temporary/Trial Topics (cybersecurity focus)	1-5
CSCI 790	Graduate Seminar (cybersecurity focus)	1-3
CSCI 669	Network Security	3
CSCI 773	Foundations of the Digital Enterprise	3
CSCI 783	Topics In Software Systems (cybersecurity focus)	3

* Either a thesis option or comprehensive study paper based on a significant software development project undertaken by the student, perhaps as a member of a team, either at the University or as part of a job. This project will require design, implementation, and testing of a significant piece of computer software.

Doctor of Philosophy

Code	Title	Credits
Select 5 from the courses listed below and not duplicating any items used to satisfy requirements for the Master of Science degree:		15
CSCI 713	Software Development Processes	
CSCI 714	Software Project Planning and Estimation	
CSCI 715	Software Requirements Definition and Analysis	
CSCI 716	Software Design	
CSCI 717	Software Construction	
CSCI 718	Software Testing and Debugging	
CSCI 845	Formal Methods for Software Development	
CSCI 846	Development of Distributed Systems	
CSCI 847	Software Complexity Metrics	
CSCI 848	Empirical Methods in Software Engineering	
Courses in Computer Science or Electrical and Computer Engineering approved by the student's Supervisory Committee.		9
CSCI 899	Doctoral Dissertation	15
Total Credits		39

Students seeking an option in cybersecurty must take 9 credits from the below list. No more than 3 credits can be from CSCI 790.

Code	Title	Credits
CSCI 676	Computer Crime & Forensics	3
CSCI 790	Graduate Seminar (cybersecurity focus)	1-3
CSCI 791	Temporary/Trial Topics (cybersecurity focus)	1-5
CSCI 793	Individual Study/Tutorial (cybersecurity focus)	1-5
CSCI 669	Network Security	3
CSCI 773	Foundations of the Digital Enterprise	3
CSCI 783	Topics In Software Systems (cybersecurity focus)	3

Department Faculty

Anne Denton, Ph.D.
University of Mainz, 1996
Research Interests: Data Mining, Bioinformatics, Scientific Informatics, Databases, Geospatial Data, Cloud Computing

Dean Knudson, Ph.D.
Northwestern University, 1972
Research Interests: Software Engineering, International Capstone Programs, University/Industry Relationships

Jun Kong, Ph.D.
University of Texas, Dallas, 2005
Research Interests: Human Computer Interaction, Mobile Computing, Software Engineering

Juan (Jen) Li, Ph.D.
University of British Columbia, 2008
Research Interests: Large-scale Distributed System (P2P and Cloud Computing, Distributed Search, Routing Algorithms), Semantic Web Technologies, Social Networks, Information Retrieval, Knowledge Discovery

Simone Ludwig, Ph.D.
Brunel University, 2004
Research Interests: Swarm Intelligence, Evolutionary Computation, Fuzzy Reasoning, Cloud Computing

Kenneth Magel, Ph.D.
Brown University, 1977

Research Interests: Software Engineering, Human-Computer Interfaces, Software Complexity, and Software Design

Kendall Nygard, Ph.D.
Virginia Polytechnic Institute and State University, 1978
Research Interests: Data Science, Optimization Modeling, Smart Grid, Sensor Networks, Agents, Artificial Intelligence, Security, Adaptive Systems, Swarm Intelligence

Saeed Salem, Ph.D.
Rensselaer Polytechnic Institute, 2009
Research Interests: Bio-Informatics and Data Mining

Brian Slator, Ph.D.
New Mexico State University, 1988
Research Interests: Artificial Intelligence, Educational Media

Jeremy Straub, Ph.D.
University of North Dakota, 2015
Research Interests: Multi-tier Mission Architecture & Control, Autonomous Data Link Reduction, Autonomous Vehicle Control, Machine Vision, Super Resolution

Vasant Ubhaya, Ph.D.
University of California-Berkeley, 1971
Research Interests: Algorithm Analysis, Approximation and Optimization

Gursimran Walia, Ph.D.
Mississippi State University, 2009
Research Interests: Empirical Software Engineering, Software Errors and Software Quality Improvement, Requirements Engineering, Human Cognition in Software Engineering, Managing and Estimating Software Quality

Changhui Yan, Ph.D.
Iowa State University, 2005
Research Interests: Bioinformatics, Computational Biology, Genomics, Machine Learning, Data Mining, Big Data, Cloud Computing

Professors of Practice

Oksana Myronovych, Ph.D.
North Dakota State University, 2009

Mark Pavicic, Ph.D.
Columbia University, 1985

Affiliate Faculty

Otto Borchert, Ph.D.
North Dakota State University, 2015
Research Interests: Artificial Intelligence, Educational Games, STEM Learning

Hyunsook Do, Ph.D.
University of Nebraska, 2007
Research Interests: Software Engineering, Software Testing, Regression Testing, Software Maintenance, Requirements Verification, Software Empirical Methodologies

Hassan Reza, Ph.D.
North Dakota State University, 2002
Research Interests: Software Architecture, Cloud Computing, Architectural Analysis & Description

Xiaodong Zhang, Ph.D.
Dalhousie University, Canada, 2001
Research Interests: Satellite Sensing, Geographic Information Systems

Soil Science

Department Information

- **Director, School of Natural Resource Sciences:**
  Frank Casey, Ph.D.

- **Program Leader:**
  Thomas DeSutter, Ph.D.
- **Email:**
  Thomas.DeSutter@ndsu.edu
- **Department Location:**
  106 Walster Hall
- **Department Phone:**
  (701) 231-8901
- **Department Web Site:**
  https://www.ndsu.edu/soils/
- **Application Deadline:**
  International applications are due May 1st for fall and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Soil Science in the School of Natural Resource Sciences offers graduate study leading to the M.S. and Ph.D. degrees that provide training in agricultural and/or environmental career tracks. The instructional and research programs emphasize an understanding of soil-plant-atmosphere interactions and their application to soil and water resource management. Students may pursue degrees with emphasis in soil chemistry, soil fertility, soil genesis and morphology, soil management, soil physics, environmental modeling, water quality, soil salinity, plant nutrition, soil survey, soil conservation, soil reclamation, soil mineralogy or agricultural climatology and meteorology. M.S. and Ph.D. programs in Natural Resources Management and Environmental and Conservation Science with emphasis in soil science are also available.

A close working relationship exists between the department and various state and federal agencies and the private sector. Strong supporting course work is available from other departments and programs at North Dakota State University. Programs of study are designed to meet student interests and needs.

North Dakota's diversity of soils and agricultural practices provides an exceptional field setting in which to study soil science. The department is well equipped for field and laboratory investigations.

Admissions Requirements

The Soil Science graduate program is open to all qualified graduates of universities and colleges of recognized standing. All applicants must meet the Graduate School requirements (p. 1086).

Financial Assistance

Research assistantships are available. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. To be considered for an assistantship, applicants must submit a completed application. A complete application will include three recommendations, transcripts and a scholarly writing example. A TOEFL score for international applicants must also be received by the Graduate School.

The M.S. program normally requires 24 months of full-time study and research while the Ph.D. program normally requires a minimum of 36 months. An overall GPA of 3.0 or better must be maintained. An oral defense of thesis and academic subject matter is required of M.S. candidates. Ph.D. candidates are required to take a preliminary written and oral examination of academic subject matter and a final oral defense of a research-based dissertation.

F. Adnan Akyuz, Ph.D.
University of Missouri-Columbia, 1994
Research Area/Activity: Applied Climatology and Microclimatology/Climate Based Agricultural Management

Francis X.M. Casey, Ph.D.
Iowa State University, 2000
Research Area/Activity: Field Oriented Soil Physics, Measurement and Prediction of Water Transfer and Chemical Transport Through Soil

Amitava Chatterjee, Ph.D.
University of Wyoming, 2007

Research Area/Activity: Soil Fertility Management, Greenhouse Gas Emissions

Larry J. Cihacek, Ph.D.
Iowa State University, 1979
Research Area/Activity: Erosion and Productivity Relationships, Conventional and Alternative Crop Management, Carbon Sequestration, Nutrient Management

Thomas M. DeSutter, Ph.D.
Kansas State University, 2004
Research Area/Activity: Trace Elements, Land Application of Byproducts, Inorganic Soil Chemistry, Soil Environmental Conditions

David W. Franzen, Ph.D.
University of Illinois, 1993
Research Area/Activity: Soil Fertility/State Soil Specialist

Caley Gasch, Ph.D.
University of Wyoming, 2013
Research Area/Activity: Soil Ecology, Restoration, Reclamation, Monitoring of Degraded Soils

R. Jay Goos, Ph.D.
Colorado State University, 1980
Research Area/Activity: Soil Fertility and Management/Fertilizer Management for Small Grains

David G. Hopkins, Ph.D.
North Dakota State University, 1997
Research Area/Activity: Interactions Among Landscape, Soil Morphology, Soil Properties and Environmental Aspects of Land Use

Abbey Wick, Ph.D.
University of Wyoming, 2007
Research Area/Activity: Soil Health in Agricultural and Range Lands; Mine Reclamation

Adjunct Faculty

Allan W. Cattanach, Ph.D.
University of Minnesota, 1979
Research Area/Activity: Soil Fertility, Sugarbeet Management

Gary H. Halvorson, Ph.D.
Oregon State University, 1979
Director of Agriculture, Sitting Bull College, Fort Yates, SD

Mark Liebig, Ph.D.
University of Nebraska, 1998
USDA-ARS Northern Great Plains Research Laboratory, Mandan, ND
Research Area/Activity: Soil Quality, Soil Carbon Dynamics, Greenhouse Gas Flux, Semiarid Agroecosystems

Stephen D. Merrill, Ph.D.
University of California, Riverside, 1976
USDA-ARS Northern Great Plains Research Laboratory, Mandan, N.D.
Research Area/Activity: Soil Erosion Processes; Crop Root Growth and Soil/Crop Hydrology; Mined Land Reclamation

Jill Motschenbacher, Ph.D.
University of Arkansas, 2012
North Dakota State University, Fargo, ND
Research Area/Activity: Soil Physics, Sustainable Cropping Systems

Kristine Nichols, Ph.D.
University of Maryland, 2003
USDA-ARS Northern Great Plains Research Laboratory, Mandan, ND
Research Area/Activity: Soil Microbiology and Aggregate Stability

Laura F. Overstreet Gentry, Ph.D.
North Carolina State University, 2005
Assistant Professor, University of Illinois Urbana-Champaign
Research Area/Activity: Soil Fertility, Grain Crops, Bioenergy Crops, Crop Management, Environmental Systems

Jimmie L. Richardson Ph.D.
Iowa State University, 1974
Research Area/Activity: Soil Salinization, Soil Development in Wetlands, Hydrologic Patterns, Sedimentation

James A. Staricka, Ph.D.
University of Minnesota, 1990
Williston Research Extension Center,
Research Area/Activity: Soil and Water Conservation and Nutrient Use Efficiency in Dryland and Irrigated Crop Production

Donald L. Tanaka, Ph.D.
University of Nebraska, 1980
USDA-ARS Northern Great Plains Research Laboratory, Mandan, ND
Research Area/Activity: Dryland Integrated Agricultural Systems, Soil and Crop Ecological Interactions

Statistics

Department Information

- **Department Chair:**
  Rhonda Magel, Ph.D.
- **Department Location:**
  221 Morrill Hall
- **Department Phone:**
  (701) 231-7177
- **Department Email:**
  ndsu.stats@ndsu.edu
- **Department Web Site:**
  https://www.ndsu.edu/statistics/
- **Application Deadline:**
  Application deadline is March 15 for international students and applicants who would like an opportunity for an assistantship if available.
- **Degrees Offered:**
  Ph.D., M.S., Certificate
- **Test Requirement:**
  GRE (recommended)
- **English Proficiency Requirements:**
  TOEFL iBT 79; IELTS 6.5

Program Description

The Department of Statistics offers programs leading to a Ph.D. in statistics or a master's degree in applied statistics. The program is flexible enough to be individually planned around prior experience and in accord with professional goals.

During the first year of the program, students are strongly encouraged to meet with each faculty member to discuss possible research topics. The student should select an advisory and examining committee by the end of the first year.

A joint master's degree in computer science and statistics may also be obtained. A graduate certificate in Statistics for non majors is also offered.

Graduate Certificate

- B.S. or equivalent degree from an accredited university,
- Knowledge of College Algebra

Master's Program in Applied Statistics

In addition to the Graduate School requirements (p. 1086), the applicant must:

- Have had at least one year of calculus,
- Have had at least one course in statistics, and
- Have had at least one programming language

Joint Master's Program in Computer Science and Statistics

To be admitted with full status into the M.S. program in computer science and statistics, the applicant must satisfy the admission requirements for both the M.S. program in computer science and the M.S. program in applied statistics.

Ph.D. Program in Statistics

In addition to the Graduate School requirements, the applicant must:

- Have an M.S. degree in statistics or related area

Students not holding a master's degree in statistics or a closely related field will not be admitted to the Ph.D. program in statistics. These students must first apply to the M.S. program in applied statistics and complete the M.S. degree.

Ph.D. Program in Statistics (with Emphasis in Sports Statistics)

In addition to the Graduate School requirements, the applicant must:

- Have an M.S. degree in statistics or related area and some knowledge or interest in sports

Financial Assistance

Teaching assistantships are available. To be considered for an assistantship, the application must be complete with the Graduate School no later than March 15.

Graduate Certificate

The graduate certificate requires 12 semester credit hours consisting of graduate level courses in statistics. STAT 725 needs to be the first course taken for students with little or no prior knowledge of statistics. No credit will be given for STAT 725 for the certificate if it is not the first course taken. Students in the certificate program should not take both STAT 661 and STAT 726. STAT 726 is recommended. Also, students in this program should not take both STAT 670 and STAT 671. After completing the requirements for the certificate, please contact the Department of Statistics to verify completion.

Code	Title	Credits
STAT 670	Statistical SAS Programming	3
STAT 671	Introduction to the R Language	3
STAT 725	Applied Statistics (must be taken first or no credit will be given)	3
STAT 726	Applied Regression and Analysis of Variance	3
or STAT 661	Applied Regression Models	
Total Credits		12

Master of Science in Applied Statistics

The program for the M.S. degree in applied statistics requires 32 semester credits with an overall GPA of 3.0 or higher. An oral defense of a research-based thesis or paper is required.

Code	Title	Credits
Complete a set of core courses* with a grade of B or better, including		
STAT 661	Applied Regression Models	3
STAT 662	Introduction to Experimental Design	3
STAT 764	Multivariate Methods	3
or STAT 774	Generalized Linear Models	
STAT 767	Probability and Mathematical Statistics I	3
STAT 768	Probability and Mathematical Statistics II	3
Successfully complete two 1-credit practicums in consulting. Each statistical practicum will be listed as STAT 794		2
Complete an additional 9-12 hours (depends on number of research hours) of course work selected from the following courses:		9-12
STAT 660	Applied Survey Sampling	
STAT 663	Nonparametric Statistics	
STAT 664	Discrete Data Analysis	

STAT 669	Introduction to Biostatistics
STAT 670	Statistical SAS Programming
STAT 671	Introduction to the R Language
STAT 672	Time Series
STAT 673	Actuarial Statistical Risk Analysis
STAT 677	Introductory Survival and Risk Analysis I
STAT 678	Introductory Survival and Risk Analysis II
STAT 730	Biostatistics
STAT 732	Introduction to Bioinformatics
STAT 770	Survival Analysis
STAT 775	Using Statistics in Sports
STAT 786	Advanced Inference
STAT 796	Special Topics
STAT 851	Bayesian Statistical Inference
STAT 859	Applied Spatial Statistics
STAT 798	Master's Thesis
or STAT 797	Master's Paper
Must have 15 hours of 700-800 level courses.	

*If one of these courses has been taken at the undergraduate level, another graduate level course should be substituted. STAT 725 Applied Statistics and STAT 726 Applied Regression and Analysis of Variance will not be counted for this degree program.

- A plan of study must be submitted at least one semester prior to graduation.
- Pass a written comprehensive exam. This exam consists of two sections. Exam 1 covers STAT 767 Probability and Mathematical Statistics I and STAT 768 Probability and Mathematical Statistics II. Exam 2 covers STAT 661 Applied Regression Models, STAT 662 Introduction to Experimental Design and STAT 764 Multivariate Methods or STAT 774 Generalized Linear Models. Exam 1 is two hours and Exam 2 is three hours. These exams are offered during approximately the fifth week of each semester. A maximum of two attempts is allowed.
- Complete and successfully defend the research thesis or paper.

M.S. Degree in Computer Science and Statistics

Code	Title	Credits
Statistics Courses		
STAT 661	Applied Regression Models	3
STAT 671	Introduction to the R Language	3
STAT 669	Introduction to Biostatistics	3
STAT 772	Computational Statistics	3
STAT 732	Introduction to Bioinformatics	3
One additional graduate course in statistics, not including STAT 725 Applied Statistics or STAT 726 Applied Regression and Analysis of Variance		
Computer Science Courses		
CSCI 713	Software Development Processes	3
CSCI 724	Survey of Artificial Intelligence	3
CSCI 732	Introduction To Bioinformatics	3
CSCI 765	Introduction To Database Systems	3
Two additional graduate level courses in computer science.		
Master's Thesis or Master's Paper Research Credits		
Total Credits		42

Ph.D. Degree in Statistics

The program for the Ph.D. degree requires an additional 30 credits of course work beyond the M.S. degree and 30 hours of research. An oral defense of a dissertation is required. All students entering program must have an M.S. degree in statistics or closely related field. Any core course (or similar

course) required for the M.S. degree that has not been taken before entering the Ph.D. program, must be taken before obtaining the Ph.D. degree. This may require additional course work beyond the 30 credits depending on the area in which the M.S. degree was obtained.

Successfully complete two 1-credit practicums in Consulting/Presentation Practicum. Each statistical practicum will be listed as **STAT 794** Practicum/Internship

Complete at least 30 semester credits of statistics courses at the 600- to 800-level (does not include STAT 725 Applied Statistics STAT 726 Applied Regression and Analysis of Variance). At least 15 credits must be at the 700- to 800-level. Students must take STAT 786 Advanced Inference , STAT 764 Multivariate Methods and STAT 774 Linear Models I if not taken at the M.S. level.

Upon approval by the adviser and advisory committee, up to 9 hours may be taken in Mathematics or Computer Science. It is recommended that a student have knowledge of real analysis at some level such as MATH 650 Real Analysis I .

- A plan of study must be submitted at least one semester prior to graduation.
- Pass a written comprehensive exam. This exam consists of two sections. Exam 1 covers STAT 767 and STAT 768. Exam 2 covers STAT 661, STAT 662 and STAT 764 or STAT 774. Exam 1 is two hours and Exam 2 is three hours. These exams are offered during approximately the fifth week of each semester. A maximum of two attempts is allowed.
- Submit a research proposal and pass an oral exam on the proposal and related topics.
- Complete and successfully defend the research dissertation.

Code	Title	Credits
Core Courses		
STAT 661	Applied Regression Models	3
STAT 662	Introduction to Experimental Design	3
STAT 764	Multivariate Methods	3
or STAT 774	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

Ron Degges, Ph.D.
North Dakota State University, 2011
Field: Sampling, Regression Analysis

Seung Won Hyun, Ph.D.
University of Missouri, 2010
Field: Optimal Designs, Adaptive Designs, Clinical Trials

Rhonda Magel, Ph.D.
University of Missouri-Rolla, 1982
Field: Nonparametrics, Inference Under Order Restrictions, Regression

Megan Orr, Ph.D.
Iowa State University, 2012
Field: Biostatistics, Gene Expression Analysis, High-Dimensional Data, Analysis and Multiple Testing

Gang Shen, Ph.D.
Purdue University, 2009
Field: Mathematical Statistics, Asymptotic Theory, Bayesian Analysis, Change-Point Problem

Yarong Yang, Ph.D.
Northern Illinois University, 2010
Field: Machine Learning, Spatial Statistics, Bayesian Statistics, Bioinformatics

STEM Education

Department Information

- **Acting Program Director:**
  Jeffrey Boyer, Ph.D.
- **Department Location:**
  Deans Office, College of Science and Mathematics
- **Department Phone:**
  (701) 231-5953
- **Department Web Site:**
  www.ndsu.edu/csme/stem_education_graduate_programs/
- **Degrees Offered:**
  Ph.D. (Dual Major in STEM Education and STEM discipline is an option)
- **English Proficiency Requirements:**
  TOEFL iBT 88, IELTS 6.5

Program Description

Applicants are invited for NDSU's interdisciplinary Ph.D. program in Science-Technology-Engineering-Mathematics (STEM) Education. The program conducts and disseminates empirical research to improve STEM learning and teaching in higher education.

Coursework centers on graduate-level courses in the discipline area, a common core of STEM Education courses, and elective courses focused on research training. An interdisciplinary team of faculty supervised the candidate's dissertation research, which will investigate teaching and learning within/across one or more STEM disciplines.

Although interdisciplinary in nature, graduate students in the STEM Education Ph.D. Program have an academic home in the STEM department/program of their discipline preference. Graduate committee membership includes faculty from the STEM Education program and from the department/program of discipline preference.

Applicants will not be considered without a core faculty member who has agreed to serve as the major advisor.

Applicants for the STEM Education PhD program must meet at least one of the following criteria:

- Completed a Masters (or PhD) degree in a STEM discipline.
- Accepted into an NDSU Master's program in a STEM discipline.
- Accepted into an NDSU PhD program in a STEM discipline.

The program requires 60 semester hours beyond the Master's Degree. Additionally, by completion of the doctorate, the coursework must include either a Master's Degree or its equivalent coursework in the chosen STEM discipline (this applies if the Master's Degree is in Education or another related field). In consultation with the student's graduate committee, a plan of study will be developed to ensure that the student has a strong background in

1. discipline-based educational research at the undergraduate level,
2. curriculum, teaching, learning, and assessment, and
3. content expertise within a discipline.

Students enrolled in program must maintain an overall GPA of at least 3.0 both within the content area and STEM courses. If the GPA in either component should drop below 3.0, then the student is placed on academic probation within the program for the following semester. If at the end of that semester the GPA still remains below 3.0, the student is subject to dismissal from the program.

Core Faculty

Jeff Boyer, Director STEM Education

Abraham Ayebo, Mathematics/Education

Warren Christensen, Physics/STEM Education

Mila Kryjevskaia, Physics/STEM Education

William Martin, Mathematics

Jennifer Momsen, Biology/STEM Education

Lisa Montplaisir, Biology/STEM Education

James Nyachwaya, Chemistry/Education

Affiliate Faculty

Julia Bowsher, Biological Sciences

John Buncher, Physics

Angela Hodgson, Biological Sciences

Teacher Education

Department Information

- **School of Education Head:**
  Chris Ray, Ph.D.
- **Program Coordinator:**
  Stacy Duffield, Ph.D.
- **Department Location:**
  School of Education, FLC 210
- **Department Phone:**
  (701) 231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring semester. Domestic applicants should apply at least one month prior to the start of classes.
- **English Proficiency Requirements:**
  TOEFL iBT 88, IELTS 6.5

Program Description

The School of Education offers graduate study leading to the Master of Education (M.Ed.) and Master of Science (M.S.) degrees. Graduate majors are offered in the following areas: Curriculum and Instruction, Agricultural Education, English Education, Family and Consumer Sciences Education, History Education, Mathematics Education, Music Education, Science Education, Social Science Education and Teacher Licensure.

Curriculum and Instruction

The program focuses on further development of teacher leaders through study of instructional delivery and enhancement. The program curriculum includes areas of human development, learning, foundations of education, school curriculum, roles of schools and society, and further study in areas of interest. Candidates choosing this option for an M.S. degree must also complete a thesis.

Agricultural Education (p. 249)

Agricultural Education offers graduate study leading to the M.Ed. and M.S. degrees. Advanced work may involve specialized training in vocational education, extension education, international extension, and agricultural education.

Degree programs are planned cooperatively to meet the needs of individual students. Candidates are encouraged to include supporting work relevant to subject matter areas of interest. Some courses focus on problems related to various phases of Agricultural Education, including secondary, post-secondary, adult, and extension programs. Others emphasize issues common to all service areas in agricultural and extension education. Provision may be made for candidates to include internships in agribusiness, natural resources education, or other aspects of agricultural and extension education in their programs. Candidates should work closely with an adviser.

English Education

Content-focused master's degree program in Teacher Education focus on increasing both pedagogical skills and content expertise. Candidates in these programs complete the four core pedagogical courses listed on the program of study and at least nine credits of master's-level content coursework; the total program of study is typically 33-36 credits. Candidates work with their graduate committee and adviser to identify an appropriate plan of study. This degree plan does not lead to teacher licensure, and candidates are encouraged to work their advisers if licensure is desired.

Family and Consumer Sciences Education (p. 347)

Students have the option of pursuing a Master of Education (M.Ed.) or Master of Sciences (M.S.) degree in Family and Consumer Sciences Education. Advanced work may be taken in FCSE, Career and Technical Education, Extension, and curriculum design and development.

History Education

Content-focused master's degree program in Teacher Education focus on increasing both pedagogical skills and content expertise. Candidates in these programs complete the four core pedagogical courses listed on the program of study and at least nine credits of master's-level content coursework; the total program of study is typically 33-36 credits. Candidates work with their graduate committee and adviser to identify an appropriate plan of study. This degree plan does not lead to teacher licensure, and candidates are encouraged to work their advisers if licensure is desired.

Mathematics Education

Content-focused master's degree program in Teacher Education focus on increasing both pedagogical skills and content expertise. Candidates in these programs complete the four core pedagogical courses listed on the program of study and at least nine credits of master's-level content coursework; the total program of study is typically 33-36 credits. Candidates work with their graduate committee and adviser to identify an appropriate plan of study. This degree plan does not lead to teacher licensure, and candidates are encouraged to work their advisers if licensure is desired.

Music Education (p. 393)

The Master of Education (M.Ed.) degree with a Music Education option is a dual program offered collaboratively by the School of Education and the Department of Music. The program is designed to facilitate the needs of currently working music teachers as well as students who wish to continue their education to the master's level after having completed the baccalaureate degree. It is possible to complete the M.Ed. degree in Music Education by attending three consecutive summer sessions, two years in residence during the academic year, or a combination of both. Most courses in the degree program are offered in the late afternoon or evening. Applied study may be in the areas of vocal, instrumental, or conducting. Students electing the choral emphasis will take vocal pedagogy and survey of choral literature. Students electing the instrumental emphasis will take instrumental pedagogy (woodwind, brass, or percussion) and survey of band literature. No thesis is required; rather, students will complete 2 three-credit hour practicum experiences: one in education and one in music. The practica will be agreed upon and planned jointly by the student and his/her adviser(s).

Science Education

Content-focused master's degree program in Teacher Education focus on increasing both pedagogical skills and content expertise. Candidates in these programs complete the four core pedagogical courses listed on the program of study and at least nine credits of master's-level content coursework; the total program of study is typically 33-36 credits. Candidates work with their graduate committee and adviser to identify an appropriate plan of study. This degree plan does not lead to teacher licensure, and candidates are encouraged to work their advisers if licensure is desired.

Social Science Education

Content-focused master's degree program in Teacher Education focus on increasing both pedagogical skills and content expertise. Candidates in these programs complete the four core pedagogical courses listed on the program of study and at least nine credits of master's-level content coursework; the total program of study is typically 33-36 credits. Candidates work with their graduate committee and adviser to identify an appropriate plan of study. This degree plan does not lead to teacher licensure, and candidates are encouraged to work their advisers if licensure is desired.

Teacher Licensure

The Teacher Licensure option allows students with a degree in teachable major to complete professional education coursework to earn teacher licensure. The program is aligned with ND teacher licensure options but transfers well to other states. Additional content coursework may be needed to meet licensure requirements and will be evaluated upon entry to the program. The Praxis Core Academic Skills exam is required for full admission to the program. Contact the Teacher Education program for a transcript evaluation to determine a plan of study.

The graduate program in Teacher Education is committed to the further development of educational leaders who are dedicated to educational equity for all persons. The Teacher Education graduate program is aligned with the National Board for Professional Teaching Standards (NBPTS) to reflect the importance of applied research and content development of educators. Programs offered in Teacher Education are designed for the practitioner. Students pursuing the M.Ed. will engage in action research as a component of the program. Students are encouraged to work closely with an academic adviser to ensure that personal and professional goals are clear and achievable. Some of the options with unique features are described in more detail below and on the next page.

The NDSU programs in education are accredited by National Council for Accreditation of Teacher Education and are approved by the ND Education Standards and Practices Board. Changes in national and state legislation, standards, or rules can affect academic program requirements.

Qualified students may apply for admission to graduate programs in the School of Education leading to Master of Education (M.Ed.) or Master of Science (M.S.) degrees.

In addition to the Graduate School's required application materials, the program requires submission of a statement of career goals consistent with the five propositions of the National Board of Professional Teaching Standards (NBPTS) (http://www.nbpts.org), as well as reasons for applying to

the program. The School of Education reserves the right to obtain additional information about the student's professional competence from qualified professionals.

In addition to meeting the requirements stated above, applicants must meet two additional requirements for the **Teacher Licensure** option:

1. Hold a bachelor's degree in a content area related to a teaching major offered at NDSU, including the following: biology, chemistry, earth science, English, French, health, history, mathematics, music, physics, or Spanish. If you hold a different major, consult with program faculty for additional information.
2. Pass the Praxis Core Academic Skills exam, meeting ND cut scores in reading, writing and math.
3. Complete 20 hours working with youth. Verification forms are provided in the application system.

Admission is considered only after all required application materials have been received and reviewed. Where appropriate, all international student requirements must be met.

Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data. A student must meet all requirements for full admission.

Financial Assistance

Graduate assistantships are available in the School of Education. Applications are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. Students must be accepted into the Graduate School before they are eligible for an assistantship.

All enrollments in Education courses before the student files a graduate plan of study must be approved by the adviser. The School of Education will evaluate graduate courses taken prior to filing the graduate plan of study when the student's plan of study is being considered. Only those courses approved by the School of Education may be included on the final plan of study leading to the degree. Master's programs within the School of Education require a minimum of 30 semester credits (minimums vary by academic program). The Master of Science (M.S.) degree requires a disquisition. The Master of Education (M.Ed.) degree is a non-disquisition, practitioner-oriented degree. Programs vary on requiring a written comprehensive exam or a portfolio/oral.

Teacher Education Required Courses

Code	Title	Credits
EDUC 750	Reflective Practice and Research in Education	3
EDUC 751	Students and Their Learning	3
EDUC 752	Curriculum Design and Delivery	3
EDUC 753	Managing/ and Monitoring Learning	3
Major/Concentration		18
EDUC 794	Practicum/Internship (or)	3
EDUC 798	Master's Thesis	6-10

Teacher Licensure Option

Code	Title	Credits
Professional Education Coursework		
EDUC 651P	Instructional Planning, Methods and Assessment	3
EDUC 681P	Classroom Practice/Methods of Teaching I (Some content areas require an additional special methods course, EDUC 682)	3
EDUC 685P	Student Teaching Seminar	1
EDUC 686	Classroom Management for Diverse Learners	3
EDUC 689	Teaching Students of Diverse Backgrounds	3
EDUC 724	Advanced Educational Psychology	3
EDUC 775	Content Area Reading	2
Content Area & Elective Coursework		
Practicum		
EDUC 687P	Student Teaching	9
EDUC 688P	Applied Student Teaching	3

Core Faculty

Mari Borr, Ph.D.
University of North Dakota, 2005

Research Interests: Qualitative Research, Family and Consumer Science Education, Adolescent Development, Experiential Learning, and Professional Development Evaluation

Stacy Duffield, Ph.D.
University of North Dakota, 2003
Research Interests: Middle School, Literacy, Learning Theory, and Instructional Practices

Jeanette Hoffman, Ph.D.
University of St. Thomas, 2006
Research Interests: Multicultural education, Social justice education, Assessing student learning

Adam A. Marx, Ph.D.
University of Missouri, 2014
Research Interests: Adolescent Career Decision-Making, Student Engagement, Teacher Development

Larry Napoleon, Ph.D.
The Pennsylvania State University-University Park, 2009
Research Interests: Student Options and Retention, Career and Technical Education, Historically Disenfranchised Learners, African-American History

James M. Nyachwaya, Ph.D.
University of Minnesota, 2012
Research Interests: High School And College Students' Conceptual Understanding of the Particulate Nature of Matter, Pre-Service And In-Service Teachers' Pedagogical Content Knowledge (PCK) of Chemistry/Science

Florin Salajan, Ed.D.
Columbia University, 2007
Research Interests: Areas Of Expertise: Interactive Learning Technologies; Educational Technology Effectiveness For Teaching And Learning; Generational Attitudes Toward Learning Technologies; Comparative E-Learning; European Higher Education Policies; International Education

Teresa Shume, Ph.D.
University of North Dakota, 2013
Research Interests: Place-based Environmental Education, Socio-Scientific Issues, Ecojustice Theory and Practice, Systems Thinking, Content-Area Language Instruction

Justin J. Wageman, Ph.D.
University of North Dakota, 1999
Research Interests: Standards, Curriculum, Instruction, Assessment, Professional Development and Evaluation

Associate Faculty

Abraham Ayebo, Mathematics Education

Ashley Baggett, History Education

Warren Christensen, Physics/STEM Education

Mila Kryjevskaia, Physics/STEM Education

Jenny Linker, Physical Education

William Martin, Mathematics/STEM Education

Lisa Montplaisir, Biology/STEM Education

Warren Olfert, Music Education

Kelly Sassi, English Education

Michael Weber, Music Education

Technology Enhanced Curriculum

Department Information

- **Head, School of Education:**
  Chris Ray, Ph.D.
- **Graduate Coordinator:**

Nate Wood, Ph.D.

- **Degrees Offered:**
  Certificate

Transportation and Logistics

Department Information

- **Program Director:**
  Denver Tolliver, Ph.D.
- **Department Chair:**
  Joseph Szmerekovsky, Ph.D.
- **Academic Coordinator:**
  Jody Bohn Baldock
- **Email:**
  jody.bohn.baldock@ndsu.edu
- **Department Location:**
  Upper Great Plains Transportation Institute, Quentin Burdick Building 448
- **Department Phone:**
  (701) 231-7767
- **Department Web Site:**
  www.ndsu.edu/business/departments/tl/
- **Application Deadline:**
  March 1 for fall semester, October 1 for spring semester
- **Degrees Offered:**
  Ph.D.
- **Test Requirement:**
  GRE (GMAT may be substituted)
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Transportation, Logistics and Finance offers a Ph.D. degree in Transportation and Logistics (TL). The degree is awarded through the College of Business in collaboration with the Upper Great Plains Transportation Institute to provide high quality assistantships for students. The program takes an interdisciplinary approach to transportation and logistics and attracts students with backgrounds in transportation and logistics, as well as agribusiness, applied economics, civil engineering, construction management, emergency management, finance, geosciences, industrial/manufacturing engineering, and supply chain management.

Admission Requirements

The Transportation and Logistics Ph.D. program is open to qualified graduates of universities and colleges of recognized standing. To be admitted with full standing, the applicant must:

1. Hold a master's degree (preferred) from an educational institution of recognized learning, baccalaureate degree a minimum.
2. Have adequate preparation in one or more of the disciplines comprising transportation and logistics
3. Have shown the potential to undertake advanced study and research as evidenced by prior academic performance
4. Have earned a cumulative grade point average of at least 3.0 or equivalent in all courses completed at the highest education level reached
5. Submit a Graduate Record Examination (GRE) score at the time of the application. If a student has a recent GMAT score it may be substituted for the GRE.
6. Submit an NDSU Graduate School application consisting of the application, letter of intent, official transcripts, letters of reference, and English proficiency scores (if applicable). Additional documents that may be submitted could include resume and professional vita. Applications for admission will be submitted via the Graduate School website before March 1 for Fall semester and October 1 for Spring semester. Applicants must meet all application requirements of the graduate school and department before being considered for acceptance.

Students who do not meet all requirements for admission or have deficiencies in prerequisite course work, but show satisfactory potential for graduate study, may be admitted conditionally. The conditional status may be changed to full graduate standing after the first or second semester of study, based on the student's academic performance.

The Transportation Infrastructure and Capacity Planning option is restricted to students with undergraduate degrees in Civil or Construction Engineering. A student wishing to pursue an area of concentration in Transportation Economics and Regulation must have completed intermediate-level microeconomics and taken at least one course in macroeconomics. In order to pursue an area of concentration in Logistics and Supply Chain Systems, a student must have earned a baccalaureate degree in Agribusiness, Business, Economics, Finance, Industrial Engineering, Management, Marketing, or a related field. All applicants must meet the general program prerequisites of at least one year of calculus and one course in statistics and economics.

Apply for Admission

To apply for admission, please visit the Admission Information page (https://bulletin.ndsu.edu/graduate/admission-information).

Financial Assistance

The number of assistantships vary from year to year, depending on grant availability and the number of students in residence. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research.

To be considered for an assistantship, an applicant must complete a Graduate School application, be accepted by the department, and identify the desire for an assistantship or financial need in the statement of purpose.

Graduate tuition is waived for students with assistantships, but all fees are the student's responsibility.

Degree Requirements

The Ph.D. program requires the completion of a minimum of 90 credits of graduate study beyond the baccalaureate degree with an overall GPA of 3.0 or higher. Each student must develop a plan of study under the guidance of a faculty adviser and a supervisory committee. Twenty-four of the graduate credit hours must consist of core Transportation & Logistics courses or suitable substitutes. A minimum of 30 credit hours must be taken in the student's area of concentration, including quantitative methods courses related to the concentration. A minimum of 30 credit hours must consist of research-based dissertation credits. The remaining credits may be comprised of technical electives and additional dissertation credits.

Students must take a qualifying examination upon completion of the core courses as identified below. In addition to core courses, transportation elective courses in supply-chain, transportation, and quantitative methods are typically completed after the first year.

The qualifying exam will include two components: (1) core transportation and logistics knowledge and (2) competency in quantitative methods. After passage of the qualifying examination and successful completion of the courses designated in the plan of study, the student may schedule a comprehensive examination. The comprehensive exam includes written and oral components related to the student's area of concentration. The comprehensive exam also includes a dissertation prospectus examination in which the student must present and defend a plan for undertaking and completing a dissertation. After passage of the comprehensive exam and completion of the dissertation, the doctoral candidate must pass a final examination in which the completed dissertation is presented and defended.

Code	Title	Credits
Core Courses (≥ 24 credits)		
TL 757	Intelligent Transportation Solutions	3
TL 782	Highway Planning and Logistics	3
TL 783	Transportation Systems II	3
TL 789	Leadership, Ethics, and Academic Conduct in Transportation	3
TL 831	Modeling for Transportation and Logistics Decision Analysis	3
TL 885	Geospatial Information Systems for Transportation	3
TL 892	Graduate Teaching Experience	1-6
ENGR 770	Quantitative Modeling	3
Transportation Concentration Elective Courses (≥ 9 credits)		
TL 751	Transportation Systems Security	3
TL 752	Transportation Planning and Environmental Compliance	3
TL 753	Transportation System Modeling	3
TL 754	Urban Transportation Systems Analysis	3
TL 755	Context Sensitive Solutions	3
TL 756	Transportation and Land Use Integration	3

TL 781	Program Evaluation	3
TL 785	Spatial Analysis in Transportation	3
TL 786	Public Transportation	3
TL 787	Public Transportation II	3
Supply-chain Concentration Elective Courses (≥ 9 credits)		
TL 715	Introduction to ERP	3
TL 719	Crisis Analysis and Homeland Security	3
TL 721	International Logistics Management	4
TL 725	ERP Configuration	3
TL 733	Case Studies in Logistics	3
TL 735	Practical Data Analytics	3
TL 811	Modeling for Logistics Research	4
TL 823	Contemporary Supply Chain Research	3
TL 829	Supply Chain Risk Management	3
Quantitative Methods Elective Courses (≥ 6 credits)		
COMM 707	Quantitative Research Methods in Communication	3
EDUC 885	Structural Equation Modeling Fundamentals	3
ENGR 771	Probabilistic and Deterministic Methods	3
SOC 700	Qualitative Methods	3
SOC 701	Quantitative Methods	3
Dissertation (≥ 30 credits)		
TL 899	Doctoral Dissertation	1-15

In addition to these courses, technical electives may be selected from graduate courses offered by participating departments, subject to the approval of the student's advisory committee. For a description of potential electives, see the graduate program descriptions for: Agribusiness and Applied Economics (https://bulletin.ndsu.edu/graduate/programs/agribusiness-applied-economics), Business Administration (https://bulletin.ndsu.edu/graduate/programs/business-administration), Civil Engineering (https://bulletin.ndsu.edu/graduate/programs/civil-engineering), Construction Management (https://bulletin.ndsu.edu/graduate/programs/construction-management), and Industrial and Manufacturing Engineering (https://bulletin.ndsu.edu/graduate/programs/industrial-manufacturing-engineering).

Faculty

Raj Bridgelall, Ph.D.
North Dakota State University, 2015
Research Interests: Big Data Analytics, Internet-of-Things (IoT), Cloud Computing; Connected and Autonomous Vehicles (CAV), Shared Mobility, Intelligent Transportation Solutions; Signal processing and mathematical modeling of transportation systems; Remote Sensing with Unmanned Aircraft Systems; Hyperspectral Image Analysis; Radio-frequency identification (RFID); Real-time locating systems (RTLS); Energy Harvesting and massive scale autonomous wireless sensor networks
Department: Transportation and Logistics

Alan Dybing, Ph.D.
North Dakota State University, 2013
Research Interests: Asset management, Energy impacts, Freight transportation, Agricultural transportation, Supply chain management, Transportation economics, Spatial analysis, Transportation systems modeling
Department: Transportation and Logistics

Ranjit Godavarthy, Ph.D.
Kansas State University, 2012
Research Interests: Public transportation in small urban and rural areas, Demand response transit and paratransit research, Bike share research, Roundabouts research, Traffic engineering and operations, Transportation and highway safety
Department: Transportation and Logistics

Jill Hough, Ph.D.
University of California-Davis, 2007
Research Interests: Public transportation in rural and small urban locations, Workforce development, Mobility of the aging, Transportation planning and policy, Intelligent transportation systems
Department: Transportation and Logistics

Michal Jaroszynski, Ph.D.
Florida State University, 2014
Research Interests: Socioeconomic impacts of transportation investments and policies; Travel demand modeling; Transportation funding, finance, and equity; Multimodal transportation systems
Department: Transportation and Logistics

Pan Lu, Ph.D.
North Dakota State University, 2011
Research Interests: Transportation infrastructure management, Freight rail transportation, Multi-mode transportation efficiency, GIS application in transportation, Operations research in transportation, Commercial truck safety, Railway transportation safety, Data mining application in transportation, Transportation resiliency analysis
Department: Transportation and Logistics

Jeremy Mattson, Ph.D.
North Dakota State University, 2017
Research Interests: Public transportation, Transportation economics, Demand modeling, Travel behavior, Built environment
Department: Transportation and Logistics

Diomo Motuba, Ph.D.
North Dakota State University, 2009
Research Interests: Transportation and land use planning, Freight modeling, Transportation economics, Connected automated vehicles, Logistics and supply chain management, Transportation safety
Department: Transportation and Logistics

Joseph Szmerekovsky, Ph.D.
Case Western Reserve University, 2003
Research Interests: Project management and scheduling, Supply chain management and technology, Energy supply chain management, Healthcare logistics
Department: Transportation and Logistics

Denver Tolliver, Ph.D.
Virginia Polytechnic Institute and State University, 1989
Research Interests: Highway systems modeling, Multimodal transportation planning, Freight transportation, Energy and environmental analysis
Department: Transportation and Logistics

Kimberly Vachal, Ph.D.
George Mason University, 2005
Research Interests: Human factors in traffic safety, Healthy community transport, Agricultural and biofuels transportation, CMV safety & security, Containerized and identity preserved grain marketing, Regional economic development
Department: Transportation and Logistics

Transportation and Urban Systems

Department Information

- **Program Director:**
  Denver Tolliver, Ph.D.
- **Department Chair:**
  Joseph Szmerekovsky, Ph.D.
- **Academic Coordinator:**
  Jody Bohn Baldock
- **Email:**
  jody.bohn.baldock@ndsu.edu
- **Department Location:**
  Upper Great Plains Transportation Institute, QBB 448
- **Department Phone:**
  (701) 231-7767
- **Department Web Site:**
  www.ndsu.edu/business/departments/tl/
- **Application Deadline:**
  July 1 for fall semester, December 1 for spring semester
- **Degrees Offered:**

M.S., M.T.U.S., Certificate - All programs offered online only

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

Program Description

The Department of Transportation and Logistics offers a Master of Science in Transportation and Urban Systems, a Master of Transportation and Urban Systems and a Certificate in Transportation and Urban Systems. The degree is awarded through the College of Business, which collaborates with the Upper Great Plains Transportation Institute to provide high-quality graduate programs for students. The program takes an interdisciplinary approach to transportation and logistics and attracts students with backgrounds in transportation and logistics, as well as agribusiness, applied economics, civil engineering, construction management, emergency management, finance, geosciences, industrial/manufacturing engineering, and supply chain management.

Master of Science (M.S.) in Transportation and Urban Systems

This degree focuses on: (1) urban transportation systems; (2) relationships between transportation, land use, environment, emergency response, and logistical delivery systems; (3) coordinated planning, operations, and security; and (4) the spatial dimensions of urban systems. The curriculum is built around the topics of: public transportation systems, geographic information systems, freight transportation and logistical delivery systems, urban geography and land use, the environmental impacts of transportation systems, transportation systems security, and the sustainability of transportation and urban systems. The M.S. degree requires a thesis and is targeted at students with strong research interests.

Master of Transportation and Urban Systems (MTUS)

This is a non-disquisition degree that is primarily intended for professional planners and engineers. Students in the M.S. and MTUS programs can select from a common set of courses. However, students enrolled in the non-disquisition (MTUS) program have more opportunities for synthesis of practice and additional course work, with less emphasis on research. Students in this option are required to complete a creative component as coordinated with their advisor.

Certificate in Transportation and Urban Systems

The Certificate in Transportation and Urban Systems is primarily targeted at practicing professionals who wish to gain additional knowledge in the emerging fields of transportation and urban systems. The certificate requires a minimum of 9 course credits from the list of core courses.

Admission Requirements

The Transportation and Urban Systems programs are open to qualified graduates of universities and colleges of recognized standing. To be admitted with full standing, the applicant must:

1. Hold a baccalaureate degree from an educational institution of recognized learning with a minimum grade point average (GPA) of 3.0 or equivalent
2. Have adequate preparation in one or more of the disciplines comprising transportation and logistics and must have professional experience or interests in community practice
3. Have shown the potential to undertake advanced study as evidenced by prior academic performance and have a stated interest in transportation and (for the M.S.) the capability to conduct transportation research
4. Submit official transcripts
5. Submit a two-page resume
6. Submit a one-page "Letter of Intent" outlying your reasons for pursuing the Master of Transportation and Urban Systems
7. Submit three letters of recommendation (NA for Certificate Option)
8. Submit online application through the NDSU Graduate School website
9. International applicants whose first language is not English and who do not possess an U.S. bachelor's degree or higher are subject to additional requirements when they apply for admission. They must meet the minimum requirements on measures of general English language proficiency. The accepted measures of language proficiency are the TOEFL ibT 71 and IELTS 6.

Students who do not meet all requirements for admission or have deficiencies in prerequisite course work, but show satisfactory potential for graduate study, may be admitted conditionally. The conditional status may be changed to full graduate standing after the first or second semester of study, based on the student's academic performance.

Apply for Admission

To apply for admission, please visit the Admission Information page (https://bulletin.ndsu.edu/graduate/admission-information).

Degree Requirements

Master of Science (M.S.) in Transportation and Urban Systems

A minimum of 30 credits is required for the degree of which 21 must be core courses and 3 credits of electives. All students must take a final examination which covers the course work taken by the candidate, as well as the thesis topic as coordinated with their adviser.

Each thesis must be of sufficient depth and quality to warrant at least six (6) graduate credits. However, no more than 10 credits can be earned for any thesis. Each thesis will contribute one of the following:

- New models – may be achieved through the synthesis of several techniques, the modification of existing models, or new applications of analytical techniques to transportation/urban problems.
- Knowledge – may be accomplished through the collection and analysis of original data or the development of innovative planning techniques.

Master of Transportation and Urban Systems (MTUS)

MTUS is a non-thesis degree. However, each student must complete a creative component, which can be a case study, practicum, or paper. In the creative component, a student may develop a case study of a metropolitan region, transit system, or public program. Case studies may include:

1. Comprehensive transportation planning processes in metropolitan areas
2. Urban transit systems or operations
3. Emergency or disaster response case studies or plans
4. Security programs or issues
5. Integrated transportation/environmental plans

The case study must be approved by the student's adviser and should involve transportation and community professionals from federal, state, or local agencies, or private industries. In lieu of a case study, the adviser may approve other activities or outcomes that would comprise the creative component.

A minimum of 30 credits is required for the degree of which 21 must be core courses and 7 credits of electives. A minimum of two (2) credits and a maximum of four (4) credits will be awarded for the creative component.

Certificate in Transportation and Urban Systems

The certificate in Transportation and Urban Systems will consist of a minimum of 9 credits selected from the core courses below. Additional courses may be offered online in the future.

Code	Title	Credits
Core Courses		
TL 751	Transportation Systems Security	3
TL 752	Transportation Planning and Environmental Compliance	3
TL 753	Transportation System Modeling	3
TL 754	Urban Transportation Systems Analysis	3
TL 755	Context Sensitive Solutions	3
TL 756	Transportation and Land Use Integration	3
TL 757	Intelligent Transportation Solutions	3
TL 786	Public Transportation	3
TL 787	Public Transportation II	3
Electives (for M.S. and MTUS)		
TL 711	Logistics Systems	4
TL 721	International Logistics Management	4
TL 723	Advanced Supply-Chain Planning Across the Enterprise	3
TL 729	Adaptive Planning in Logistics Systems	3
TL 731	Logistics Decision Analysis	3
TL 735	Practical Data Analytics	3
TL 789	Leadership, Ethics, and Academic Conduct in Transportation	3
Creative Component (for M.S. and MTUS)		
TL 798	Master's Thesis	
or TL 797	Master's Paper	

Areas of Focus *(for M.S. and MTUS)*

Code	Title	Credits
Spacial Analysis		
GEOG 655	Introduction to Geographic Information Systems	4
GEOG 656	Advanced Geographic Information Systems	3
TL 785	Spatial Analysis in Transportation	3

Code	Title	Credits
Information Systems Technologies		
TL 725	ERP Configuration	3
TL 735	Practical Data Analytics	3

Code	Title	Credits
Enterprise Management		
TL 715	Introduction to ERP	3
TL 727	Organizational Change Management	3

Code	Title	Credits
Transportation Planning		
CE 780	Transportation Planning	3

Code	Title	Credits
Emergency Response and Disaster		
TL 719	Crisis Analysis and Homeland Security	3

Faculty

Raj Bridgelall, Ph.D.
North Dakota State University, 2015
Research Interests: Big Data Analytics, Internet-of-Things (IoT), Cloud Computing; Connected and Autonomous Vehicles (CAV), Shared Mobility, Intelligent Transportation Solutions; Signal processing and mathematical modeling of transportation systems; Remote Sensing with Unmanned Aircraft Systems; Hyperspectral Image Analysis; Radio-frequency identification (RFID); Real-time locating systems (RTLS); Energy Harvesting and massive scale autonomous wireless sensor networks
Department: Transportation and Logistics

Alan Dybing, Ph.D.
North Dakota State University, 2013
Research Interests: Asset management, Energy impacts, Freight transportation, Agricultural transportation, Supply chain management, Transportation economics, Spatial analysis, Transportation systems modeling
Department: Transportation and Logistics

Ranjit Godavarthy, Ph.D.
Kansas State University, 2012
Research Interests: Public transportation in small urban and rural areas, Demand response transit and paratransit research, Bike share research, Roundabouts research, Traffic engineering and operations, Transportation and highway safety
Department: Transportation and Logistics

Jill Hough, Ph.D.
University of California-Davis, 2007
Research Interests: Public transportation in rural and small urban locations, Workforce development, Mobility of the aging, Transportation planning and policy, Intelligent transportation systems
Department: Transportation and Logistics

Michal Jaroszynski, Ph.D.
Florida State University, 2014
Research Interests: Socioeconomic impacts of transportation investments and policies; Travel demand modeling; Transportation funding, finance, and equity; Multimodal transportation systems
Department: Transportation and Logistics

Pan Lu, Ph.D.
North Dakota State University, 2011
Research Interests: Transportation infrastructure management, Freight rail transportation, Multi-mode transportation efficiency, GIS application in transportation, Operations research in transportation, Commercial truck safety, Railway transportation safety, Data mining application in transportation, Transportation resiliency analysis
Department: Transportation and Logistics

Jeremy Mattson, Ph.D.
North Dakota State University, 2017
Research Interests: Public transportation, Transportation economics, Demand modeling, Travel behavior, Built environment
Department: Transportation and Logistics

Diomo Motuba, Ph.D.
North Dakota State University, 2009
Research Interests: Transportation and land use planning, Freight modeling, Transportation economics, Connected automated vehicles, Logistics and supply chain management, Transportation safety
Department: Transportation and Logistics

Joseph Szmerekovsky, Ph.D.
Case Western Reserve University, 2003
Research Interests: Project management and scheduling, Supply chain management and technology, Energy supply chain management, Healthcare logistics
Department: Transportation and Logistics

Denver Tolliver, Ph.D.
Virginia Polytechnic Institute and State University, 1989
Research Interests: Highway systems modeling, Multimodal transportation planning, Freight transportation, Energy and environmental analysis
Department: Transportation and Logistics

Kimberly Vachal, Ph.D.
George Mason University, 2005
Research Interests: Human factors in traffic safety, Healthy community transport, Agricultural and biofuels transportation, CMV safety & security, Containerized and identity preserved grain marketing, Regional economic development
Department: Transportation and Logistics

Admission

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

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

Freshman Admission

Applications for Freshman 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. NDSU reviews the following criteria:

- High School GPA - It is recommended applicants have a cumulative high school grade point average of 2.75 (4.0 scale). Strong consideration is given to grades earned in the high school core courses listed below.
- Test Score(s) - An ACT composite score of 22 or higher or SAT score of 1100 or higher (evidence-based reading and writing + math combined score) is also recommended. If you have not achieved this score, you are strongly encouraged to re-test. The writing component of the ACT is not required.
- High School Core Coursework - Students should complete the following 14 high school core courses:

    4 units of English

    3 units of mathematics (at the level of algebra 1 and above)

    3 units of laboratory science

    3 units of social science

    1 unit from existing core subject area or world language (including foreign languages, Native American languages or American Sign Language)

Students who do not meet these minimum guidelines will still be considered if there is evidence in the student's academic record that demonstrates a high probability of success. Students with higher GPAs and lower test scores, or conversely, lower GPAs and higher test scores will also be given consideration.

NDSU will accept the General Education Development (GED) certificate from applicants 19 or older. For students testing in 2014 or later, a minimum score of 170 must be presented. Applicants with GED scores prior to 2014 must meet prior requirements for successful completion of a GED.

For full procedures, deadlines and to apply for Freshman Admission, follow the Freshman Admission Procedures (https://www.ndsu.edu/admission/how_to_apply) outlined online.

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:

- Fewer than 24 transferrable college credits completed at the time of application - your high school record will be taken into consideration along with your college academic record.
- 24 or more transferrable 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.

In most cases, it is recommended that all applicants present at least a 2.0 GPA in all college course work to be considered for admission. If you have credits from more than one college or university, all credits will be combined to determine the cumulative GPA for admission consideration. When reviewing applications, particular attention is paid to students’ most recent course work and the number of credits completed. If you have in-progress course work at the time of application, all course work must be completed with a 2.0 GPA or above. Students who have been suspended from other institutions will not be considered for admission to NDSU until the suspension has been lifted by that institution or until one year has elapsed.

For full procedures, deadlines and to apply for Transfer Admission, follow the Transfer Admission Procedures (https://www.ndsu.edu/admission/how_to_apply/transfer) outlined online.

International Student Admission

International applicants applying to NDSU must demonstrate academic ability, English proficiency and the ability to finance their education. Students may apply for Freshman, Transfer or Intensive English Language Program Admission.

For full procedures, deadlines, and to apply, follow the steps outlined at on the International Admission (https://www.ndsu.edu/admission/how_to_apply/international) page.

Early Entry Admission

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

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

Early Entry students pay regular tuition and fees.

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. Some courses require ACT scores or AP/IB exam scores as prerequisites prior to registration. Students are required to participate in a brief orientation session with an admission representative following registration. To begin enrollment as an Early Entry student, contact the Office of Admission.

Non-Degree Seeking Student Admission

Special status is reserved for non-degree seeking students who wish to enroll in a limited number of courses at NDSU. Students are permitted to register for up to 15 credits. Interested students must submit an *Application for Admission* to the Office of Admission and pay the $35 nonrefundable application fee. Official transcripts are required if coursework was attempted any time one year prior to application. To take additional courses or become degree-seeking, appropriate high school and/or college transcripts must be submitted to be considered for admission. **Non-degree seeking students are not eligible for financial aid.**

Students currently enrolled at another college or university and planning to take limited coursework at NDSU with intention of transferring NDSU credits to their home institution should follow application procedures for non-degree student status.

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

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.

Readmission Process

Returning students are those who have previously attended NDSU and are returning after a leave of absence of at least one full term, exclusive of summer session. Returning students must have a minimum cumulative GPA of 2.00 in all NDSU and transfer coursework to be considered for readmission. Undergraduate students requesting readmission should begin the reactivation process with the Office of Registration and Records (http://www.ndsu.edu/registrar) at least 30 business days prior to their expected return so that records may be updated to permit further registration. Refer to the Undergraduate Reactivation/Petition for Readmission (https://dmsforms.ndus.edu/iFiller/iFiller.jsp?fref=1de6e037-8d8b-4cbc-a1d3-23c704553423) form for further information. Returning graduate students should contact the Graduate College (https://www.ndsu.edu/gradschool) for information on returning from a leave of absence.

Undergraduate

Advising Resource Center - Undeclared/ Exploratory Students

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 Advising Resource Center (ARC), whose mission is to guide academic exploration, provide academic advising services to undeclared/exploratory students, and support academic and career exploration.

Working one-on-one with an academic advisor in the ARC, students choose one of five Exploratory Areas to guide their academic choices. Exploratory Areas are collections of majors at NDSU that can lead to careers in related fields. The five Exploratory Areas are listed below; for a full list of majors included in each Area, visit the Advising Resource Center (https://www.ndsu.edu/advising_resource_center/exploratory_students/exploratory_areas).

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

ARC staff will confirm a student's choice of Exploratory Area during summer orientation and use it to help build the most appropriate course schedule, incorporating academic interests and goals. Students are encouraged to take 15-16 credits each semester that include general education requirements as well as a course to explore a major of interest. ARC 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.

For further information, contact:
Advising Resource Center (https://www.ndsu.edu/advising_resource_center)
Morrill Hall 112
701-231-7014
ndsu.arc@ndsu.edu

Undergraduate Program Curriculum

Each official university curriculum listed below contains two sets of degree requirements that must be satisfactorily completed: **a)** university-wide requirements (i.e. degree & graduation requirements and general education) and **b)** college or department-level requirements, which include requirements for completing majors, minors and certificates.

A

Accounting (p. 467) (major and minor)

Aerospace Studies (p. 470) (minor)

Agribusiness (p. 471) (major and minor)

Agricultural and Biosystems Engineering (p. 474) (major)

Agricultural Communication (p. 485) (major and minor)

Agricultural Economics (p. 488) (major)

Agricultural Education (p. 490) (major)

Agricultural Systems Management (p. 492) (major and minor)

Animal Science (p. 496) (major and minor)

Anthropology (p. 501) (major and minor)

Apparel, Retail Merchandising and Design (p. 503) (major and minor)

Architecture (p. 508) (major)

Art (p. 511) (major and minor)

Art Education (p. 515) (major)

B

Behavioral Statistics (p. 517) (major)

Biochemistry and Molecular Biology (p. 520) (major and minor)

Biological Sciences (p. 522) (major and minor)

Biological Sciences Education (p. 528) (major)

Biomedical Engineering (p. 530) (minor)

Biotechnology (p. 531) (major and minor)

Botany (p. 534) (minor)

Business Administration (p. 534) (major and minor)

C

Chemistry (p. 538) (major and minor)

Chemistry Education (p. 541) (major)

Civil Engineering (p. 544) (major)

Coatings and Polymeric Materials (p. 547) (minor)

Community Development (p. 547) (minor)

D

E

F

G

H

I

J

L

M

N

P

R

S

Social Science Education (p. 779) (major)

Social Work & Human Development and Family Science (p. 782) Dual Degree Program with Minot State University (major)

Sociology (p. 784) (major and minor)

Soil Science (p. 787) (major and minor)

Spanish (p. 790) (major and minor)

Spanish Education (p. 792) (major)

Spanish Studies (p. 794) (minor)

Sport Management (p. 795) (major)

Statistics (p. 797) (major and minor)

Statistics and Mathematics (p. 693) (major)

Strategic Communication (p. 800) (major and minor)

T

Theatre Arts (p. 802) (major and minor)

Tribal and Indigenous Peoples Studies (p. 811) (minor)

U

University Studies (p. 812) (major)

V

Veterinary Technology (p. 813) (major)

W

Web Design (p. 815) (minor)

Wellness (p. 816) (minor)

Women and Gender Studies (p. 817) (major and minor)

Z

Zoology (p. 820) (minor)

Accounting

Department Information

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

Degree Requirements

Major: Accounting

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

Minimum Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Accounting Requirements

Code	Title	Credits
Pre-College of Business Requirements		
ACCT 200	Elements of Accounting I (Requires a grade of B or better) [2]	3
ACCT 201	Elements of Accounting II (Requires a grade of B or better) [2]	3
COMM 110	Fundamentals of Public Speaking (May satisfy general education category C) [2]	3
ECON 201	Principles of Microeconomics (May satisfy general education category B and G) [2]	3
ECON 202	Principles of Macroeconomics (May satisfy general education category B and G) [2]	3
ENGL 110	College Composition I (May satisfy general education category C) [2]	4
ENGL 120	College Composition II (May satisfy general education category C) [2]	3
PHIL 216	Business Ethics (May satisfy general education category A) [2]	3
PSYC 111	Introduction to Psychology (May satisfy general education category B) [2]	3
or SOC 110	Introduction to Sociology	
MIS 116	Business Use of Computers (May satisfy general education category S) [2]	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
STAT 331	Regression Analysis [2]	2
MATH 144	Mathematics for Business [2]	4

Accounting Major Requirements [3]		
ENGL 320	Business and Professional Writing (May satisfy general education category C)	3
FIN 320	Principles of Finance [1]	3
MGMT 320	Foundations of Management [1]	3
MRKT 320	Foundations of Marketing [1]	3
BUSN 430	Legal and Social Environment of Business [1]	3
BUSN 489	Strategic Management (Capstone Course) [1]	3
MIS 320	Management Information Systems [1]	3
ACCT 311	Intermediate Accounting I (requires a grade of C or better)	4
ACCT 312	Intermediate Accounting II	4
ACCT 318	Taxation in Management Decisions	3
or ACCT 418	Tax Accounting I	
ACCT 320	Cost Management Systems	3
ACCT 420	Accounting Information Systems	3
ACCT 421	Auditing I	3
ACCT 300-400	Accounting Elective	3
300-400 Level Courses: Any course in BUSN, FIN, MIS, MGMT, MRKT, or ECON 324; includes courses cross-listed with CoB courses; excludes LEAD prefix courses and BUSN 318. Courses numbered 394/494 require departmental approval. [3]		9
Accounting Practicum		3
Students must complete one of the following options:		
ACCT 397	Fe/Coop Ed/Internship	
ACCT 413	Accounting Internship	
AGEC 371	Export Management	
UNIV 492	Study Abroad	
Total Credits		96

1 Denotes Common Body of Knowledge (CBK) course.

2 Pre-college and pre-accounting major courses. A grade of 'C' or better for pre-college and pre-accounting major courses is required for admission into the Accounting major. The only exception is ACCT 200 Elements of Accounting I and ACCT 201 Elements of Accounting II, which require grades of 'B' or better.

3 Students must earn a grade of 'C' or better, and have a minimum 2.5 cumulative GPA, in ALL courses included in the professional program (i.e., all required courses, elective requirements, and additional 300-400 level CoB electives or breadth electives).

Degree Requirements and Notes

- Students follow the published curricula for the accounting program of study from the semester/year of entrance in the College of Business to graduation provided enrollment at NDSU has not been discontinued for more than one year. Students who change their major are subject to meeting the curricular requirements in effect at the time the new major is declared.
- Business courses from programs that do not hold AACSB International accreditation cannot be used for major or minor requirements in the College of Business (CoB); such courses may be eligible for use as free electives.
- The CoB accepts a maximum of nine credits of non-NDSU 300-400 level business courses from AACSB programs with approval of the department.
- Admission into the Accounting Major: Students must earn a 'B' or better in ACCT 200 Elements of Accounting I and ACCT 201 Elements of Accounting II, a 'C' or better in the pre-college and pre-accounting major courses that are indicated with an asterisk (*), achieve junior standing (60 credits), and earn a 2.50 institutional cumulative grade point average. Students must submit an online application to the CoB.
- Admission to the Accounting major is required to enroll in advanced 300- 400 level CoB courses.
- A grade of 'C' or better is required in transfer courses accepted for all 300-400 level accounting, business administration, finance, management, management information systems, and marketing courses.
- A 2.50 cumulative GPA is required to enroll in 300-400 level CoB courses.
- A letter grade must be earned in any course that fulfills a major requirement (with the exception of some practicum options and BUSN 301).
- Students must earn a 2.50 institutional GPA to graduate.
- Students must be accepted to the accounting major prior to the completion of the last 30 credits in 300 and 400 level CoB courses.
- Of the credits completed in residence at least 30 credits must be in 300-400 level CoB courses.
- A Business Administration minor is NOT offered with this major.
- For multiple majors within the CoB, at least 15 unique credits of 300-400 level CoB courses must exist between the majors.

- Prerequisite for Accounting Practicum: ACCT 311 with a grade of C or better.
- Students should refer to www.ndsu.edu/business for current and complete listing of the major requirements.

Minor: Accounting

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
300-400 Level Courses		6
Courses may be chosen from any 300-400 level accounting course with the exception of ACCT 397 and ACCT 413.		
Total Credits		19

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

Minor Requirements and Notes

- Students should refer to the College of Business (https://www.ndsu.edu/business) for information on declaring the minor.
- To be accepted into the minor program, students must have a 2.50 institutional cumulative GPA and at least junior standing (60 credits).
- To complete a minor, students must earn at least a 2.50 GPA that is based on the courses used to satisfy the minor requirements. Courses may not be taken pass/fail. Students must also earn a grade of 'C' or better in all courses required for the minor; the only exception is ACCT 200 and ACCT 201, which require grades of 'B' or better.
- If the cumulative GPA falls below the 2.50 after acceptance into the program, the student will not be allowed to register for the College of Business courses until the cumulative GPA returns to 2.50 or above.
- Students are subject to the minor requirements in effect during the year in which the minor was approved.
- Minors must satisfy all course prerequisites.
- Approval for a minor does not guarantee enrollment in specific courses.

Aerospace Studies

Department Information

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

Minor: Aerospace Studies

Required Credits: 16

Minor Requirements

Code	Title	Credits
Required General Military Courses (Year 1-2)		
AS 111	The Air Force Today I	1
AS 112	The Air Force Today II	1
AS 210	Leadership Laboratory (Freshman/Sophomore take every semester)	0
AS 211	Evolution of USAF Air and Space Power I	1

AS 212	Evolution of USAF Air and Space Power II	1
Required Professional Office Courses (Years 3-4)		
AS 321	Air Force Leadership Management I	3
AS 322	Air Force Leadership Management II	3
AS 410	Leadership Laboratory (Juniors/Seniors take every semester)	0
AS 441	Preparation For Active Duty I	3
AS 442	Preparation for Active Duty II	3
Total Credits		16

Minor Requirements and Notes

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

Agribusiness

Department Information

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

Degree Requirements

Major: Agribusiness

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

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Quantitative Reasoning (R) †		3
Science and Technology (S) †		10
Humanities and Fine Arts (A) †		6

Social and Behavioral Sciences (B) †	6
Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Core Courses for Agribusiness:		
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
AGEC 246	Introduction to Agricultural Finance	3
AGEC 339	Quantitative Methods & Decision Making	3
AGEC 344	Agricultural Price Analysis	3
AGEC 346	Applied Risk Analysis	3
AGEC 397	Fe/Coop Ed/Internship	1-3
AGEC 445	Agribusiness Industrial Strategy (capstone)	3
ECON 201	Principles of Microeconomics (May satisfy general education category B)	3
ECON 202	Principles of Macroeconomics (May satisfy general education category B)	3
ECON 341	Intermediate Microeconomics	3
ECON 343	Intermediate Macroeconomics	3
Accounting:		
ACCT 200	Elements of Accounting I	3
ACCT 201	Elements of Accounting II	3
Agriculture Science & Technology:		9
Complete nine (9) credits from two (2) areas in the College of AFSNR other than Agribusiness & Applied Economics. (Includes: ASM, ANSC, ABEN, CFS, ENT, MICR, NRM, PPTH, PLSC, RNG, SOIL & VETS.) EXCEPTION - All 9 credits may be in the same area if a student completes a minor from within the College of AFSNR.		
Areas of Specialization: Select one of the Areas of Specialization listed below.		6
Additional Requirements for Agribusiness		
AGRI 150	Agriculture Orientation	1
ECON 189	Skills for Academic Success	1
MIS 116	Business Use of Computers (May satisfy general education category S)	3
Communication Requirement: Select one of the following:		3
COMM 212	Interpersonal Communication	
COMM 216	Intercultural Communication (Gen Ed B/D)	
COMM 308	Business and Professional Speaking	
COMM 315	Small Group Communication	
COMM 383	Organizational Communication I	
Math Requirement:		
MATH 144	Mathematics for Business (or any higher math)	4
STAT 330	Introductory Statistics (May satisfy general education category R)	3
STAT 331	Regression Analysis	2 or 3
or ECON 410	Econometrics	
Minor Requirement		19-24

In addition to the requirements for the major in Agribusiness, students must complete a minor in Accounting (19 cr) or Business Administration (24 cr).

Total Credits	91-99

Areas of Specialization: Select one

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

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

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

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

Degree Requirements and Notes

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

Minor Requirements

Agribusiness Minor

Minor Requirements

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: A minimum of 9 credits from the following:		9
ECON 341	Intermediate Microeconomics	
AGEC	Any AGEC prefix courses numbered 242 or higher (excluding AGEC 397 and AGEC 496)	
Total Credits		18

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a minimum 2.00 GPA for the minor requirements.
- Minor requirements are to be met with didactic courses only.

Agricultural and Biosystems Engineering

Department Information

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

Major Requirements

Major: Agricultural & Biosystems Engineering
Option: Agricultural

Degree Type: B.S.A.B.En
Minimum Degree Credits to Graduate: 133

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements - Agricultural Option

Code	Title	Credits
ABEN Core Courses:		
ABEN 110	Introduction to Agricultural and Biosystems Engineering	3
ABEN 255	Computer Aided Analysis & Design	3
ABEN 263	Biological Materials Processing	3
ABEN 377	Numerical Modeling in Agricultural and Biosystems Engineering	3
ABEN 482	Instrumentation & Measurements	3
ABEN 486	Design Project I	2
ABEN 487	Design Project II	2
ABEN 491	Seminar	1
ABEN 496	Field Experience	1
ABEN 300-400 Electives: Select 9 credits from the following:		9
ABEN 358	Electric Energy Application in Agriculture	
ABEN 383	Structural Design for Biosystems	
ABEN 444	Transport Processes	
ABEN 450	Bioprocess Engineering	
ABEN 452	Bioenvironmental Systems Design	
ABEN 456	Biobased Energy	
ABEN 458	Process Engineering for Food, Biofuels and Bioproducts	
ABEN 464	Resource Conservation and Irrigation Engineering	
ABEN 473	Agricultural Power	
ABEN 478	Machinery Analysis & Design	
ABEN 479	Fluid Power Systems Design	
ABEN 484	Drainage and Wetland Engineering	
MATH 128	Introduction to Linear Algebra	1
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
ME 212	Fundamentals of Visual Communication for Engineers	3
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 223	Mechanics of Materials	3
ME 350	Thermodynamics and Heat Transfer	3
CE 309	Fluid Mechanics	3
or ME 352	Fluid Dynamics	
CHEM 121	General Chemistry I (May satisfy general education category S)	3

CHEM 122	General Chemistry II (May satisfy general education category S)	3
ECE 301	Electrical Engineering I	3
Select one from the following:		3
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
ENGR 402	Engineering Ethics and Social Responsibility	1
IME 440	Engineering Economy	2
IME 460	Evaluation of Engineering Data	3
or STAT 330	Introductory Statistics	
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
Program Electives:		23
Select the following program electives in each category from courses listed in the corresponding Program Electives Tab. Minimum credit in each category below will apply. A minimum of 9 Adv. Bioscience credits (at least 3 credits non-ABEN) are required as part of these 23 program electives.		
Computer Electives	Select a minimum of 3 credits from the Program Electives Tab.	
Business or Communication Elective	Select a minimum of 3 credits from the following prefix options: BUSN, COMM, ACCT, AGEC, ECON, MGT, MIS, MRKT [2]	
Chemistry/Biological Science Electives	Select a minimum of 9 credits from the Program Electives Tab.	
Technical Electives	Select a minimum of 8 credits from the Program Electives Tab.	
Total Credits		109

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

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

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

Degree Requirements and Notes

A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.

Major Requirements

Major: Agricultural & Biosystems Engineering
Option: Biosystems

Degree Type: B.S.A.B.En
Minimum Degree Credits to Graduate: 133

University Degree Requirements

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

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

7. At least 36 credits must be NDSU resident credits. Residence credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements - Biosystems Option

Code	Title	Credits
ABEN Core Requirements:		
ABEN 110	Introduction to Agricultural and Biosystems Engineering	3
ABEN 255	Computer Aided Analysis & Design	3
ABEN 263	Biological Materials Processing	3
ABEN 444	Transport Processes	3
ABEN 482	Instrumentation & Measurements	3
ABEN 486	Design Project I	2
ABEN 487	Design Project II	2
ABEN 491	Seminar	1
ABEN 496	Field Experience	1
ABEN 300-400 Electives: Select 9 credits form the following:		9
ABEN 358	Electric Energy Application in Agriculture	
ABEN 377	Numerical Modeling in Agricultural and Biosystems Engineering	
ABEN 450	Bioprocess Engineering	
ABEN 452	Bioenvironmental Systems Design	
ABEN 456	Biobased Energy	
ABEN 458	Process Engineering for Food, Biofuels and Bioproducts	
ABEN 464	Resource Conservation and Irrigation Engineering	
ABEN 473	Agricultural Power	
ABEN 478	Machinery Analysis & Design	
ABEN/ME 479	Fluid Power Systems Design	
ABEN 484	Drainage and Wetland Engineering	
MATH 128	Introduction to Linear Algebra	1

MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 350	Thermodynamics and Heat Transfer	3
BIOL 150	General Biology I	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory (May satisfy general education category S)	4
CHEM 240	Survey of Organic Chemistry	3
CE 309	Fluid Mechanics	3
Select one from the following:		3
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
ENGR 402	Engineering Ethics and Social Responsibility	1
IME 440	Engineering Economy	2
IME 460	Evaluation of Engineering Data	3
or STAT 330	Introductory Statistics	
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
Program Electives:		24
Select the following program electives in each category from courses listed in the corresponding Program Electives Tab. Minimum credit in each category below will apply. A minimum of 9 Adv. Bioscience credits (at least 3 credits non-ABEN) are required as part of these 24 program electives.		
Engineering Electives	Select a minimum of 9 credits from the Program Electives Tab.	
Chemistry/Biological Science Electives	Select a minimum of 6 credits from the Program Electives Tab.	
Technical Electives	Select a minimum of 6 elective courses from the Program Electives Tab.	
Computer Elective	Select a minimum of 3 credits from the Program Electives Tab.	
Total Credits		109

Degree Requirements and Notes

A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.

Program Electives for the Agricultural and Biosystems Engineering - Agricultural Option

Code	Title	Credits
Computer Electives: Select one course from the following:		3
CE 212	Civil Engineering Graphic Communications	
CSCI 122	Visual BASIC	
CSCI 160	Computer Science I	
ECE 173	Introduction to Computing	
GEOG 105	Fundamentals of Geographic Information Systems	
GEOG 455	Introduction to Geographic Information Systems	
IME 380	CAD/CAM for Manufacturing	
ME 213	Modeling of Engineering Systems	

Code	Title	Credits
Business or Communication Electives: Choose one of the following courses or a course from the following prefix options:		3
BUSN, COMM, ACCT, AGEC, ECON, MGT, MIS, MRKT (The course used for this elective cannot double-count as General Education)		
ACCT 102	Fundamentals of Accounting	
ACCT 200	Elements of Accounting I	
AGEC 242	Introduction to Agricultural Management	
AGEC 244	Agricultural Marketing	
AGEC 246	Introduction to Agricultural Finance	
COMM 212	Interpersonal Communication	
COMM 214	Persuasive Speaking	
COMM 216	Intercultural Communication	
COMM 260	Introduction to Web Design	
ECON 201	Principles of Microeconomics	
ECON 202	Principles of Macroeconomics	
MRKT 301	Marketing for Non-Business Majors	

Code	Title	Credits
Chemistry/Biological/Environmental Science Electives: Select 9 credits from the following:		9
ASM 264	Natural Resource Management Systems	
ANSC 220	Livestock Production	
BIOL 111	Concepts of Biology	
BIOL 111L	Concepts of Biology Lab	
BIOL 124	Environmental Science	
BIOL 124L	Environmental Science Laboratory	
BIOL 150	General Biology I	
BIOL 150L	General Biology I Laboratory	
BIOL 151	General Biology II	
BIOL 151L	General Biology II Laboratory	
CFS 210	Introduction to Food Science and Technology	
CFS 370	Food Processing I	
CFS 450	Cereal Technology	
CHEM 121L	General Chemistry I Laboratory	
CHEM 122L	General Chemistry II Laboratory	
CHEM 240	Survey of Organic Chemistry	
ENT 210	Insects, Humans and the Environment	
MICR 202	Introductory Microbiology	
MICR 202L	Introductory Microbiology Lab	
MICR 350	General Microbiology	
MICR 350L	General Microbiology Lab	
NRM 322	Environmental Law and Policy	
PLSC 110	World Food Crops	
PLSC 215	Weed Identification	
PLSC 225	Principles of Crop Production	
PLSC 315	Genetics	
PLSC 320	Principles of Forage Production	
PLSC 323	Principles of Weed Science	
PLSC 335	Seed Technology & Production	
RNG 225	Natural Resource & Agro-Ecosystems	
SOIL 210	Introduction to Soil Science	
SOIL 217	Introduction to Meteorology & Climatology	
SOIL 410	Soils and Land Use	

Code	Title	Credits
Technical Electives: May choose from the ABEN section, Chemistry/Biological Science electives, Computer electives, or the Engineering electives listed below:		8
ABEN 496 - Ag Tech Expo (1 add'l cr.) may be used as a Technical Elective. ABEN 496 - Field Exp./Internship, 1 cr., may be used as an ABEN Elective or as a Technical Elective. A maximum of two credits of ABEN 496 FE/Internship may be counted towards degree requirements.		
ASM 323	Post-Harvest Technology	
ASM 373	Tractors & Power Units	
ASM 374	Power Units Laboratory	
ASM 378	Machinery Principles and Management	
ASM 429	Hydraulic Power Principles and Applications	
ASM 454	Principles and Application of Precision Agriculture	
CE 204	Surveying	
CE 310	Fluid Mechanics Laboratory	
CE 343	Structural Engineering and Analysis	
CE 370	Introduction to Environmental Engineering	
CE 371	Environmental Engineering Laboratory	
CE 404	Reinforced Concrete	
CE 408	Water Resources and Supply	
CE 410	Water and Wastewater Engineering	
CE 421	Open Channel Flow	
CE 473	Air Pollution	
CE 477	Applied Hydrology	
CE 478	Water Quality Management	
CE 479	Advanced Water and Wastewater Treatment	
CE 483	Contracts and Specifications	
ECE 275	Digital Design	
ECE 303	Electrical Engineering II	
ECE 376	Embedded Systems	
GEOG 455	Introduction to Geographic Information Systems	
GEOG 456	Advanced Geographic Information Systems	
IME 330	Manufacturing Processes	
IME 335	Welding Technology	
IME 380	CAD/CAM for Manufacturing	
IME 430	Process Engineering	
IME 431	Production Engineering	
IME 450	Systems Engineering and Management	
IME 455	Management of People Systems	
IME 456	Program and Project Management	
IME 461	Quality Assurance and Control	
ME 331	Materials Science and Engineering	
ME 353	Thermodynamics II	
ME 421	Theory of Vibrations	
ME 442	Machine Design I	
ME 454	Heat and Mass Transfer	
ME 471	Experimental Stress Analysis	
ME 473	Engineering with Polymeric Materials	
ME 474	Mechanics of Composite Materials	
ME 475	Automatic Controls	
ME 487	Internal Combustion Engines	
RNG 326	Modeling of Range and Agro-Ecosystems	
STAT 461	Applied Regression Models	

STAT 462	Introduction to Experimental Design	
Total Credits		8

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

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

Code	Title	Credits
AGRICULTURAL SYSTEMS		
ABEN 358	Electric Energy Application in Agriculture	
ABEN 383	Structural Design for Biosystems	
ABEN 444	Transport Processes	
ABEN 452	Bioenvironmental Systems Design	
ABEN 456	Biobased Energy	
ABEN 458	Process Engineering for Food, Biofuels and Bioproducts	
ABEN 464	Resource Conservation and Irrigation Engineering	
ABEN 473	Agricultural Power	
ABEN 478	Machinery Analysis & Design	
ABEN 479	Fluid Power Systems Design	
ASM 323	Post-Harvest Technology	
ASM 373	Tractors & Power Units	
ASM 374	Power Units Laboratory	
ASM 378	Machinery Principles and Management	
ASM 429	Hydraulic Power Principles and Applications	
ASM 454	Principles and Application of Precision Agriculture	
CE 343	Structural Engineering and Analysis	
CE 404	Reinforced Concrete	
ECE 275	Digital Design	
ECE 303	Electrical Engineering II	
ECE 376	Embedded Systems	
GEOG 455	Introduction to Geographic Information Systems	
GEOG 456	Advanced Geographic Information Systems	
IME 330	Manufacturing Processes	
IME 335	Welding Technology	
IME 380	CAD/CAM for Manufacturing	
IME 430	Process Engineering	
IME 431	Production Engineering	
IME 450	Systems Engineering and Management	
IME 455	Management of People Systems	
IME 456	Program and Project Management	
IME 461	Quality Assurance and Control	
ME 331	Materials Science and Engineering	
ME 353	Thermodynamics II	
ME 421	Theory of Vibrations	
ME 442	Machine Design I	
ME 454	Heat and Mass Transfer	
ME 471	Experimental Stress Analysis	

ME 473	Engineering with Polymeric Materials
ME 474	Mechanics of Composite Materials
ME 475	Automatic Controls
ME 487	Internal Combustion Engines
ENVIRONMENTAL SYSTEMS	
ABEN 358	Electric Energy Application in Agriculture
ABEN 444	Transport Processes
ABEN 452	Bioenvironmental Systems Design
ABEN 456	Biobased Energy
ABEN 464	Resource Conservation and Irrigation Engineering
ABEN 479	Fluid Power Systems Design
ABEN 484	Drainage and Wetland Engineering
ASM 454	Principles and Application of Precision Agriculture
CE 204	Surveying
CE 370	Introduction to Environmental Engineering
CE 371	Environmental Engineering Laboratory
CE 408	Water Resources and Supply
CE 410	Water and Wastewater Engineering
CE 421	Open Channel Flow
CE 473	Air Pollution
CE 477	Applied Hydrology
CE 478	Water Quality Management
CE 479	Advanced Water and Wastewater Treatment
CE 483	Contracts and Specifications
CHEM 240	Survey of Organic Chemistry
CHEM 341	Organic Chemistry I
CHEM 341L	Organic Chemistry I Laboratory
ECE 303	Electrical Engineering II
ME 454	Heat and Mass Transfer
MICR 350	General Microbiology
RNG 326	Modeling of Range and Agro-Ecosystems
SOIL 210	Introduction to Soil Science
SOIL 410	Soils and Land Use
BIOMATERIALS SYSTEMS	
ABEN 358	Electric Energy Application in Agriculture
ABEN 444	Transport Processes
ABEN 452	Bioenvironmental Systems Design
ABEN 456	Biobased Energy
ABEN 458	Process Engineering for Food, Biofuels and Bioproducts
ABEN 479	Fluid Power Systems Design
ABEN 479	Fluid Power Systems Design
ABEN 484	Drainage and Wetland Engineering
BIOC 460	Foundations of Biochemistry and Molecular Biology I
BIOC 460L	Foundations of Biochemistry I Laboratory
CFS 210	Introduction to Food Science and Technology
CFS 430	Food Unit Operations
CFS 450	Cereal Technology
CFS 470	Food Processing II
CFS 471	Food Processing Laboratory
CHEM 240	Survey of Organic Chemistry
CHEM 341	Organic Chemistry I
CHEM 341L	Organic Chemistry I Laboratory

CHEM 342	Organic Chemistry II
ECE 303	Electrical Engineering II
IME 450	Systems Engineering and Management
IME 460	Evaluation of Engineering Data
IME 461	Quality Assurance and Control
ME 331	Materials Science and Engineering
ME 442	Machine Design I
ME 454	Heat and Mass Transfer
MICR 350	General Microbiology

Code	Title	Credits
Advanced Biosciences Electives - 9 credits required. Students may double count with other program electives. A minimum of 3 credits must be from non-ABEN prefix courses in the Advanced Biosciences tab.		
ABEN Courses (Eligible for Adv. Biosci.)		
ABEN 444	Transport Processes	
ABEN 452	Bioenvironmental Systems Design	
ABEN 456	Biobased Energy	
ABEN 458	Process Engineering for Food, Biofuels and Bioproducts	
ABEN 464	Resource Conservation and Irrigation Engineering	
ABEN 484	Drainage and Wetland Engineering	
SOIL Courses		
SOIL 322	Soil Fertility and Fertilizers	
SOIL 351	Soil Ecology	
SOIL 410	Soils and Land Use	
SOIL 444	Soil Genesis and Survey	
SOIL 465	Soil And Plant Analysis	
PLSC Courses		
PLSC 320	Principles of Forage Production	
PLSC 335	Seed Technology & Production	
PLSC 350	Sugarbeet Production	
PLSC 411	Genomics	
PLSC 431	Intermediate Genetics	
Additional Course Options		
BIOL 364	General Ecology	
ANSC 357	Animal Genetics	
RNG 452	Geographic Information Systems in Range Survey	

Code	Title	Credits
Engineering Electives: Select 9 credits from the following:		9
CE 310	Fluid Mechanics Laboratory	
CE 370	Introduction to Environmental Engineering	
CE 371	Environmental Engineering Laboratory	
ECE 301	Electrical Engineering I	
ME 223	Mechanics of Materials	
ME 331	Materials Science and Engineering	
Chemistry/Biological Science Electives: Select 6 credits from the following:		6
ANSC 357	Animal Genetics	
ANSC 463	Physiology of Reproduction	
BIOC 260	Elements of Biochemistry	
BIOC 461	Foundations of Biochemistry and Molecular Biology II	
BIOC 473	Methods of Biochemical Research	
BIOC 474	Methods of Recombinant DNA Technology	
BIOL 150L	General Biology I Laboratory	

BIOL 151	General Biology II	
BIOL 151L	General Biology II Laboratory	
BIOL 220	Human Anatomy and Physiology I	
BIOL 315	Genetics	
BIOL 315L	Genetics Laboratory	
BIOL 364	General Ecology	
CFS 210	Introduction to Food Science and Technology	
CFS 370	Food Processing I	
CFS 450	Cereal Technology	
CHEM 341	Organic Chemistry I	
CHEM 341L	Organic Chemistry I Laboratory	
CHEM 342	Organic Chemistry II	
CHEM 342L	Organic Chemistry II Laboratory	
MICR 202	Introductory Microbiology	
MICR 202L	Introductory Microbiology Lab	
MICR 350	General Microbiology	
MICR 350L	General Microbiology Lab	
MICR 352	General Microbiology II	
MICR 352L	General Microbiology Lab II	
MICR 452	Microbial Ecology	
Technical Electives: Select 6 credits from ABEN Electives, Engineering Electives, Chem/Bio Electives, or Computer Electives.		6
ABEN 496 - Ag Tech Expo (1 add'l cr.) may be used as a Technical Elective. ABEN 496 - Field Exp./Internship, 1 cr., may be used as an ABEN Elective or as a Technical Elective. A maximum of two credits of ABEN 496 FE/Internship may be counted towards degree requirements.		
Computer Elective: Select 3 credits from the following:		3
CE 212	Civil Engineering Graphic Communications	
CSCI 122	Visual BASIC	
CSCI 160	Computer Science I	
ECE 173	Introduction to Computing	
GEOG 455	Introduction to Geographic Information Systems	
IME 380	CAD/CAM for Manufacturing	
ME 212	Fundamentals of Visual Communication for Engineers	
ME 213	Modeling of Engineering Systems	
Total Credits		24

Code	Title	Credits
Advanced Biosciences Electives - 9 credits required. Students may double count with other program electives. A minimum of 3 credits must be from non-ABEN prefix courses in the Advanced Biosciences tab.		
ABEN Courses (Eligible for Adv. Biosci.)		
ABEN 444	Transport Processes	
ABEN 452	Bioenvironmental Systems Design	
ABEN 456	Biobased Energy	
ABEN 458	Process Engineering for Food, Biofuels and Bioproducts	
ABEN 464	Resource Conservation and Irrigation Engineering	
ABEN 484	Drainage and Wetland Engineering	
Engineering Electives (Eligible for Adv. Biosci.)		
CE 370	Introduction to Environmental Engineering	
CE 371	Environmental Engineering Laboratory	
CHEM/BIO Electives (Eligible for Adv. Biosci.)		
ANSC 357	Animal Genetics	
BIOC 260	Elements of Biochemistry	
BIOC 473	Methods of Biochemical Research	
BIOC 474	Methods of Recombinant DNA Technology	
BIOL 364	General Ecology	

CHEM 240	Survey of Organic Chemistry
CHEM 341	Organic Chemistry I
CHEM 341L	Organic Chemistry I Laboratory
CHEM 342	Organic Chemistry II
CHEM 342L	Organic Chemistry II Laboratory
MICR 350	General Microbiology
MICR 350L	General Microbiology Lab
MICR 352	General Microbiology II
MICR 352L	General Microbiology Lab II
MICR 452	Microbial Ecology

Agricultural Communication

Department Information

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

Major Requirements

Major: Agricultural Communication

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Quantitative Reasoning (R) †		3
Science and Technology (S) †		10
Humanities and Fine Arts (A) †		6
Social and Behavioral Sciences (B) †		6

Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major Requirements

Code	Title	Credits
Pre-Communication Requirements		
Students must complete the following 19 credits of coursework with a minimum GPA of 3.0 to be admitted to the professional major.		
ENGL 120	College Composition II	3
COMM 110	Fundamentals of Public Speaking	3
COMM 112	Understanding Media and Social Change	3
COMM 114	Human Communication	3
COMM 189	Skills for Academic Success	1
COMM 212	Interpersonal Communication	3
COMM 220	Persuasion	3
Professional Agricultural Communication Major		
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
Electives:		15
AGEC 242	Introduction to Agricultural Management	
AGEC 244	Agricultural Marketing	
AGEC 350	Agrisales	
COMM 216	Intercultural Communication	
COMM 245	Principles of Broadcast Production	
COMM 308	Business and Professional Speaking	
COMM 313	Editorial Processes	
COMM 330	Photography for the Media	
COMM 375	Principles of Strategic Communication	
COMM 445	Advanced Broadcast Production	
COMM 450	Issues in Communication	
COMM 470	Research for Strategic Communication	
COMM 485	Risk and Crisis Communication	
CFS 200	Introduction to Food Systems	
EMGT 101	Emergencies, Disasters, and Catastrophes	
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 323	Creative Writing	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 357	Visual Culture and Language	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Minor Requirement:		16
Students are required to minor in Animal Science, Crop and Weed Science, Equine Science, Food Safety, Natural Resource Management, Range Science, or Soil Science.		
Total Credits		77

Minor Notes:

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

Minor Requirements

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	Principles of Broadcast Production	
COMM 308	Business and Professional Speaking	
COMM 310	Advanced Media Writing	
COMM 313	Editorial Processes	
COMM 330	Photography for the Media	
COMM 362	Principles of Design For Media	
COMM 375	Principles of Strategic Communication	
COMM 465	Convergence Media	

COMM 470	Research for Strategic Communication	
COMM 485	Risk and Crisis Communication	
Total Credits		21

Minor Requirements and Notes

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

Agricultural Economics

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-7441
- **Department Web Site:**
  www.ag.ndsu.edu/agecon
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/agricultural-economics/#planofstudytext

Major Requirements

Major: Agricultural Economics

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Core Courses for Agricultural Economics		
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
AGEC 246	Introduction to Agricultural Finance	3
AGEC 339	Quantitative Methods & Decision Making	3
AGEC 375	Applied Agricultural Law	3
or AGEC 484	Agricultural Policy	
Select one of the following:		3
AGEC 342	Farm and Agribusiness Management II	
AGEC 344	Agricultural Price Analysis	
AGEC 346	Applied Risk Analysis	
Agribusiness & Applied Economics Electives: A minimum of 9 credits of 300-400 AGEC or ECON electives		9
Agriculture Science & Technology:		9
Complete nine (9) credits from two (2) areas in the College of AFSNR other than Agribusiness & Applied Economics. (Includes: ASM, ANSC, ABEN, CFS, ENT, MICR, NRM, PPTH, PLSC, RNG, SOIL & VETS.) EXCEPTION - All 9 credits may be in the same area if a student completes a minor from the College of AFSNR.		
Capstone Experience: Select one of the following: [1]		3
AGEC 420	Integrated Farm and Ranch Management	
AGEC 444	Commodity Trading	
AGEC 445	Agribusiness Industrial Strategy	
AGEC 446	Agribusiness Finance	
Support Area:		
ECON 201	Principles of Microeconomics (May satisfy general education category B)	3
ECON 202	Principles of Macroeconomics (May satisfy general education category B)	3
ECON 341	Intermediate Microeconomics	3
ECON 343	Intermediate Macroeconomics	3
Select one of the following:		3-6
ACCT 102	Fundamentals of Accounting	
ACCT 200 & ACCT 201	Elements of Accounting I and Elements of Accounting II	
Additional Requirements for Ag Econ		
AGRI 150	Agriculture Orientation (Students transferring in 24 or more credits do not need to take 150.)	1
ECON 189	Skills for Academic Success	1
MIS 116	Business Use of Computers	3
Select one communication course from the following:		3
COMM 212	Interpersonal Communication	
COMM 216	Intercultural Communication (Gen Ed B/D)	
COMM 308	Business and Professional Speaking	
COMM 315	Small Group Communication	
COMM 383	Organizational Communication I	
MATH 144	Mathematics for Business (or any higher math)	4
STAT 330	Introductory Statistics (May satisfy general education category R)	3

STAT 331	Regression Analysis	2-3
or ECON 410	Econometrics	
Total Credits		71-75

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

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

Degree Requirements and Notes

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

Agricultural Education

Department Information

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

Major Requirements

Major: Agriculture Education

Degree Type: B.S.
Required Degree Credits to Graduate: 130

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Quantitative Reasoning (R) †		3
Science and Technology (S) †		10
Humanities and Fine Arts (A) †		6

Social and Behavioral Sciences (B) †	6
Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

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

Code	Title	Credits
Agriculture Education Requirements		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 315L	Genetics Laboratory	1
ECON 201	Principles of Microeconomics (May satisfy general education category B and G)	3
ECON 202	Principles of Macroeconomics (May satisfy general education category B)	3
ENGL 358	Writing in the Humanities and Social Sciences (May satisfy general education category C)	3
PLSC 110	World Food Crops (May satisfy general education category S)	3
PLSC 315	Genetics (May satisfy general education category S)	3
Select one of the following:		4
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab (May satisfy general education category S)	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	
Teaching Specialty Requirements		
AGEC 242	Introduction to Agricultural Management	3
AGEC	Electives	6
ASM 125	Fabrication & Construction Technology	3
ASM	Engineering Electives	6
IME 335	Welding Technology	3
ANSC 114	Introduction to Animal Sciences	3
ANSC 223	Introduction to Animal Nutrition	2
ANSC	Animal Science Electives	6
PLSC 210	Horticulture Science	3
PLSC 211	Horticulture Science Lab	1
SOIL 210	Introduction to Soil Science	3
PLSC or SOIL	Plant Science or Soil Science Elective	3
Agriculture Elective		3
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
H&CE 232	Philosophy and Policy	3
H&CE 444	Planning the Community Program in Agricultural Education	3
H&CE 480	Science, Technology, Engineering & Mathematics Teaching Methods in Agricultural Education	3

H&CE 481	Methods of Teaching Agriculture	3
H&CE 483	Student Teaching Seminar	1
H&CE 487	Student Teaching	9
H&CE 488	Applied Student Teaching	3
Total Credits		109

Degree Requirements and Notes

- A grade of 'C' or better is required in all Professional Education Requirement courses.
- A GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- Courses taken P/F may not be used to satisfy any requirements.
- See School of Education (https://www.ndsu.edu/education) for admission requirements.

Agricultural Systems Management

Department Information

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

Major Requirements

Major: Agricultural Systems Management

Degree Type: B.S.
Minimum Degree Credits to Graduate: 127

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		

Quantitative Reasoning (R) †	3
Science and Technology (S) †	10
Humanities and Fine Arts (A) †	6
Social and Behavioral Sciences (B) †	6
Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

ASM Major Requirements

Students must maintain a 2.25 GPA in ASM prefix courses.

Code	Title	Credits
Agricultural Systems Management Core Requirements		
ASM 115	Fundamentals of Agricultural Systems Management (Students transferring in or changing major to ASM with 32+ credits do not need to take ASM 115)	3
ASM 125	Fabrication & Construction Technology (Students transferring in or changing major to ASM with 32+ credits do not need to take ASM 125)	3
ASM 225	Computer Applications in Agricultural Systems Management	3
ASM 264	Natural Resource Management Systems	3
ASM 264L	Natural Resource Management Systems Laboratory	1
ASM 323	Post-Harvest Technology	3
ASM 354	Electricity and Electronic Applications	3
ASM 373	Tractors & Power Units	3
ASM 374	Power Units Laboratory	1
ASM 378	Machinery Principles and Management	3
ASM 429	Hydraulic Power Principles and Applications	3
ASM 454	Principles and Application of Precision Agriculture	3
ASM 475	Management of Agricultural Systems (Capstone Course)	2
ASM 491	Seminar	1
ASM 496	Field Experience (Expo)	1
Supporting Courses		
ABEN 189	Skills for Academic Success [1]	1
CHEM 121	General Chemistry I (May satisfy general education category S)	3
CHEM 122	General Chemistry II (May satisfy general education category S)	3
CSCI 114	Microcomputer Packages (May satisfy general education category S)	3
or MIS 116	Business Use of Computers	
ECON 201	Principles of Microeconomics (May satisfy general education category B)	3
ECON 202	Principles of Macroeconomics (May satisfy general education category B)	3
MATH 103	College Algebra (or higher - May not be required based on math placement.)	3
MATH 105	Trigonometry (or higher)	3
PHYS 211	College Physics I (May satisfy general education category S)	3
PHYS 211L	College Physics I Laboratory (Either course may satisfy general education category S)	1
or CHEM 121L	General Chemistry I Laboratory	
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Select one of the following:		3 or 6
ACCT 102	Fundamentals of Accounting	

ACCT 200 & ACCT 201	Elements of Accounting I and Elements of Accounting II	
Specialized Options - Select from one of the specialized options listed below. A minor program of study may be completed in place of an option.		30-38
Total Credits		98-109

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

specialized options

Code	Title	Credits
Applied Business Option: Minimum 30 Credits		
This is the standard option for this major; students can declare another option or the minor option with the Office of Registration and Records.		
Complete any course from the College of Ag, including Ag Econ as well as the BIO dept, and those listed under Program/Option Electives.		
Select courses in agriculture science or supporting areas to enhance careers in Agribusiness. Select courses in consultation with an advisor. Courses not on the list will require a substitution form to be submitted to the Office of Registration and Records.		

Code	Title	Credits
Production Agriculture Option: Minimum of 30 Credits		
Complete any course from the College of Ag, including Ag Econ as well as the BIO dept, and those listed under Program/Option Electives		
Select courses in consultation with an advisor. Courses not on the list will require substitution form to be submitted to the Office of Registration and Records.		

Code	Title	Credits
Dealership Management Option: Minimum 32-38		
Minor in either Business Administration (24 credits) or Agribusiness (18 credits) required.		18-24
ACCT 200 & ACCT 201	Elements of Accounting I and Elements of Accounting II	6
ASM 496	Field Experience	2
Elective	Complete any course from the College of Ag, including Ag Econ as well as the BIO dept, and those listed under Program/Option Electives	3
Select one of the following:		3
COMM 214	Persuasive Speaking	
COMM 271	Listening and Nonverbal Communication	
COMM 308	Business and Professional Speaking	
COMM 315	Small Group Communication	

Degree Requirements and Notes:

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

Minor Requirements

Agricultural Systems Management

Minor Requirements

Required Credits: 16

Code	Title	Credits
Required Courses		
ASM 264	Natural Resource Management Systems	3
ASM 354	Electricity and Electronic Applications	3
ASM 373	Tractors & Power Units	3

or ASM 378	Machinery Principles and Management	
Remaining Credits: Select 7 credits from the following:		7
ASM 225	Computer Applications in Agricultural Systems Management	
ASM 323	Post-Harvest Technology	
ASM 374	Power Units Laboratory	
ASM 429	Hydraulic Power Principles and Applications	
ASM 454	Principles and Application of Precision Agriculture	
ASM 475	Management of Agricultural Systems (Capstone)	
ASM 491	Seminar	
ASM 496	Field Experience (Expo)	
ASM 496	Field Experience	
Total Credits		16

Minor Requirements and Notes:

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

Code	Title	Credits
Option Electives		
May select any courses offered in the College of Ag, including Ag Econ, as well as the Biology department, and those curses listed here.		
ASM 496 – Ag Tech Expo (1 add'l cr.) may be used as an Option Elective for all Specialized Options. ASM 496 – Field Exp/Internship, 1cr., may also be used as an Option Elective (maximum two credits) in the Applied Business and Production Agriculture Specialized Options only.		
ACCT 201	Elements of Accounting II	
AGEC 1XX - 4XX		
ANSC 1XX - 4XX		
BUSN 340	International Business	
BUSN 487	Managerial Economics	
BUSN 3XX -4XX		
COMM 114	Human Communication	
COMM 212	Interpersonal Communication	
COMM 216	Intercultural Communication	
COMM 260	Introduction to Web Design	
COMM 308	Business and Professional Speaking	
COMM 313	Editorial Processes	
COMM 362	Principles of Design For Print	
COMM 434	Communication Law	
COMM 484	Organizational Advocacy and Issue Management	
COMM 485	Risk and Crisis Communication	
ECON 105	Elements of Economics	
ECON 341	Intermediate Microeconomics	
ECON 343	Intermediate Macroeconomics	
ECON 3XX - 4XX		
ENT 1XX - 4XX		
FIN 320	Principles of Finance	
FIN 3XX - 4XX		
GEOG 105	Fundamentals of Geographic Information Systems	
GEOG 455	Introduction to Geographic Information Systems	
GEOG 456	Advanced Geographic Information Systems	
GEOG 470	Remote Sensing	
GEOG 480	Geographic Information Systems Pattern Analysis and Modeling	
IME 335	Welding Technology	
MGMT 320	Foundations of Management	

MGMT 3XX - 4XX	
MRKT 320	Foundations of Marketing
MRKT 3XX - 4XX	
ME 311	Introduction To Aviation
ME 312	Introduction to Flight
ME 313	Commercial Instrument Ground School
PLSC 1XX - 4XX	
SOIL 1XX - 4XX	

Animal Science

Department Information

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

Major Requirements

Major: Animal Science

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Quantitative Reasoning (R) †		3
Science and Technology (S) †		10
Humanities and Fine Arts (A) †		6
Social and Behavioral Sciences (B) †		6

Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Required Core Courses for Animal Science		
ANSC 114	Introduction to Animal Sciences	3
ECON 201	Principles of Microeconomics (May satisfy general education category B and G)	3
MATH 103	College Algebra	3
or MATH 105	Trigonometry	
or MATH 107	Precalculus	
or MATH 146	Applied Calculus I	
STAT 330	Introductory Statistics (May satisfy general education category R)	3
VETS 135	Anatomy and Physiology of Domestic Animals	3
Select one of the following (only required by first year, non-transfer students):		1
AGRI 150	Agriculture Orientation	
ANSC 101	Student Success Techniques - Animal and Equine Science	
VETS 150	Introduction to the Veterinary Profession	
ANSC 240	Meat Animal Evaluation and Marketing	3
ANSC 300	Domestic Animal Behavior and Management	3
ANSC 323	Fundamentals of Nutrition	3
ANSC 324	Applied Animal Nutrition	3
ANSC 463 & 463L	Physiology of Reproduction and Physiology of Reproduction Laboratory	4
ANSC 478	Research and Issues in Animal Agriculture	3
Select one of the following:		2
ANSC 379	Study Tour Abroad	
ANSC 393	Undergraduate Research (research experience)	
ANSC 396	Field Experience (internship experience)	
Select one of the following:		3
ANSC 480	Equine Industry and Production Systems	
ANSC 482	Sheep Industry and Production Systems	
ANSC 484	Swine Production/Pork Industry Systems	
ANSC 486	Beef Industry and Production Systems	
ANSC 488	Dairy Industry and Production Systems	
Options: Select one of the five options listed below.		44-48
Students must select one option of interest. The standard option for this major is the Animal Production, Management and Husbandry. Students who wish to declare an option other than the standard option must officially declare that option with the Office of Registration and Records.		
Total Credits		84-88

Option 1: Animal Production, Management, & Husbandry Option

Code	Title	Credits
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3

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

Option 2: Animal Agribusiness Option

Code	Title	Credits
ACCT 102	Fundamentals of Accounting	3
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
AGEC 246	Introduction to Agricultural Finance	3
Select one from the following:		4
BIOL 111 & 111L	Concepts of Biology and Concepts of Biology Lab (May satisfy general education category S)	
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	
Select one from the following:		4
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab (May satisfy general education category S)	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	
Select one of the following evaluation courses:		2
ANSC 230	Meat Grading and Evaluation	
ANSC 231	Livestock Evaluation	
ANSC 232	Dairy Cattle Evaluation	
ANSC 235	Equine Evaluation	
ANSC 357	Animal Genetics	3
ANSC 380	Livestock Sales and Marketing	2

ECON 202	Principles of Macroeconomics (May satisfy general education category B)	3
PLSC 315	Genetics (May satisfy general education category S)	3
AGEC elective	300-400 level	6
Animal Agribusiness Electives (choose from 300+ level ANSC, AGEC, ECON, PLSC or RNG)		9
Total Credits		48

Option 3: Biomedical Science Option

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

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

Option 4: Livestock Media Option

Code	Title	Credits
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
ANSC 357	Animal Genetics	3
ANSC 380	Livestock Sales and Marketing	2
PLSC 315	Genetics (May satisfy general education category S)	3
Select one of the following evaluation courses:		2
ANSC 230	Meat Grading and Evaluation	
ANSC 231	Livestock Evaluation	
ANSC 232	Dairy Cattle Evaluation	
ANSC 235	Equine Evaluation	
Select one from the following:		4
BIOL 111 & 111L	Concepts of Biology and Concepts of Biology Lab (May satisfy general education category S)	
BIOL 150 & 150L	General Biology I and General Biology I Laboratory (May satisfy general education category S)	
Select one from the following:		4

CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab (May satisfy general education category S)	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	
Complete any minor in the the Communications Dept. (Ag Comm; Health Comm; Journalism; Mgmt Comm; New Media & Web Design; or Strategic Comm)		21
Total Credits		45

Option 5: Meat Science Option

Code	Title	Credits
AGEC 244	Agricultural Marketing	3
ANSC 230	Meat Grading and Evaluation	2
ANSC 340	Principles of Meat Science	3
ANSC 344	Fundamentals of Meat Processing	2
ANSC 357	Animal Genetics	3
ANSC 444	Livestock Muscle Physiology	3
BIOC 260	Elements of Biochemistry	4
CFS 210	Introduction to Food Science and Technology	2
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab (May satisfy general education category S)	3
PLSC 315	Genetics (May satisfy general education category S)	3
CFS elective	300-400 Level	3
Select one from the following:		4
BIOL 111 & 111L	Concepts of Biology and Concepts of Biology Lab (May satisfy general education category S)	
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	
Select from the following:		4
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab (May satisfy general education category S)	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	
Meat Science Electives (choose from 300+ level ANSC, BIOC, CFS, CHEM, MICR OR SAFE)		6
Total Credits		45

Degree Requirements and Notes:

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

Minor Requirements

Animal Science Minor

Minor Requirements

Required Credits: 16

Code	Title	Credits
Required Courses		
ANSC 114	Introduction to Animal Sciences	3
ANSC 223	Introduction to Animal Nutrition	2
ANSC 220	Livestock Production	3
ANSC 240	Meat Animal Evaluation and Marketing	3
Elective Courses *		5
Must include one of the following courses:		
ANSC 300	Domestic Animal Behavior and Management	

ANSC 314	Animal Biotechnology
ANSC 323	Fundamentals of Nutrition
ANSC 324	Applied Animal Nutrition
ANSC 340	Principles of Meat Science
ANSC 344	Fundamentals of Meat Processing
ANSC 357	Animal Genetics
ANSC 370	Fundamentals/Animal Disease
ANSC 380	Livestock Sales and Marketing
ANSC 426	Feed Technology
ANSC 444	Livestock Muscle Physiology
ANSC 463	Physiology of Reproduction
ANSC 487	Growing and Finishing Cattle Management
Remaining credits may come from those listed above or the following courses:	
ANSC 230	Meat Grading and Evaluation
ANSC 231	Livestock Evaluation
ANSC 232	Dairy Cattle Evaluation
Total Credits	16

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

Minor Requirements and Notes:

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

Anthropology

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-8657
- **Department Web Site:**
  www.ndsu.edu/socanth/
- **Degrees Offered:**
  B.S.; B.A.
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/anthropology/

Major Requirements

Major: Anthropology

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major Requirements

Code	Title	Credits
Anthropology Core Requirements		
SOC 110	Introduction to Sociology (May satisfy general education category S)	3
ANTH 111	Introduction to Anthropology (May satisfy general education category S and D)	3
200 Level Core: 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	
*Theory:		3
ANTH 470	Analysis & Interpretation in Archaeology	
or ANTH 480	Development of Anthropological Theory	
*Methods:		3
ANTH 471	Archaeological Research Methods	
or ANTH 481	Qualitative Methods in Cultural Anthropology	
Senior Capstone:		
ANTH 489	Senior Capstone In Anthropology	1
Major Electives 300-400 Level:		18
Other courses may qualify to substitute for the 300-400 level courses. Substitutions must be approved by the adviser and department chairperson prior to course enrollment. These include internships, field schools, archaeology lab credits, etc.		
Total Credits		37

* 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 file with the Office of Registration and Records.

Minor Requirements

Anthropology Minor

Minor Requirements

Required Credits: 18

Code	Title	Credits
Required Courses		
ANTH 111	Introduction to Anthropology	3
SOC 110	Introduction to Sociology	3
Electives: Select two of the following:		6
ANTH 204	Archaeology and Prehistory	
ANTH 205	Human Origins	
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
Additional Electives		
Two anthropology courses at the 300-400 level		6
Total Credits		18

Minor Requirements and Notes

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

Apparel, Retail Merchandising and Design

Department Information

- **Department Location:**
  E. Morrow Lebedeff Hall
- **Department Phone:**
  701-231-8604
- **Department Web Site:**
  www.ndsu.edu/adhm/index.html
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/apparel-retail-mechandising-design/#planofstudyapparelstudiesoptiontext

Major Requirements

Major: Apparel, Retail Merchandising & Design
Option: Apparel Studies

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Apparel Studies Option Major Requirements

Code	Title	Credits
Core Requirements - Apparel Studies Option		
ADHM 155	Apparel Construction and Fit	3
or ADHM 370	Sewn-Product Manufacturing and Analysis	
ADHM 171	Fashion Dynamics	3
ADHM 181	Aesthetics and Visual Analysis of Apparel Products	3
ADHM 271	Visual Merchandising and Promotion	3
ADHM 272	Product Development	3
ADHM 310	History of Fashion	3
ADHM 366	Textiles	3
ADHM 367	Textiles Laboratory	1

ADHM 375	Professional Development	1
ADHM 385	Global Fashion Economics	3
ADHM 481	Capstone in Apparel, Retail Merchandising and Design	3
ADHM 486	Dress and Human Behavior	3
ADHM 489	Study Tour	1-3
CSCI 114	Microcomputer Packages (May satisfy general education category S)	3
or MIS 116	Business Use of Computers	
ECON 105	Elements of Economics (May satisfy general education category G)	3
ENGL 320	Business and Professional Writing (May satisfy general education category C)	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Professional Electives *		21
Select 21 credits from the following ADHM courses:		
ADHM 101	Beginning Apparel Construction	
ADHM 140	Introduction to the Hospitality Industry	
ADHM 141	Tourism and Travel Management	
ADHM 155	Apparel Construction and Fit	
ADHM 355	Flat Pattern Design & Draping	
ADHM 356	Pattern Drafting and Grading	
ADHM 357	Product Development: Designing Pants	
ADHM 370	Sewn-Product Manufacturing and Analysis	
ADHM 371	Fashion Trend Analysis and Forecasting	
ADHM 372	Global Retailing	
ADHM 386	Merchandise Planning and Buying	
ADHM 401	Convention and Meeting Planning	
ADHM 410	Dress in World Cultures	
ADHM 425	Experiential Retailing	
ADHM 455	Apparel Design and Assembly	
ADHM 470	Retail Financial Management and Control	
ADHM 496	Field Experience	
COMM 216	Intercultural Communication	
COMM 271	Listening and Nonverbal Communication	
COMM 383	Organizational Communication I	
Minor Program of Study Required: 16 credit minimum required		16
Total Credits		82-84

* With advisor approval, six of these 21 professional elective credits may be taken from BUSN, MRKT, MGMT, THEA, COMM or ART to meet the student's professional/personal objectives.

Degree Requirements and Notes

- Transfer courses from other institutions must have grades of 'C' or better to be accepted for the program.

Link to view program description and 4-year Plan of Study (http://bulletin.ndsu.edu/undergraduate/colleges/human-development-education/apparel-design-hospitality-management/apparel-retail-merchandising-design)

Major Requirements

Major: Apparel, Retail Merchandising & Design
Option: Retail Merchandising

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 122

University Degree Requirements

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

3. Satisfactory completion of the general education requirements as specific by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses number 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institituion.
   a. Of these 60, at least 36 must be NDSU residence credits as defined in #7.
   b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Residence credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Retail Merchandising Option Major Requirements

Code	Title	Credits
Core Requirements Retail Merchandising Option		
ADHM 171	Fashion Dynamics	3
ADHM 271	Visual Merchandising and Promotion	3
ADHM 272	Product Development	3
ADHM 366	Textiles	3
ADHM 367	Textiles Laboratory	1
ADHM 372	Global Retailing	3
ADHM 375	Professional Development	1
ADHM 386	Merchandise Planning and Buying	3
ADHM 470	Retail Financial Management and Control	3
ADHM 481	Capstone in Apparel, Retail Merchandising and Design	3
ADHM 489	Study Tour	1-3
ADHM 496	Field Experience	3-6
CSCI 114	Microcomputer Packages (May satisfy general education category S)	3
or MIS 116	Business Use of Computers	
ENGL 320	Business and Professional Writing (May satisfy general education category C)	3
PSYC 111	Introduction to Psychology (May satisfy general education category B and G)	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Select one of the following:		3

COMM 216	Intercultural Communication	
COMM 271	Listening and Nonverbal Communication	
COMM 383	Organizational Communication I	
Business Minor requires an application to the College of Business and a minimum 2.5 GPA in courses used for the minor.		24
ACCT 102	Fundamentals of Accounting	
ECON 105	Elements of Economics (May satisfy general education category B and G)	
MGMT 320	Foundations of Management	
MRKT 320	Foundations of Marketing	
MRKT 362	Foundations of Retailing	
MRKT 410	Consumer Behavior	
College of Business 300-400 level courses as approved by ADHM Department to total 24 credits.		
(ADHM 372/MRKT 372 and COMM/BUSN 383 may be used as an elective for Business Minor.)		
Retail Merchandising Focus Area:		18-19
As part of the Retail Merchandising option, students select a focus area. Focus Area One: Textile Product Merchandising or Focus Area Two: Interior Merchandising		
Focus Area One - Core Requirements - Textile Product Merchandising Focus (18 credits)		
ADHM 181	Aesthetics and Visual Analysis of Apparel Products	
ADHM 310	History of Fashion (May satisfy general education category A)	
ADHM 370	Sewn-Product Manufacturing and Analysis	
ADHM 385	Global Fashion Economics	
ADHM 486	Dress and Human Behavior	
Focus Area One Professional Elective Credit - 6 credits of professional electives courses are needed to reach the minimum degree total of 122 credits. Courses can be chosen with advisor approval from the list below or from ADHM, BUSN, MRKT, MGMT, THEA, COMM, or ART.		
ADHM 371	Fashion Trend Analysis and Forecasting	
ADHM 410	Dress in World Cultures	
ADHM 425	Experiential Retailing	
ADHM 491	Seminar (Photoshop/Illustrator for ARMD Majors)	
Focus Area Two - Core Requirements - Interior Merchandising Focus (19 credits)		
ADHM 151	Design Fundamentals	
ADHM 161	Introduction to Manual Drafting	
ADHM 251	Interior Design Studio I-Residential	
ADHM 261	Visual Communications	
ADHM 264	Residential Systems	
ADHM 315	History of Interiors I (May satisfy general education category A)	
or ADHM 316	History of Interiors II	
ADHM 368	Interior Materials	
Total Credits		87-93

Degree Requirements and Notes

- Transfer courses from other institutions must have grades of 'C' or better to be accepted for the program.

Minor Requirements

Minor: Apparel, Retail Merchandising & Design
Options: Apparel Studies and Retail Management

Required Credits: 21-22

Apparel Studies Minor Option

A total of 12 upper-division (300/400 level) courses must be taken

Code	Title	Credits
Required Courses		
ADHM 171	Fashion Dynamics	3
ADHM 366	Textiles	3

ADHM 367	Textiles Laboratory	1
ADHM 155	Apparel Construction and Fit	3
or ADHM 370	Sewn-Product Manufacturing and Analysis	
Electives: 12 credits from the following:		12
ADHM 101	Beginning Apparel Construction	
ADHM 155	Apparel Construction and Fit	
ADHM 181	Aesthetics and Visual Analysis of Apparel Products	
ADHM 271	Visual Merchandising and Promotion *	
ADHM 272	Product Development	
ADHM 310	History of Fashion	
ADHM 355	Flat Pattern Design & Draping	
ADHM 356	Pattern Drafting and Grading	
ADHM 370	Sewn-Product Manufacturing and Analysis	
ADHM 371	Fashion Trend Analysis and Forecasting	
ADHM 372	Global Retailing	
ADHM 385	Global Fashion Economics	
ADHM 386	Merchandise Planning and Buying	
ADHM 410	Dress in World Cultures	
ADHM 425	Experiential Retailing	
ADHM 455	Apparel Design and Assembly	
ADHM 470	Retail Financial Management and Control	
ADHM 486	Dress and Human Behavior	
ADHM 489	Study Tour	
Total Credits		22

Retail Management Minor Option

The Retail Management minor option is available to all majors in the College of Business.

Code	Title	Credits
Required Courses		
ADHM 171	Fashion Dynamics	3
ADHM 181	Aesthetics and Visual Analysis of Apparel Products	3
ADHM 271	Visual Merchandising and Promotion	3
Electives: Select 12 credits from the following:		12
ADHM 372	Global Retailing	
ADHM 385	Global Fashion Economics	
ADHM 386	Merchandise Planning and Buying	
ADHM 470	Retail Financial Management and Control	
MRKT 320	Foundations of Marketing	
MRKT 362	Foundations of Retailing	
Total Credits		21

Minor Requirements and Notes:

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

Architecture

Department Information

- **Department Location:**
  Klai Hall
- **Department Phone:**
  701-231-6151
- **Department Email:**

ndsu.ala@ndsu.edu

- **Department Web Site:**
  www.ndsu.edu/ala/
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/architecture/#planofstudytext

Major Requirements

Major: Architecture

Degree Type: B.S.Arch
Required Degree Credits to Graduate: 136

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Code	Title	Credits
Architecture Requirements		
ANTH 111	Introduction to Anthropology (May satisfy general education category B and D)	3
ARCH 231	Architectural Drawing	3
ARCH 232	Design Technology	3
ARCH 233	Math for Designers	1
ARCH 271	Architectural Design I	6
ARCH 272	Architectural Design II	6

ARCH 321	History and Theory of Architecture I (May satisfy general education category A and G)	3
ARCH 322	History and Theory of Architecture II	3
ARCH 323	History and Theory of Architecture III	3
ARCH 341	Site Design for Architects	3
ARCH 344	Architectural Structures I	3
ARCH 351	Materials & Construction	4
ARCH 371	Architectural Design III	6
ARCH 372	Architectural Design IV	6
ARCH 443	Architectural Structures II	3
ARCH 450	Architectural Detailing	3
ARCH 453	Environmental Control Systems: Passive Principles	3
ARCH 454	Environmental Control System: Active System	3
ARCH 461	Urban Design	3
ARCH 471	Architectural Design V (Capstone)	6
ARCH 472	Architectural Design VI	6
or ARCH 474	International Design Studio	
ENVD 101	Introduction to Environmental Design (May satisfy a general education category A)	3
ENVD 102	Drawing Basics for Environmental Designers	1
ENVD 104	Environmental Design Fundamentals	1
ENVD 130	Drawing Skills for Environmental Designers	3
ENVD 172	Environmental Design Fundamentals Studio	3
PHYS 120	Fundamentals of Physics (May satisfy general education category S)	3
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
Elective Requirements		
SOC 110	Introduction to Sociology (May satisfy general education category B)	3
PHIL Elective		3
Total Credits		103

Code	Title	Credits
Architecture - Graduate Level		
ARCH 763	Programming/Thesis Prep	3
ARCH 781	Professional Practice	3
ARCH 771	Advanced Architectural Design	6
ARCH 772	Design Thesis	8
Select 12 credits from the following: (May be repeated, except for identical course offering)		12
ARCH 721	Non-Western Architectural Traditions	
ARCH 722	Urbanism	
ARCH 723	Historic Preservation	
ARCH 724	Architectural Technology	
ARCH 725	Architecture or the Recent Past	
ARCH 726	Current Architectural Theory	
ARCH 727	Vernacular Architectural Traditions	
ARCH 728	Sociocultural Issues	
ARCH 789	Professional Topics in Architecture	
Total Credits		32

Degree Requirements and Notes

- NO GRADES OF 'D' ALLOWED FOR ANY MAJOR REQUIREMENT.
- Courses listed on this curriculum guide will lead to both a Bachelor of Science in Architecture degree and to an Masters of Architecture degree.
- If a student receives a grade of “D” or “F” in studio, he/she will be required to repeat the studio class the following year, before advancing to the next studio course.

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.

Art

Department Information

- **Department Location:**
  Renaissance Hall
- **Department Phone:**
  701-231-8818
- **Department Web Site:**
  www.ndsu.edu/visualarts/
- **Degrees Offered:**
  B.S.; B.A.; B.F.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/art/#planofstudybfatext

Major Requirements

Major: Art

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major Requirements

Code	Title	Credits
Major Requirements		
Studies in Art History:		
ART 210	Art History I (May satisfy general education category A)	3
ART 211	Art History II (May satisfy general education category A)	3
ART 452	Contemporary Art	3
Studies in Studio:		
ART 120	Painting I	3
ART 122	Studio Technology Foundations	3
ART 124	Foundations of Design	3
ART 131	Foundations Drawing	3
ART 150	Ceramics I	3
ART 160	Sculpture I	3
ART 170	Printmaking I	3
ART 180	Photography I	3
ART 185	Graphic Design I	3
ART 230	Drawing II	3
ART 330	Drawing III	3
or ART 335	Figure Drawing	
Intermediate Studio Course: Select one of the following:		3
ART 220	Painting II	
ART 250	Ceramics II	
ART 260	Sculpture II	

ART 270	Printmaking II	
ART 280	Digital Image and Output	
ART 285	Graphic Design and Digital Media	
Upper Division Studio Electives: Select one of the following:		3
ART 320	Painting III	
ART 350	Ceramics III	
ART 360	Sculpture III	
ART 370	Printmaking III	
ART 380	Topics in Photography	
ART 385	Topics in Graphic Design	
ART 420	Painting IV	
ART 430	Drawing IV	
ART 435	Advanced Figure Drawing	
ART 450	Ceramics IV	
ART 460	Sculpture IV	
ART 470	Printmaking IV	
ART 480	Advanced Photography	
ART 485	Advanced Graphic Design	
ART 494	Individual Study (IS may be used toward the upper division studio elelctives in the following areas: ceramics, digital media, drawing, painting, photography, printmaking or sculpture.)	
Baccalaureate Project: Capstone		
ART 489	Baccalaureate Project	3
Total Credits		51

Major Requirements

Major: Art

Degree Type: B.F.A.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Quantitative Reasoning (R) †		3
Science and Technology (S) †		10
Humanities and Fine Arts (A) †		6
Social and Behavioral Sciences (B) †		6

Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Bachelor of Fine Arts in Art Requirements		
Studio Foundation (Level I Studio Classes):		
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 210	Art History I (May satisfy general education category A)	3
ART 211	Art History II (May satisfy general education category A)	3
Intermediate Studio Course: Select two of the following:		6
ART 220	Painting II	
ART 250	Ceramics II	
ART 270	Printmaking II	
ART 260	Sculpture II	
ART 280	Digital Image and Output	
ART 285	Graphic Design and Digital Media	
Studies in Art History:		
ART 451	History of American Art	3
ART 452	Contemporary Art	3
ART 453	Topics in Art History	3
Studies in Studio		
Drawing:		
ART 230	Drawing II	3
ART 335	Figure Drawing	3
Baccalaureate Project: Capstone		
ART 489	Baccalaureate Project	3
ART 489	Baccalaureate Project	3
Studio Emphasis Electives: Select 15 credits from the following:		15
ART 320	Painting III	
ART 350	Ceramics III	
ART 360	Sculpture III	
ART 370	Printmaking III	
ART 379	Study Tour Abroad	
ART 380	Topics in Photography	
ART 385	Topics in Graphic Design	

ART 399	Special Topics
ART 420	Painting IV
ART 430	Drawing IV
ART 435	Advanced Figure Drawing
ART 450	Ceramics IV
ART 460	Sculpture IV
ART 470	Printmaking IV
ART 480	Advanced Photography
ART 485	Advanced Graphic Design
ART 491	Seminar
ART 494	Individual Study (IS may be used in the studio emphasis electives and can be iin the following areas: ceramics, digital media, drawing, painting, photography, printmaking or sculpture.)
ART 499	Special Topics
Total Credits	75

Minor Requirements

Art Minor

Minor Requirements

Required Credits: 18

Code	Title	Credits
Required Courses		
Art History/Art Appreciation Elective		3
Additional Art History/Studio Electives		15
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- This minor is intended to provide maximum flexibility to serve as a compliment to ones major track and/or an opportunity to go deeply into one studio area.

Art Education

Department Information

- **Department Location:**
  Renaissance Hall
- **Department Phone:**
  701-231-8818
- **Department Web Site:**
  www.ndsu.edu/visualarts/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/art-education/#planofstudytext

Major Requirements

Major: Art Education

Degree Type: B.S.
Required Degree Credits to Graduate: 122

University Degree Requirements

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

3. Satisfactory completion of the general education requirements as specific by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses number 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institituion.
   a. Of these 60, at least 36 must be NDSU residence credits as defined in #7.
   b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Residence credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Art Education Requirements		
ART 210	Art History I (May satisfy general education category A)	3
ART 211	Art History II (May satisfy general education category A)	3
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Art)	3
EDUC 482	Classroom Practice/Methods of Teaching II:	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Teaching Specialty Requirements		
Studies in Art History		
ART 451	History of American Art	3
or ART 453	Topics in Art History	
ART 452	Contemporary Art	3

Studies in Studio		
ART 120	Painting I	3
ART 122	Studio Technology Foundations	3
ART 124	Foundations of Design	3
ART 131	Foundations Drawing	3
ART 150	Ceramics I	3
ART 160	Sculpture I	3
ART 170	Printmaking I	3
ART 180	Photography I	3
ART 185	Graphic Design I	3
ART 230	Drawing II	3
ART 330	Drawing III	3
or ART 335	Figure Drawing	
Art Studio or Art History Elective: Select 3 credits		3
Intermediate Studio Course: Select one course from the following:		3
ART 220	Painting II	
ART 250	Ceramics II	
ART 260	Sculpture II	
ART 270	Printmaking II	
ART 280	Digital Image and Output	
ART 285	Graphic Design and Digital Media	
Upper Division Studio Electives: Select one course from the following:		3
ART 320	Painting III	
ART 350	Ceramics III	
ART 360	Sculpture III	
ART 370	Printmaking III	
ART 380	Topics in Photography	
ART 385	Topics in Graphic Design	
ART 420	Painting IV	
ART 430	Drawing IV	
ART 435	Advanced Figure Drawing	
ART 450	Ceramics IV	
ART 460	Sculpture IV	
ART 470	Printmaking IV	
ART 480	Advanced Photography	
ART 485	Advanced Graphic Design	
ART 494	Individual Study (IS may be used toward the upper division studio electives. IS can be taken in Ceramics, Digital Media, Drawing, Painting, Photography, Printmaking, or Sculpture)	
Baccalaureate Project:		3
ART 489	Baccalaureate Project (Capstone)	
Total Credits		91

Degree Requirements and Notes

- Courses taken P/F may not be used to satisfy any requirements.
- GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A grade of 'C' or better is required in all Professional Education Requirement courses.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- See School of Education (https://www.ndsu.edu/education) for admission requirements.

Behavioral Statitics

Department Information

- **Department Location:**
  Morrill Hall
- **Department Phone:**
  701-231-8734
- **Department Email:**
  ndsu.stats@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/statistics/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/behavioral-statistics/#planofstudytext

Major Requirements

Major: Behavioral Statistics

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

Code	Title	Credits
Behavioral Statistics Requirements		
PSYC 111	Introduction to Psychology	3
PSYC Elective	200-400 Level Electives	6
PSYC 350	Research Methods I	3
PSYC 351	Research Methods II	3
PSYC Elective	400 Level Elective	3
STAT 331	Regression Analysis	2
STAT 462	Introduction to Experimental Design (Capstone)	3
STAT 470	Statistical SAS Programming	3
or STAT 471	Introduction to the R Language	
Select one of the following:		2-3
PSYC 480	History & Systems	
PSYC 489	Honors Thesis	
Related Courses Required		
ANTH 111	Introduction to Anthropology (May satisfy general education category B and D)	3
BIOL 126	Human Biology (May satisfy general education category S)	3
CSCI 114	Microcomputer Packages (May satisfy general education category S)	3 or 4
or CSCI 116	Business Use of Computers	
MATH 103	College Algebra (or higher level if needed as a prerequisite)	3
SOC 110	Introduction to Sociology (May satisfy general education category B)	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Select one course from 3 of the following 4 groups (A-D)		
Group A - Social/Personality:		3
PSYC 453	Organizational Psychology	
PSYC 468	Personality	
PSYC 470	Experimental Social Psychology	
Group B - Perception/Cognition:		3
PSYC 460	Sensation & Perception	
PSYC 461	Memory And Knowledge	
PSYC 464	Attention & Thinking	
Group C - Biological Bases of Behavior:		3
PSYC 465	Psychobiology	
PSYC 481	Health Psychology	
PSYC 486	Neuropsychology	
Group D - Individual Differences:		3
PSYC 463	Experimental Developmental Psychology	
PSYC 471	The Psychology Of Aging	
PSYC 472	Advanced Psychopathology	
PSYC 473	Child Psychopathology and Therapy	
Group E - Select two of the following:		6

STAT 460	Applied Survey Sampling	
STAT 463	Nonparametric Statistics	
STAT 469	Introduction to Biostatistics	
STAT 472	Time Series	
Total Credits		64-66

Program notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Biochemistry and Molecular Biology

Department Information

- **Department Location:**
  Ladd Hall
- **Department Phone:**
  701-231-8694
- **Department Email:**
  ndsu.chemistry@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/chemistry/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/biochemistry-molecular-biology/#planofstudytext

Major Requirements

Major: Biochemistry & Molecular Biology

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Quantitative Reasoning (R) †		3
Science and Technology (S) †		10
Humanities and Fine Arts (A) †		6
Social and Behavioral Sciences (B) †		6

Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

Code	Title	Credits
Biochem & Molecular Biology Requirements		
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
BIOC 460L	Foundations of Biochemistry I Laboratory	1
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
BIOC 473	Methods of Biochemical Research	3
BIOC 474	Methods of Recombinant DNA Technology	3
BIOC 483	Cellular Signal Transduction Processes and Metabolic Regulations	3
BIOC 487	Molecular Biology of Gene Expression	3
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
Select one of the follwing:		4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
Select one of the following:		4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 341	Organic Chemistry I	3
CHEM 342	Organic Chemistry II	3
CHEM 353	Majors Organic Chemistry Laboratory I	1
CHEM 354	Majors Organic Chemistry Laboratory II	2
CHEM 465	Survey of Physical Chemistry	4
CHEM 380	Chemistry Junior Seminar	1
CHEM 431	Analytical Chemistry I	3
CHEM 491	Seminar	2
ENGL 321	Writing in the Technical Professions (May satisfy general education category C)	3
or ENGL 324	Writing in the Sciences	

MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
PHYS 251 & 251L	University Physics I and University Physics I Laboratory (May satisfy general education category S)	5
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
STAT 330	Introductory Statistics (May satisfy general education category R)	3
ZOO 315	Genetics (May satisfy general education category S)	3
Upper-Level Science Electives		
300-400 level courses in BIOL, BIOC, BOT, ZOO, CHEM, CSCI, MICR, PSCI, PHYS, PPTH, or STAT. No more than 6 credits from one prefix may apply. Research credits (CHEM 494/BIOC 494) may count towards 3 of these credits.		9
Total Credits		91

* CHEM 364 Physical Chemistry I & CHEM 365 Physical Chemistry II will satisfy this requirement and 2 credits of upper-level science electives.

Degree Notes:

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Minor Requirements

Biochemistry Minor

Minor Requirements

Required Credits: 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 student and adviser will complete a substitution form with the courses to be used for the biochemistry minor. This form will also requires the signature of the department chairperson before being submitted to the Office of Registration and Records for verification of minor program completion.
- Note: This minor will not be available for view in the Student Advisement/Requirement Report in Campus Connection.

Biological Sciences

Department Information

- **Department Location:**
  Stevens Hall
- **Department Phone:**
  701-231-7087
- **Department Web Site:**
  www.ndsu.edu/biology/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/biological-science/

Major Requirements

Major: Biological Sciences - Standard

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

Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail

Code	Title	Credits
Biological Sciences Core Requirements - Standard Option		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
BIOL 189	Skills for Academic Success [1]	1
BIOL 252	Plant and Animal Diversity	3
BIOL 270	Antibiotic Drug Discovery	3
or BIOL 271	Wildlife Ecology and Conservation: An undergraduate research course	
or BIOL 272	Research Experience: Learning in Biology	
BIOL 315 & 315L	Genetics and Genetics Laboratory	4
BIOL 359	Evolution	3
BIOL 364	General Ecology	3
or BIOL 370	Cell Biology	
BIOL 491	Seminar	2
Electives: Select 15 credits of any 300 or 400 level courses offered in the department:		15
BIOL 410	Comparative Chordate Morphology	
BIOL 414	Plant Systematics	
BIOL 444	Vertebrate Histology	
BIOL 450	Invertebrate Zoology	
BIOL 452	Ichthyology	
BIOL 454	Herpetology	
BIOL 456	Ornithology	
BIOL 460	Animal Physiology	
BIOL 461	Plant Ecology	
BIOL 462	Physiological Ecology	
BIOL 464	Endocrinology	
BIOL 465	Hormones and Behavior	
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 483	Cellular Mechanisms of Diseases	
PLSC 380	Principles of Plant Physiology	
Related Required Courses		

MATH 146	Applied Calculus I (May satisfy general education category R)	4
or MATH 165	Calculus I	
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
Select one of the following:		3 or 8
CHEM 240	Survey of Organic Chemistry	
CHEM 341 & 341L & CHEM 342 & CHEM 342L	Organic Chemistry I and Organic Chemistry I Laboratory and Organic Chemistry II and Organic Chemistry II Laboratory	
Select one of the following:		3 or 8
PHYS 120	Fundamentals of Physics (May satisfy general education category S)	
PHYS 211 & 211L & PHYS 212 & PHYS 212L	College Physics I and College Physics I Laboratory and College Physics II and College Physics II Laboratory (May satisfy general education category S)	
Total Credits		60-70

[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.

Department NOTES

- Students may not minor in biology with this major

Link to view program description and 4-year Plan of Study (p. 54)

Major Requirements

Major: Biological Sciences - Environmental Science Option

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Code	Title	Credits
Biological Sciences Core Requirements - Environmental Science Option		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
BIOL 189	Skills for Academic Success [1]	1
BIOL 359	Evolution	3
BIOL 491	Seminar	2
BIOL 315 & 315L	Genetics and Genetics Laboratory	4
BIOL 364	General Ecology	3
BIOL 480	Ecotoxicology	3
Select one of the following:		3-4
BIOL 472	Structure and Diversity of Plants and Fungi	
BIOL 414	Plant Systematics	
BIOL 461	Plant Ecology	
BOT 450	Range Plants	
PLSC 380	Principles of Plant Physiology	
Electives: Select 12 credits from the following:		12
BIOL 270	Antibiotic Drug Discovery	
BIOL 370	Cell Biology	
BIOL 410	Comparative Chordate Morphology	
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 (If not used above)	
BIOL 462	Physiological Ecology	
BIOL 463	Animal Behavior	
BIOL 464	Endocrinology	
BIOL 465	Hormones and Behavior	
BIOL 472	Structure and Diversity of Plants and Fungi (If not used above)	
BIOL 475	Conservation Biology	
BIOL 476	Wildlife Ecology and Management	
BIOL 477	Wildlife and Fisheries Management Techniques	

BIOL 481	Wetland Science	
BIOL 482	Developmental Biology	
BOT 450	Range Plants (If not used above)	
PLSC 380	Principles of Plant Physiology (If not used above)	
Related 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
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
MATH 146	Applied Calculus I	4
MATH 147	Applied Calculus II	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
SOIL 217	Introduction to Meteorology & Climatology	3
SOIL 410	Soils and Land Use	3
STAT 330	Introductory Statistics	3
Select one from the following:		3 or 4
GEOL 428	Geochemistry	
CHEM 431 & 431L	Analytical Chemistry I and Analytical Chemistry I Laboratory	
Select one of the following:		7 or 10
CHEM 240 & BIOC 260	Survey of Organic Chemistry and Elements of Biochemistry	
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	
Total Credits		90-95

[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.

Department notes

- Students may not minor in biology with this major

Minor Requirements

Biological Sciences Minor

Minor Requirements

Required Credits: 17

Code	Title	Credits
Required Courses		
BIOL 150	General Biology I	3
BIOL 150L	General Biology I Laboratory	1
BIOL 151	General Biology II	3
BIOL 151L	General Biology II Laboratory	1
Select one of the following:		3-4

BIOL 414	Plant Systematics	
BIOL 461	Plant Ecology	
BIOL 472	Structure and Diversity of Plants and Fungi	
PLSC 380	Principles of Plant Physiology	
Electives	Department approved 300-400 level courses	6
Total Credits		17

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Botany and Zoology majors may not minor in Biological Sciences.

Biological Sciences Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/biological-sciences-education/#planofstudytext

Major Requirements

Major: Biological Sciences Education

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 140

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Quantitative Reasoning (R) †		3
Science and Technology (S) †		10
Humanities and Fine Arts (A) †		6
Social and Behavioral Sciences (B) †		6

Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Biological Sciences Education Requirements		
BIOL 189	Skills for Academic Success	1
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
MATH 146	Applied Calculus I (May satisfy general education category R)	4
Teaching Specialty Requirements		
BIOC 260	Elements of Biochemistry	4
BIOL 124 & 124L	Environmental Science and Environmental Science Laboratory	4
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
BIOL 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 364	General Ecology	3
BIOL 359	Evolution	3
BIOL 491	Seminar (Capstone)	2
Select one of the following:		4
BOT 315 & 315L	Genetics and Genetics Laboratory	
ZOO 315 & 315L	Genetics and Genetics Laboratory	
Botany Elective	300-400 Level Elective	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
CHEM 240	Survey of Organic Chemistry	3
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4
STAT 330	Introductory Statistics	3
ZOO 370	Cell Biology	3
Zoology Elective	300-400 Level Elective	3

Computer Science Elective	Elective	3
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Science)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		117

Degree Requirements and Notes

- Courses taken P/F may not be used to satisfy any requirements.
- GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A grade of 'C' or better is required in all Professional Education Requirement courses.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- See School of Education (https://www.ndsu.edu/education) for admission requirements.

Biomedical Engineering

Department Information

- **Department Phone:**
  701-231-7494
- **Department Web Site:**
  www.ndsu.edu/coe/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/biomedical-engineering/

Minor Requirements

Biomedical Engineering Minor

Required Credits: 21

Minor Requirements

Code	Title	Credits
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
CHEM 121	General Chemistry I	3
ZOO 370	Cell Biology	3
or ZOO 460	Animal Physiology	
Electives		11
CE 486	Nanotechnology and Nanomaterials	
ECE 483	Instrumentation for Engineers	
ECE 485	Biomedical Engineering	
ECE 487	Cardiovascular Engineering	
ECE 488	Cardiovascular Engineering II	
IME 411	Human Factors Engineering	
IME 453	Hospital Management Engineering	
ME 331	Materials Science and Engineering	
ME 468	Introduction to Biomechanics	

ME 480	Biofluid Mechanics
ME 486	Nanotechnology and Nanomaterials
MICR 445	Animal Cell Culture Techniques
ZOO 460	Animal Physiology
Undergraduate Research: ENGR 193, 293, 393, or 494	
Total Credits	21

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Course pre-requisites apply.
- At least 12 credits that apply to this minor must be unique from courses that apply to the student's major.

Biotechnology

Department Information

- **Department Location:**
  Van Es Hall
- **Department Phone:**
  701-231-7520
- **Department Web Site:**
  www.ndsu.edu/majors/biotech/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/biotechnology/#planofstudytext

Major Requirements

Major: Biotechnology

Degree Type: B.S.
Minimum Degree Credits to Graduate: 128

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Quantitative Reasoning (R) †		3
Science and Technology (S) †		10
Humanities and Fine Arts (A) †		6

Social and Behavioral Sciences (B) †	6
Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major requirements

Code	Title	Credits
Biotechnology Requirements		
BIOC 460 & 460L	Foundations of Biochemistry and Molecular Biology I and Foundations of Biochemistry I Laboratory	4
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
BIOC 474	Methods of Recombinant DNA Technology	3
CHEM 465	Survey of Physical Chemistry	4
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
MICR 470	Basic Immunology	3
MICR 471	Immunology and Serology Laboratory	2
MICR 482	Bacterial Genetics & Phage	3
MICR 491	Seminar (Biotechnology)	1-5
MICR 494	Individual Study (Senior Research)	2-4
MICR 494	Individual Study (Senior Thesis)	1
Supporting Requirements		
AGRI 150	Agriculture Orientation (Applies only to students earning this degree out of the College of AFSNR;Not required for students transferring in 24 or more credits)	1
AGRI 189	Skills for Academic Success [1]	1
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory (May satisfy general education category S)	4
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342	Organic Chemistry II	3
CSCI 114	Microcomputer Packages	3
or CSCI 122	Introduction to Programming Concepts	
Select one from the following: (May satisfy general education category R)		8
MATH 146 & MATH 147	Applied Calculus I and Applied Calculus II	
MATH 165 & MATH 166	Calculus I and Calculus II	
Select one from the following: (May satisfy general education category S)		4 or 5
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	

PHYS 251 & 251L	University Physics I and University Physics I Laboratory	
Select one from the following: (May satisfy general education category S)		4 or 5
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	
PLSC 315 & 315L	Genetics and Genetics Laboratory (May satisfy general education category S)	4
STAT 330	Introductory Statistics (May satisfy general edcuation category R)	3
Major Elective in Physiology: Select 3 credits from the following:		3
BOT 380	Plant Physiology	
ZOO 460	Animal Physiology	
MICR 480	Bacterial Physiology	
Major Elective in Biotechnology Technique: Select 4-6 credits from the following:		4-6
BIOC 473	Methods of Biochemical Research	
BIOC 487	Molecular Biology of Gene Expression	
MICR 445	Animal Cell Culture Techniques	
PLSC 411	Genomics	
PLSC 484	Plant Tissue Culture and Biotechnology	
Additional Humanities & Fine Arts or Social & Behavioral Sciences Credits		6
An additional 6 credits from these General Education categories is required for earning a B.S. degree from either the College of Agriculture, Food Systems, and Natural Resources or the College of Science and Mathematics.		
Total Credits		95-105

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

Degree Notes:

- The Bachelors of Science degree is the default degree type for this program of study. However, a Bachelor of Arts degree is available if the degree is being earned from the College of Science & Mathematics.
- Bachelor of Arts (B.A.) Degree Requirements: An additional 12 credits of Humanities and/or Social Sciences courses and proficiency of a modern foreign language at the second year level (example: SPAN 201 & 202). Courses for the Humanities and/or Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the current Humanities & Fine Arts (A) and/or Social & Behavioral Sciences (B) General Education list.

Minor Requirements

Biotechnology Minor

Required Credits: 21

Code	Title	Credits
BIOC 460 & 460L	Foundations of Biochemistry and Molecular Biology I and Foundations of Biochemistry I Laboratory	4
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
PLSC 315 & 315L	Genetics and Genetics Laboratory	4
Biotechnology Technique Electives: Select 4 credits from the following:		4
BIOC 473	Methods of Biochemical Research	
BIOC 474	Methods of Recombinant DNA Technology	
MICR 445	Animal Cell Culture Techniques	
PLSC 484	Plant Tissue Culture and Biotechnology	
Specialized Electives: Select 6 credits form the following:		6
BOT 380	Plant Physiology	

MICR 470	Basic Immunology
MICR 471	Immunology and Serology Laboratory
MICR 482	Bacterial Genetics & Phage
PPTH 324	Introductory Plant Pathology
ZOO 370	Cell Biology
ZOO 460	Animal Physiology
Total Credits	21

Minor Requirements and Notes

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

Botany

Department Information

- **Department Location:**
  Stevens Hall
- **Department Phone:**
  701-231-7087
- **Department Web Site:**
  www.ndsu.edu/biology/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/botany/

Minor Requirements

Botany Minor

Minor Requirements

Required Credits: 18

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 315 & 315L	Genetics and Genetics Laboratory	4
BIOL 472	Structure and Diversity of Plants and Fungi	3
Botony Elective	300-400 level	3
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Botany majors may not minor in Botany or Biology.

Business Administration

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-8651

- **Department Web Site:**
  www.ndsu.edu/business/departments/mm/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/business-administration/#planofstudytext

Major Requirements

Major: Business Administration

Degree Type: B.S.
Minimum Credits Required for Degree: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Pre-College of Business Requirements		
ACCT 200	Elements of Accounting I *	3
ACCT 201	Elements of Accounting II *	3
COMM 110	Fundamentals of Public Speaking (May satisfy general education category C) *	3
MIS 116	Business Use of Computers (May satisfy general education category S) *	3

ECON 201	Principles of Microeconomics (May satisfy general education category B and G) *	3
ECON 202	Principles of Macroeconomics (May satisfy general education category B and G) *	3
ENGL 110	College Composition I (May satisfy general education category C) *	4
ENGL 120	College Composition II (May satisfy general education category C) *	3
PHIL 216	Business Ethics (May satisfy general education category A) *	3
STAT 330	Introductory Statistics (May satisfy general education category R) *	3
STAT 331	Regression Analysis *	2
MATH 144	Mathematics for Business *	4
Pre-Business Administration Requirements		
PSYC 111	Introduction to Psychology *	3
SOC 110	Introduction to Sociology *	3
Business Administration Major Requirements **		
ENGL 320	Business and Professional Writing (May satisfy general education category C)	3
FIN 320	Principles of Finance [1]	3
MGMT 320	Foundations of Management [1]	3
MRKT 320	Foundations of Marketing [1]	3
BUSN 340	International Business	3
BUSN 430	Legal and Social Environment of Business [1]	3
BUSN 431	Business Law I-Contracts, Property and Torts	3
MGMT 470	Entrepreneurship/Small Business Management	3
BUSN 489	Strategic Management [1]	4
MIS 320	Management Information Systems [1]	3
300-400 Level Courses: Of these 21 credits, at least three different CoB course prefixes must be represented (includes courses cross-listed with CoB courses) **		21
Additional 300-400 Level Course: This additional elective cannot be used to satisfy other requirements; includes courses cross-listed with CoB courses; excludes ATHL credits **		3
Total Credits		98

* Pre-college and pre-business administration major courses. A grade of 'C' or better for pre-college and pre-business administration major courses is required for admission into the Business Administration major.

** Students must earn a 'C' or better and have a minimum 2.5 cumulative GPA in ALL courses included in the professional program (i.e., all required courses, elective requirements, and additional 300-400 level CoB electives or breadth electives).

[1] Denotes Common Body of Knowledge (CBK) course.

Degree Requirements and Notes

- Student may choose to take the Supply Chain Management Track within the Business Administration major.

Code	Title	Credits
MGMT 461	Supply Chain Management (Required)	3
MGMT 462	Modeling the Supply Chain (Required)	3
Select two of the following:		
MGMT 360	Operations Management	3
MGMT 451	Negotiation and Alternative Dispute Resolution	3
MRKT 430	Sales and Personal Selling	3
MRKT 438	Customer Relationship Management (CRM) and Sales Technology	3
MRKT 460	Marketing Strategy	3
AGEC 378	Introduction to Transportation & Logistics	3

- Students follow the published curricula for the business administration program of study from the semester/year of entrance in the College of Business to graduation, provided enrollment at NDSU has not been discontinued for more than one year. Students who change their major are subject to meeting the curricular requirements in effect at the time the new major is declared.
- Business courses from programs that do not hold AACSB International accreditation cannot be used for major or minor requirements in the College of Business (CoB); such courses may be eligible for use as free electives.
- The CoB accepts a maximum of nine credits of non-NDSU 300-400 level business courses from AACSB programs with approval of the department.

- Admission into the Business Administration Major: Students must earn a 'C' or better in the pre-college and pre-business administration major courses that are indicated with an asterisk (*), achieve junior standing (60 credits), and earn a 2.50 institutional cumulative grade point average. Students must submit an online application to the CoB.
- Admission to the business administration major is required to enroll in advanced 300 or 400 level CoB courses.
- A grade of 'C' or better is required in transfer courses accepted for ACCT 200 Elements of Accounting I and ACCT 201 Elements of Accounting II and all 300-400 level accounting, business administration, finance, management, management information systems, and marketing courses.
- A letter grade must be earned in any course that fulfills a major requirement.
- A 2.50 cumulative grade point average is required to enroll in 300-400 level CoB courses.
- Students must earn a 2.50 institutional GPA to graduate.
- Of the credits completed in residence at least 30 credits must be in 300-400 level CoB courses.
- Students must be accepted to the Business Administration major prior to the completion of the last 30 credits in 300 and 400 level CoB courses.
- For multiple majors within CoB, at least 15 unique credits of 300-400 level CoB courses must exist between the majors.
- Internship and cooperative education credits may be applied toward the total credits required for graduation as non-major electives.
- Students should refer to www.ndsu.edu/business for current and complete listing of the major requirements.

Minor Requirements

Business Administration Minor

Minor Requirements

Required Credits: 24

Students should refer to College of Business (https://www.ndsu.edu/business) for information on declaring this minor.

Code	Title	Credits
Requirements		
Select one of the following:		3-6
ACCT 102	Fundamentals of Accounting	
ACCT 200 & ACCT 201	Elements of Accounting I and Elements of Accounting II	
Select one of the following:		3-6
ECON 105	Elements of Economics	
ECON 201 & ECON 202	Principles of Microeconomics and Principles of Macroeconomics	
Select two of the following:		6
FIN 320	Principles of Finance	
MGMT 320	Foundations of Management	
MRKT 320	Foundations of Marketing	
Elective Courses		12
An additional 12 credits of 300-400 level business administration (BUSN), Finance (FIN), Management (MGMT), or Marketing (MRKT) courses; may include MIS 320, ENTR 366, ENTR 385, LEAD 305, LEAD 325, but excludes BUSN 413 and BUSN 415; may also include courses cross-listed with CoB courses		
Total Credits		24

Minor Requirements and Notes

- To be accepted into the minor program, students must have a 2.50 institutional cumulative GPA and at least junior standing (60 credits). This minor is not available to students with majors in the College of Business.
- Departmental approval is required for any course (including Tri-College) NOT completed at NDSU and used to satisfy the minor requirements (6 credits maximum).
- Students must earn a 2.50 minimum GPA, which is based upon the courses used to satisfy the minor requirements. Minors must satisfy all course prerequisites.
- Students should refer to www.ndsu.edu/business for information on declaring the minor with the College of Business.
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Chemistry

Department Information

- **Department Location:**
  Ladd Hall
- **Department Phone:**
  701-231-8694
- **Department Email:**
  ndsu.chemistry@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/chemistry/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/chemistry/#planofstudytext

Major Requirements

Major: Chemistry

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Code	Title	Credits
Chemistry Core Requirements		
Select one from the following (May satisfy general education category R):		4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
Select one from the following (May satisfy general education category S):		4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 341	Organic Chemistry I	3
CHEM 342	Organic Chemistry II	3
CHEM 353	Majors Organic Chemistry Laboratory I	1
CHEM 354	Majors Organic Chemistry Laboratory II	2
CHEM 364	Physical Chemistry I	3
CHEM 365	Physical Chemistry II	3
CHEM 380	Chemistry Junior Seminar	1
CHEM 431 & 431L	Analytical Chemistry I and Analytical Chemistry I Laboratory	5
CHEM 471	Physical Chemistry Laboratory (Not required for Pre-professional and Chemistry Education Options)	2
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
BIOC 460L	Foundations of Biochemistry I Laboratory	1
CHEM 491	Seminar	2
Related Required Courses		
ENGL 321	Writing in the Technical Professions (May satisfy general education category C)	3
or ENGL 324	Writing in the Sciences	
MATH 128	Introduction to Linear Algebra	1
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
PHYS 251 & 251L	University Physics I and University Physics I Laboratory (May satisfy general education category S)	5

PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5
Option	**Select one of the five options listed below to complete the major.**	12-32
Total Credits		74-94

Select one of the five options to complete major requirements (12-32 credits):

Option 1: ACS Certified Chemistry

Code	Title	Credits
CHEM 425 & CHEM 429	Inorganic Chemistry I and Inorganic Chemistry Laboratory	5
CHEM 432 & 432L	Analytical Chemistry II and Analytical Chemistry II Laboratory	4
MATH 266	Introduction to Differential Equations	3
Total Credits		12

Option 2: ACS Certified w/Biochemistry Option

Code	Title	Credits
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
BIOC 473	Methods of Biochemical Research	3
BIOC 474	Methods of Recombinant DNA Technology	3
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
CHEM 425 & CHEM 429	Inorganic Chemistry I and Inorganic Chemistry Laboratory	5
MATH 266	Introduction to Differential Equations	3
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
Select 6 credits of the following (Biology):		6
BIOL 315 & 315L	Genetics and Genetics Laboratory	
BOT 380	Plant Physiology	
MICR 352	General Microbiology II	
ZOO 370	Cell Biology	
Total Credits		32

Option 3: Coating & Polymeric Materials

Code	Title	Credits
CHEM 425 & CHEM 429	Inorganic Chemistry I and Inorganic Chemistry Laboratory	5
CHEM 471	Physical Chemistry Laboratory	2
CHEM 432 & 432L	Analytical Chemistry II and Analytical Chemistry II Laboratory	4
CPM 473	Polymer Synthesis	3
CPM 474 & CPM 484	Applied Polymer Science and Coatings I Laboratory	5
CPM 475 & CPM 485	Coatings' Materials Science and Coatings II Laboratory	5
MATH 266	Introduction to Differential Equations	3
Total Credits		27

Option 4: Pre-Professional Option

Code	Title	Credits
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4

BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
CHEM 425	Inorganic Chemistry I	3
MATH 266	Introduction to Differential Equations	3
or STAT 330	Introductory Statistics	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
Total Credits		23

Option 5: Chemistry Pre-Education Application must be made to the School of Education in order to obtain a teaching degre

Code	Title	Credits
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
CHEM 425	Inorganic Chemistry I	3
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
MATH 266	Introduction to Differential Equations	3
or STAT 330	Introductory Statistics	
PHYS Elective		3
Recommended for Education Option		
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
Total Credits		27

Minor Requirements

Chemistry Minor

Minor Requirements

Required Credits: 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

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921

- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/chemistry-education/#planofstudytext

Major Requirements

Major: Chemistry Education

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 136

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

major Requirements

Code	Title	Credits
Chemistry Education Requirements		
BIOL 124 & 124L	Environmental Science and Environmental Science Laboratory (May satisfy general education category S)	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 S and G)	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab (May satisfy general education category S)	4
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Teaching Specialty Requirements		
Select one of the following:		4
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342 & 342L	Organic Chemistry II and Organic Chemistry II Laboratory	4
CHEM 364	Physical Chemistry I	3
CHEM 365	Physical Chemistry II	3
CHEM 425	Inorganic Chemistry I	3
CHEM 431 & 431L	Analytical Chemistry I and Analytical Chemistry I Laboratory	5
CHEM 491	Seminar (Senior Capstone)	2
PHYS 251 & 251L	University Physics I and University Physics I Laboratory	5
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3-4
or MATH 265	Calculus III	
MATH 266	Introduction to Differential Equations	3
Select sequence A or sequence B:		8
Sequence A:		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Sequence B:		
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Science)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		112

Degree Requirements and Notes

- Courses taken P/F may not be used to satisfy any requirements.
- GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A grade of 'C' or better is required in all Professional Education Requirement courses.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- See School of Education (https://www.ndsu.edu/education) for admission requirements.

Civil Engineering

Department Information

- **Department Location:**
  Civil & Industrial Engineering
- **Department Phone:**
  701-231-7244
- **Department Web Site:**
  www.ndsu.edu/ce/
- **Degrees Offered:**
  B.S.C.E.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/civil-engineering/#planofstudytext

Major Requirements

Major: Civil Engineering

Degree Type: B.S.C.E.
Minimum Credits Required for Degree: 133

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Civil Engineering Core Requirements		
CE 111	Introduction to Civil Engineering	2
CE 204	Surveying	4
CE 212	Civil Engineering Graphic Communications	3
CE 303	Civil Engineering Materials	2
CE 303L	Civil Engineering Materials Laboratory	1
CE 309	Fluid Mechanics	3
CE 310	Fluid Mechanics Laboratory	1
CE 316	Soil Mechanics	3
CE 343	Structural Engineering and Analysis	4
CE 370	Introduction to Environmental Engineering	3
CE 371	Environmental Engineering Laboratory	1
CE 404	Reinforced Concrete	3
CE 408	Water Resources and Supply	3
CE 418	Transportation Engineering	4
CE 444	Structural Steel Design	3
CE 483	Contracts and Specifications	3
CE 489	Senior Design	3
MATH Courses Required*:		
MATH 128	Introduction to Linear Algebra	1
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
Other Required Courses :		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory (May satisfy general education category S)	4
ENGR 402	Engineering Ethics and Social Responsibility	1
ENGR 311	History of Technology in America (May satisfy general education category A)	3
ENGR 312	Impact of Technology on Society (May satisfy general education category B)	3
ENGL 321	Writing in the Technical Professions (May satisfy general education category C)	3
GEOL 105	Physical Geology (May satisfy general education category S and G)	3
IME 440	Engineering Economy	2
IME 460	Evaluation of Engineering Data	3
ME 221	Engineering Mechanics I *	3
ME 222	Engineering Mechanics II *	3
ME 223	Mechanics of Materials *	3
ME 350	Thermodynamics and Heat Transfer	3
PHYS 252	University Physics II	4
Technical Electives Required: Select 12 credits from the following:		12

Structures:	
CE 411	Design of Pre-stressed Concrete (Design Credits 1.0)
CE 425	Bridge Evaluation and Rehabilitation (Design Credits 1.5)
CE 430	Timber and Form Design (Design Credits 1.5)
CE 441	Finite Element Analysis (Design Credits 1.0)
CE 445	Advanced Steel Design (Design Credits 1.0)
CE 446	Basic Dynamics of Structures (Design Credits 1.0)
CE 447	Stability of Structures (Design Credits 1.5)
CM&E 465	Bridge Engineering and Management (Design Credits 1.5)
Water Resources:	
CE 421	Open Channel Flow (Design Credits 1.5)
CE 476	Watershed Modeling (Design Credits 1.5)
CE 477	Applied Hydrology (Design Credits 1.5)
Environmental:	
CE 410	Water and Wastewater Engineering (Design Credits 1.5)
CE 471	Environmental Nanotechnology (Design Credits 1.5)
CE 472	Solid Waste Management (Design Credits 1.5)
CE 473	Air Pollution (Design Credits 1.5)
CE 478	Water Quality Management (Design Credits 1.5)
CE 479	Advanced Water and Wastewater Treatment (Design Credits 1.5)
CE 499	Special Topics (Design Credits 1.5)
Transportation:	
CE 419	Pavement Design (Design Credits 1.5)
CE 454	Geometric Highway Design (Design Credits 2.0)
CE 455	Airport Planning and Design (Design Credits 1.0)
CE 456	Railroad Planning and Design (Design Credits 1.5)
CE 457	Pavement Management Systems (Design Credits 1.0)
CE 458	Bituminous Materials and Mix (Design Credits 1.5)
CE 499	Special Topics (Design Credits 1.0)
Geotechnical:	
CE 417	Slope Stability and Retaining Walls (Design Credits 1.5)
CE 461	Foundation Engineering (Design Credits 1.0)
CE 462	Designing with Geosynthetics (Design Credits 1.0)
CE 463	Geotechnical Earthquake Engineering (Design Credits 1.5)
CE 464	Advanced Soil Mechanics (Design Credits 1.0)
Advanced Materials:	
CE 486	Nanotechnology and Nanomaterials (Design Credits 0.0)
Total Credits	115

* No grades less than a "C" are accepted in any of the math courses, as well as ME 221 Engineering Mechanics I, ME 222 Engineering Mechanics II, and ME 223 Mechanics of Materials for this curriculum.

Degree Requirements and Notes

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.
- **Students must complete courses in a minimum of three technical areas with a minimum of 6 credits in design for a minimum total of 12 technical electives.**
- Transfer students are required to take ENGR 311 History of Technology in America or ENGR 312 Impact of Technology on Society regardless of General Education completion.

Note: *Department permission required for graduate level courses. Credit may be earned only at the undergraduate level. Department permission is also required for some undergraduate courses. There are specific prerequisites and grade requirements to be allowed to take certain courses.*

Coatings and Polymeric Materials

Department Information

- **Department Location:**
  Research 1
- **Department Phone:**
  701-231-7633
- **Department Web Site:**
  www.ndsu.edu/cpm/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/coatings-polymeric-materials/

Minor Requirements

Coatings & Polymeric Materials Minor

Minor Requirements

Required Credits: 16

Code	Title	Credits
Required Courses: Select 16 credits from the following:		16
CHEM 341	Organic Chemistry I	
CHEM 341L	Organic Chemistry I Laboratory	
CHEM 342	Organic Chemistry II	
CHEM 342L	Organic Chemistry II Laboratory	
CPM 451	Laboratory, Chemical, Radiation, and Biological Safety	
CPM 472	Environment and Chemical Industries	
CPM 473	Polymer Synthesis	
CPM 474	Applied Polymer Science	
CPM 475	Coatings' Materials Science	
CPM 483	Polymer Practicum	
CPM 484	Coatings I Laboratory	
CPM 485	Coatings II Laboratory	
CPM 486	Corrosion and Materials	
CPM 487	Corrosion and Materials Laboratory	
Total Credits		16

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU.
- If CHEM 341 Organic Chemistry I/CHEM 341L Organic Chemistry I Laboratory and CHEM 342 Organic Chemistry II/CHEM 342L Organic Chemistry II Laboratory are required for Major degree, the credits cannot also count toward a minor in Coatings and Polymeric Materials. CHEM 353 Majors Organic Chemistry Laboratory I and CHEM 354 Majors Organic Chemistry Laboratory II can be substituted for CHEM 341L Organic Chemistry I Laboratory and CHEM 342L Organic Chemistry II Laboratory.
- Chemistry majors taking CPM minor are required to have CPM 473 Polymer Synthesis.
- One CPM Laboratory Course (CPM 484 Coatings I Laboratory, CPM 485 Coatings II Laboratory, CPM 483 Polymer Practicum, CPM 487 Corrosion and Materials Laboratory)

Community Development

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**

701-231-8657

- **Department Web Site:**
  www.ndsu.edu/socanth/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/community-development/

Minor Requirements

Community Development Minor

Minor Requirements

Required Credits: 18

Code	Title	Credits
Required Courses		
SOC 404	Community Assessment	3
SOC 405	Community Development	3
Economic Electives: Select at least one course from the following:		3
AGEC 220	World Agricultural Development	
AGEC 350	Agrisales	
AGEC/BUSN 347	Principles of Real Estate	
AGEC/BUSN 474	Cooperatives	
ECON 341	Intermediate Microeconomics	
ECON 461	Economic Development	
ECON 470	Public Economics	
ECON 472	International Trade	
ECON 481	Natural Resource Economics	
Business Administration Electives: Select at least one course from the following:		3
ACCT 102	Fundamentals of Accounting	
ACCT 200	Elements of Accounting I	
ACCT 201	Elements of Accounting II	
BUSN 430	Legal and Social Environment of Business	
BUSN 431	Business Law I-Contracts, Property and Torts	
BUSN 432	Business Law II-Business Organization and Commercial Transactions	
BUSN 487	Managerial Economics	
FIN 320	Principles of Finance	
FIN 410	Investment Analysis and Management	
FIN 430	Management of Financial Institutions	
MGMT 301	Management for Non-Business Majors	
MGMT 430	Leadership in Organizations	
MGMT 453	Understanding and Managing Diversity in Organizations	
MGMT 470	Entrepreneurship/Small Business Management	
MGMT 471	Leading the Nonprofit Organization	
MRKT 301	Marketing for Non-Business Majors	
MRKT 450	Marketing Research	
Social Science Electives: Select at least one course from the following:		3
COMM 200	Introduction to Media Writing	
COMM 472	Public Relations Campaigns	
EMGT 101	Emergencies, Disasters, and Catastrophes	
EMGT 264	Disaster Recovery	
EMGT 461	Business Continuity and Crisis Management	
GEOG 455	Introduction to Geographic Information Systems	

POLS 360	Principles of Public Administration
SOC 431	Environmental Sociology
SOC 439	Social Change
SOC 465	Applied Demographics
SOC/BUSN/ECON 196	Field Experience (or 296, 396, 496; no more than 3 credits)
SOC/BUSN/ECON 199	Special Topics (or 299, 399, 499; no more than 3 credits)
Select one additional course from the above categories	3
Total Credits	18

Minor Requirements and Notes

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

Comprehensive Science Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/comprehensive-science-education/#planofstudytext

Major Requirements

Major: Comprehensive Science Education

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 136

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Quantitative Reasoning (R) †		3
Science and Technology (S) †		10
Humanities and Fine Arts (A) †		6

Social and Behavioral Sciences (B) †	6
Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Comprehensive Science Education Requirements		
ENGL 324	Writing in the Sciences (May satisfy general education category C)	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Teaching Specialty Requirements		
BIOC 260	Elements of Biochemistry	4
BIOL 124 & 124L	Environmental Science and Environmental Science Laboratory	4
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
BIOL 491	Seminar	2
BOT 372	Structure and Diversity of Plants and Fungi	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342 & 342L	Organic Chemistry II and Organic Chemistry II Laboratory	4
Computer Science Elective	Elective	2
MATH 165	Calculus I	4
MATH 166	Calculus II	4
PHYS 110	Introductory Astronomy	3
PHYS 251 & 251L	University Physics I and University Physics I Laboratory	5
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5
GEOL 105 & 105L	Physical Geology and Physical Geology Lab (May satisfy general education category G)	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
Biology/Botany/Zoology Elective	300-400 Level	6
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (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		112

Degree Requirements and Notes

- Courses taken P/F may not be used to satisfy any requirements.
- GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A grade of 'C' or better is required in all Professional Education Requirement courses.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- See School of Education (https://www.ndsu.edu/education) for admission requirements.

Computer Engineering

Department Information

- **Department Location:**
  Electrical and Computer Engineering
- **Department Phone:**
  701-231-7019
- **Department Web Site:**
  www.ndsu.edu/ece/
- **Degrees Offered:**
  B.S.Cpr.E.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/computer-engineering/#planofstudytext

Major Requirements

Major: Computer Engineering

Degree Type: B.S.Cpr.E.
Required Degree Credits to Graduate: 128

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Quantitative Reasoning (R) †		3
Science and Technology (S) †		10

Humanities and Fine Arts (A) †	6
Social and Behavioral Sciences (B) †	6
Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Computer Engineering Core Requirements		
ECE 111	Introduction to Electrical and Computer Engineering	3
ECE 173	Introduction to Computing *	4
ECE 275	Digital Design *	4
ECE 320	Electronics for Computer Engineers	3
ECE 341	Random Processes	3
ECE 343	Signals & Systems	4
ECE 374	Computer Organization	4
ECE 376	Embedded Systems	4
ECE 401	Design I (capstone)	1
ECE 403	Design II (capstone)	2
ECE 405	Design III (capstone)	3
ECE 474	Computer Architecture	3
ECE 475	Advanced Digital Design	4
Math Courses Required		
MATH 129	Basic Linear Algebra *	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II *	4
MATH 265	Calculus III (w/ vectors) *	4
MATH 266	Introduction to Differential Equations *	3
CSCI Courses Required		
CSCI 161	Computer Science II (May satisfy general education category S for Computer Engineering majors only))	4
CSCI 222	Discrete Mathematics	3
CSCI 413	Principles of Software Engineering	3
CSCI 459	Foundations of Computer Networks	3
CSCI 474	Operating Systems Concepts	3
Other Courses Required		
CHEM 121	General Chemistry I (May satisfy general education category S)	3
CHEM 121L	General Chemistry I Laboratory (May satisfy general education category S)	1
or PHYS 251L	University Physics I Laboratory	
EE 206	Circuit Analysis I *	4
Select one of the following: (May satisfy general education category C)		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
ENGR 402	Engineering Ethics and Social Responsibility	1

PHYS 251	University Physics I (May satisfy general education category S)	4
ECE Electives	**Select 6 cr. of ECE 400 level electives (excluding 494 and 496); may include CSCI 467**	6
Includes the cross listed courses of ECE/IME 427; ECE/IME 429; ECE/PHYS 411; & ECE/PHYS 411L		
Tech Electives: Select 6 credits from the following:		6
CSCI 336	Theoretical Computer Science	
CSCI 366	Database Systems	
CSCI 372	Comparative Programming Languages	
CSCI 4XX	Any CSCI 400 level didactic course	
ECE 311	Circuit Analysis II	
ECE 321	Electronics for Electrical Engineers †	
ECE 351	Applied Electromagnetics	
ECE 4XX	Any ECE 400 level didactic course	
ECE 494	Individual Study	
ECE 496	Field Experience (max. of 3 cr.)	
ENGR 310	Entrepreneurship for Engineers and Scientists	
IME 440	Engineering Economy	
IME 456	Program and Project Management	
IME 460	Evaluation of Engineering Data	
IME 470	Operations Research I	
PHYS 252	University Physics II	
Total Credits		100

* No grade less than a C accepted in these courses.

Degree Requirements and Notes

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.
- Transfer Students – Transfer courses with grades less than 'C' in Biology, Chemistry, Computer Science, Mathematics, Physics, and any type of engineering class will not be accepted as a major requirement.
- In order to graduate, an ECE student must have at least a 2.0 GPA in all required EE and ECE courses taken at NDSU. Elective ECE courses are not included in this GPA requirement.
- All Students – Students are required to attain a grade of 'C' or better in ECE 173 Introduction to Computing, ECE 275 Digital Design, EE 206 Circuit Analysis I, and all required MATH courses.

Computer Science

Department Information

- **Department Location:**
  Quentin Burdick Building
- **Department Phone:**
  701-231-8568
- **Department Web Site:**
  www.ndsu.edu/cs/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/computer-science/

Major Requirements

Major: Computer Science

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

A Grade of 'C' or better is required for all CSCI prefix courses.

Code	Title	Credits
B.S. Computer Science Core Requirements		
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
CSCI 189	Skills for Academic Success [1]	1
CSCI 213	Modern Software Development	3

CSCI 222	Discrete Mathematics	3
CSCI 313	Software Development for Games	3
CSCI 336	Theoretical Computer Science	3
CSCI 366	Database Systems	3
CSCI 372	Comparative Programming Languages	3
CSCI 374	Computer Organization and Architechure	3
CSCI 415	Networking and Distributed Systems	3
CSCI 445	Software Projects Capstone [2]	3
CSCI 467	Algorithm Analysis	3
CSCI 474	Operating Systems Concepts	3
CSCI 489	Social Implications of Computers [2]	3
ENGL 321	Writing in the Technical Professions (May satisfy general education category C)	3
or ENGL 324	Writing in the Sciences	
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
STAT 367	Probability	3
STAT 368	Statistics	3
Computer Science Electives: Select 3 courses from the list below.		9
Note: Students seeking recognition of cyber-security skills should follow the cyber-security section below.		
CSCI 345	Topics on Personal Computers	
CSCI 371	Web Scripting Languages	
CSCI 413	Principles of Software Engineering	
CSCI 418	Simulation Models	
CSCI 426	Introduction to Artificial Intelligence	
CSCI 428	Computational Techniques for Environmental Sustainability	
CSCI 450	Cloud Computing	
CSCI 453	Linear Programming and Network Flows	
CSCI 454	Operations Research	
CSCI 458	Computer Graphics	
CSCI 459	Foundations of Computer Networks	
CSCI 462	Mobile and Wireless Networks	
CSCI 469	Network Security	
CSCI 473	Foundations of the Digital Enterprise	
CSCI 476	Computer Forensics	
CSCI 477	Object-Oriented Systems	
CSCI 479	Introduction to Data Mining	
CSCI 488	Human-Computer Interaction	
CSCI 491	Seminar (Cyber-Security Focus)	
CSCI 499	Special Topics	
MIS 412	Computer Crime, Forensics, and Investigation	
MIS 415	Managing Information Technology Security	
Total Credits		71

Cyber-security

Cyber-security is optional - students interested in pursuing recognition of their achievement in cyber-security core concepts should take the B.S. Core Requirements as indicated above, as well as the additional courses listed here. This sequence satisfies the Computer Science elective courses required for the B.S. degree.

Code	Title	Credits
CSCI 491	Seminar (Cyber-Security Focus)	3
MIS 415	Managing Information Technology Security	3
One of the following:		3
CSCI 473	Foundations of the Digital Enterprise	

CSCI 345	Topics on Personal Computers (Cyber-Security Focus)
CSCI 499	Special Topics (Cyber-Security Focus)
MIS 412	Computer Crime, Forensics, and Investigation
Total Credits	9

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

[2] Together, 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), form the department capstone.

Link to view program description and 4-year Plan of Study (p. 71)

Major Requirements

Major: Computer Science

Degree Type: B.A.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

A Grade of 'C' or better is required for all CSCI prefix courses.

Code	Title	Credits
B.A. Computer Science Core Requirements		
CSCI 114	Microcomputer Packages (May satisfy general education category S)	3
or MIS 116	Business Use of Computers	
CSCI 159	Computer Science Problem Solving	3
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
CSCI 189	Skills for Academic Success [1]	1
CSCI 213	Modern Software Development	3
CSCI 222	Discrete Mathematics	3
CSCI 313	Software Development for Games	3
CSCI 366	Database Systems	3
CSCI 371	Web Scripting Languages	3
CSCI 445	Software Projects Capstone [2]	3
CSCI 488	Human-Computer Interaction	3
CSCI 489	Social Implications of Computers [2]	3
Related Courses		
COMM 260	Introduction to Web Design	3
COMM 261	Introduction to Web Development	3
ENGL 321	Writing in the Technical Professions (May satisfy general education category C)	3
or ENGL 324	Writing in the Sciences	
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 (a course with a number higher than MATH 147, but not MATH 165)		
Statistics (cannot be STAT 330 or STAT 331)		
Total Credits		64

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

2 CSCI 445 Software Projects Capstone & CSCI 489 Social Implications of Computers form the department capstone. CSCI 445 is typically taken during the last spring semester and CSCI 489 is typically taken during the last fall semester prior to degree completion.

Minor Requirements

Computer Science Minor

Minor Requirements

Required Credits: 17

Code	Title	Credits
Required Courses		
CSCI 213	Modern Software Development	3
Choose one of the following two sequences:		7-8
CSCI 160 & CSCI 161	Computer Science I and Computer Science II	
CSCI 227 & CSCI 161	Computing Fundamentals I and Computer Science II	
Additional Electives: Select 7-8 credits (at least 3 credits must be CSCI 300-400 level).		7-8
Total Credits		17-19

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- A grade of 'C' or better is required in all courses applied to the computer science minor.

Computer Science and Mathematics

Department Information

- **Department Location:**
  Quentin Burdick Building or Minard Hall
- **Department Web Site:**
  www.ndsu.edu/cs/ or www.ndsu.edu/math/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/computer-science-mathematics/#planofstudytext

Major Requirements

Major: Computer Science & Mathematics

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

A grade of 'C' or better is required in MATH & CSCI prefix courses used toward the major.

Code	Title	Credits
Mathematics Major Requirements		
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 270	Introduction to Abstract Mathematics	3
MATH 329	Intermediate Linear Algebra	3
MATH 420	Abstract Algebra I	3
Choose 6 credits of 300-400 level Math courses (we recommend two of the following):		6
MATH 421	Abstract Algebra II	
MATH 430	Graph Theory	
MATH 436	Combinatorics	
MATH 488	Numerical Analysis I	
MATH 491	Seminar	2
Computer Science Major Requirements		
CSCI 160	Computer Science I	4

CSCI 161	Computer Science II	4
CSCI 189	Skills for Academic Success [1]	1
CSCI 213	Modern Software Development	3
CSCI 313	Software Development for Games	3
CSCI 336	Theoretical Computer Science	3
CSCI 366	Database Systems	3
CSCI 372	Comparative Programming Languages	3
CSCI 374	Computer Organization and Architechure	3
CSCI 445	Software Projects Capstone	3
CSCI 467	Algorithm Analysis	3
CSCI 489	Social Implications of Computers	3
Related Required Courses		
STAT 367	Probability	3
STAT 368	Statistics	3
Select one from the following:		3
CSCI 418	Simulation Models	
CSCI 453	Linear Programming and Network Flows	
Any 400 level Mathematics Course not used to satisfy a requirement above		
Total Credits		80

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

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Computer Science and Physics

Department Information

- **Department Location:**
  Quentin Burdick Building or South Engineering
- **Department Web Site:**
  www.ndsu.edu/cs/ or www.ndsu.edu/physics/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/computer-science-physics/

Major Requirements

Major: Computer Science & Physics

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 122

University Degree Requirements

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

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

7. At least 36 credits must be NDSU resident credits. Residence credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

A grade of 'C' or better is required for all CSCI, PHYS, and AST prefix courses.

Code	Title	Credits
Computer Science Major Requirements		
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
CSCI 189	Skills for Academic Success [1]	1
CSCI 213	Modern Software Development	3
CSCI 336	Theoretical Computer Science	3
CSCI 366	Database Systems	3
CSCI 372	Comparative Programming Languages	3
CSCI 374	Computer Organization and Architechure	3
CSCI 467	Algorithm Analysis	3
CSCI 474	Operating Systems Concepts	3
CSCI Electives	CSCI 313 and/or any 400-level CSCI course that is not already used.	6

Physics Major Requirements:		
PHYS 171	Introductory Projects in Physics	1
PHYS 251 & 251L	University Physics I and University Physics I Laboratory (May satisfy general education category S)	5
PHYS 251R	University Physics I Recitation	1
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
PHYS 252R	University Physics II Recitation	1
PHYS 350	Modern Physics	3
PHYS 360	Modern Physics II	3
PHYS 361	Electromagnetic Theory (or PHY 370: Electromagnetic Theory at MSUM)	3
PHYS 370	Introduction to Computational Physics	3
PHYS 355	Classical Mechanics (or PHY 330: Internediate Mechanics at MSUM)	3
PHYS 462	Thermal and Statistical Physics	3
PHYS 485	Quantum Mechanics I	3
PHYS 486	Quantum Mechanics II	3
Physics Electives: Select from the following:		6
PHYS 215	Research For Undergraduates	
PHYS 411	Optics for Scientists & Engineers	
PHYS 413	Lasers for Scientists and Engineers	
PHYS 415	Elements of Photonics	
PHYS 463	Statistical Mechanics	
PHYS 481	Condensed Matter Physics	
PHYS 488	Senior Project I (If not used to satisfy project requirement)	
PHYS 489	Senior Project II (If not used to satisfy project requirement)	
MSUM AST	Astronomy courses (300/400-level) with departmental permissionsion	
Related Required Courses		
MATH 129	Basic Linear Algebra	3
or MATH 329	Intermediate Linear Algebra	
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 270	Introduction to Abstract Mathematics	3
CSCI 445	Software Projects Capstone	3
or PHYS 488 & PHYS 489	Senior Project I and Senior Project II	
Total Credits		103

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

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Construction Engineering

Department Information

- **Department Location:**
  Construction Management and Engineering
- **Department Phone:**
  701-231-6202
- **Department Web Site:**

www.ndsu.edu/construction/

- **Degrees Offered:**
  B.S.Cons.E.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/construction-engineering/#planofstudytext

Major Requirements

Major: Construction Engineering

Degree Type: B.S.Cons.E.
Required Degree Credits to Graduate: 131

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

major requirements

Code	Title	Credits
Construction Engineering Core Requirements		
CM&E 111	Introduction to Construction Management and Engineering	1
CM&E 200	Construction Documents and Codes	3
CM&E 204	Construction Surveying	3
CM&E 212	Construction Graphic Communications	3
CM&E 240	Financial Cost Concepts for Construction Managers	3

CM&E 301	Construction Technology and Equipment	3
CM&E 305	Pre-Construction Management	3
CM&E 315	Specifications and Contracts	3
CM&E 380	Construction Estimating: Quantities and Costs	3
CM&E 403	Scheduling and Project Control	3
CM&E 405	Construction Support Operations	3
CM&E 489	Construction Design Capstone	3
CE Courses:		
CE 303 & 303L	Civil Engineering Materials and Civil Engineering Materials Laboratory	3
CE 309	Fluid Mechanics	3
CE 316	Soil Mechanics	3
CE 343	Structural Engineering and Analysis	4
CE 400 Level Courses: Select 12 credits from the following:		12
CM&E 465	Bridge Engineering and Management	
CM&E 475	Design of Site Erosion Control	
CE 404	Reinforced Concrete	
CE 408	Water Resources and Supply	
CE 411	Design of Pre-stressed Concrete	
CE 417	Slope Stability and Retaining Walls	
CE 419	Pavement Design	
CE 421	Open Channel Flow	
CE 430	Timber and Form Design	
CE 441	Finite Element Analysis	
CE 444	Structural Steel Design	
CE 461	Foundation Engineering	
CE 462	Designing with Geosynthetics	
CE 478	Water Quality Management	
ME Courses Required:		
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 223	Mechanics of Materials	3
Math Courses Required:		
MATH 128	Introduction to Linear Algebra	1
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
Additional Courses:		
BUSN 431	Business Law I-Contracts, Property and Torts	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122	General Chemistry II (May satisfy general education category S)	3
ENGR 402	Engineering Ethics and Social Responsibility	1
ENGL 320	Business and Professional Writing (May satisfy general education category C)	3
or ENGL 321	Writing in the Technical Professions	
GEOL 105	Physical Geology (May satisfy general education category S)	3
or GEOL 106	The Earth Through Time	
PHYS 252	University Physics II (May satisfy general education category S)	4
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Select one from the following (May satisfy general education category B & G):		3 or 6
ECON 105	Elements of Economics	

ECON 201 & ECON 202	Principles of Microeconomics and Principles of Macroeconomics
Total Credits	110-113

Degree Requirements and Notes

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.
- A minimum 2.50 cumulative GPA is required for transfer students to be admitted to the B.S. in construction engineering program.
- To satisfy the Gen Ed Category B requirements, a student can choose between two options: ECON 105 plus an additional course within Category B OR ECON 201 and ECON 202. Both options satisfy the Gen Ed Category G requirement.

Construction Management

Department Information

- **Department Location:**
  Construction Management and Engineering
- **Department Phone:**
  701-231-6202
- **Department Web Site:**
  www.ndsu.edu/construction/
- **Degrees Offered:**
  B.S.Cons.M.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/construction-management/#planofstudytext

Major Requirements

Major: Construction Management

Degree Type: B.S.Cons.M.
Minimum Credits Required for Degree: 124

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Quantitative Reasoning (R) †		3
Science and Technology (S) †		10
Humanities and Fine Arts (A) †		6
Social and Behavioral Sciences (B) †		6

Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Construction Management Core Requirements		
CM&E 111	Introduction to Construction Management and Engineering	1
CM&E 200	Construction Documents and Codes	3
CM&E 203	Building Construction: Methods and Materials	3
CM&E 204	Construction Surveying	3
CM&E 212	Construction Graphic Communications	3
CM&E 240	Financial Cost Concepts for Construction Managers	3
CM&E 250	Construction Statics and Mechanics	3
CM&E 260	Soils and Foundations	3
CM&E 301	Construction Technology and Equipment	3
CM&E 305	Pre-Construction Management	3
CM&E 315	Specifications and Contracts	3
CM&E 380	Construction Estimating: Quantities and Costs	3
CM&E 403	Scheduling and Project Control	3
CM&E 405	Construction Support Operations	3
CM&E 421	Electrical and Mechanical Construction	3
CM&E 430	Land Development	3
CM&E 450	Steel Design and Construction	3
CM&E 453	Concrete Design and Construction	3
CM&E 488	Construction Management Capstone	3
Additional Courses:		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
ENGL 320	Business and Professional Writing (May satisfy general education category C)	3
or ENGL 321	Writing in the Technical Professions	
GEOL 105	Physical Geology (May satisfy general education category S)	3
MATH 105	Trigonometry	3
or MATH 107	Precalculus	
MATH 146	Applied Calculus I (May satisfy general education category R)	4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory (May satisfy general education category S)	4
STAT 330	Introductory Statistics	3
Business Minor Courses:		24
ACCT 102	Fundamentals of Accounting	3
Select one from the following (May satisfy general education category B & G):		3 or 6
ECON 105	Elements of Economics	
ECON 201 & ECON 202	Principles of Microeconomics and Principles of Macroeconomics	
MGMT 320	Foundations of Management	3
MRKT 320	Foundations of Marketing	3

or FIN 320	Principles of Finance	
BUSN 431	Business Law I-Contracts, Property and Torts	3
BA Minor 300/400 Elec. I		3
BA Minor 300/400 Elec. II		3
BA Minor 300/400 Elec. III		3
Students must apply for the minor through the College of Business and maintain a minimum 2.50 cumulative GPA to be eligible to enroll in all 300/400 level courses offered by the College of Business		
Total Credits		103-106

Degree Requirements and Notes

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the College of Engineering. Students transferring into the College of Engineering from programs with professional accreditation are exempt from this residency requirement but are subject to the University residency requirement.
- An overall minimum cumulative GPA of 2.50 in all courses and a minor in Business Administration with a minor GPA of 2.50 are required to graduate with a B.S. in Construction Management.
- A cumulative GPA of 2.50 is required for both internal and external transfer students into this program.
- To satisfy the Gen Ed Category B requirements, a student can choose between two options: ECON 105 plus an additional course within Category B OR ECON 201 and ECON 202. Both options satisfy the Gen Ed Category G requirement and the requirements for the BA minor.

Creative Writing

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7143
- **Department Web Site:**
  www.ndsu.edu/english/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/creative-writing/

Minor Requirements

Creative Writing Minor

Required Credits: 21

Code	Title	Credits
ENGL 229	Introduction to Creative Writing	3
ENGL 272	Literary Analysis	3
ENGL 322	Writing and the Creative Process	3
ENGL 423	Creative Writing Studio	3
Select 6 credits from the following:		6
ENGL 323	Creative Writing (select from the options listed here)	
Creative Writing (Fiction - Fall semester)		
Creative Writing (Poetry - Spring semester)		
Creative Writing (Creative Non-Fiction - offered by demand)		
Creative Writing (Scriptwriting - offered by demand)		
Select one course from the following:		3
ENGL 315	British Literature I	
ENGL 316	British Literature II	
ENGL 317	American Literature I	

ENGL 318	American Literature II
ENGL 326	Writing in the Design Professions
ENGL 330	British and American Women Writers
ENGL 331	Contemporary Women Writers
ENGL 333	Fantasy and Science Fiction
ENGL 335	Multicultural Writers
ENGL 336	Literature and The Environment
ENGL 340	19th Century American Fiction
ENGL 341	20th Century American Fiction
ENGL 345	Themes in American Culture
ENGL 377	Modern Poetry
ENGL 380	Shakespeare
ENGL 381	American Road Book
ENGL 382	Film Genres and Styles
ENGL 385	British Fiction
ENGL 389	Non-fiction Prose
ENGL 435	Young Adult Literature in a Multicultural World
ENGL 471	American Realistic Literature
ENGL 472	20th Century American Writers
ENGL 474	Native American Literature
ENGL 476	Topics in American Literature
ENGL 480	Medieval Literature
ENGL 482	Renaissance Literature
ENGL 483	Topics in British Literature
ENGL 485	18th Century Literature
ENGL 486	Romantic Literature
Total Credits	21

Criminal Justice

Department Information

- **Department Location:**
  Putnam Hall
- **Department Phone:**
  701-231-8567
- **Department Web Site:**
  www.ndsu.edu/cjps/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/criminal-justice/#planofstudytext

Major Requirements

Major: Criminal Justice

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major Requirements

Code	Title	Credits
Pre-Criminal Justice Requirements		
Complete 3 of the 4 courses below with an average GPA of 3.0 or higher in those courses to apply for admission to the major. Completion of all 4 courses are required for graduation.		
CJ 201	Introduction to Criminal Justice	3
CJ 210	Introduction to Policing	3
CJ 230	Criminology	3
CJ 270	Introduction to Corrections	3
Professional Major Requirements		
Professional courses require a minimum 3.0 GPA		
CJ 325	Applied Research Methods	4
or POLS 325	Applied Research Methods	
CJ 330	Criminal Law and Procedure	3
or POLS 431	Constitutional Law-Criminal Justice	
CJ 406	Crime and Delinquency	3
CJ 407	Deviant Behavior	3
CJ 460	Criminal Court System	3
CJ 461	Corrections	3
or CJ 410	Police & Society	
CJ 465	Women and Minorities in Criminal Justice	3
CJ 489	Senior Capstone in Criminal Justice	1
Additional Program Requirements:		
ANTH 111	Introduction to Anthropology (May satisfy general education category B and D)	3
POLS 230	Judicial Process	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		53

Degree Requirements and Notes

- Students should refer to www.ndsu.edu/cjps for information regarding application to professional program.
- To apply, a student must have completed a minimum of 30 credit hours and achieved a minimum GPA of 2.75 in all coursework, including transfer work.
- Only one re-take per Criminal Justice (CJ) course is allowed.
- Once admitted to the professional Criminal Justice program, failure to maintain the minimum GPA of 3.00 in the core upper-level criminal justice courses will result in an academic warning issued from the department for the first violation. Students will receive notification of this warning at their NDSU email address. If the GPA falls below 3.00 for a second semester in professional-level core CJ courses, the student will be administratively removed from the criminal justice professional program.
- These guidelines apply for all majors and minors of criminal justice.

Minor Requirements

Criminal Justice Minor

Minor Requirements

Required Credits: 18

Code	Title	Credits
Required Courses		
CJ 201	Introduction to Criminal Justice	3
CJ 210	Introduction to Policing	3
CJ 230	Criminology	3

CJ 270	Introduction to Corrections	3
CJ 300-400 Level	6 credits of CJ credits at the 300-400 level required. Using CJ 494 and CJ 496 to fulfill these electives requires permission from the department chairperson.	6
Total Credits		18

* Students who do not complete a Research Methods course in their major program of study will be required to complete CJ 325 Applied Research Methods as part of their minor requirement.

Minor Requirements and Notes

- Students should refer to www.ndsu.edu/cjps for information regarding the application for minor.
- A minimum of 8 credits must be taken at NDSU.
- A minimum 3.0 GPA is required for all courses needed to complete the minor.
- To apply, a student must have completed a minimum of 30 credit hours and achieve a minimum GPA of 2.75 in all coursework including any transfer work.
- To apply for the admission to the minor, a student must complete 3 of the 4 introductory courses (CJ 201, CJ 210, CJ 230, CJ 270) with an average GPA of 3.0 or higher. Completion of all 4 courses is required for graduation with a minor in CJ.
- Only one re-take per CJ course is allowed.
- Failure to maintain a minimum GPA of 3.00 in the minor courses for criminal justice will result in an academic warning issued from the department for the first violation. Students will receive notification of this warning via their NDSU email address. If the GPA falls below 3.00 for a second semester in criminal justice minor courses, the student will be administratively removed from the program.

Crop and Weed Science

Department Information

- **Department Location:**
  Loftsgard Hall
- **Department Phone:**
  701-231-7971
- **Department Web Site:**
  www.ag.ndsu.edu/plantsciences/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/crop-weed-science/#planofstudytext

Major Requirements

Major: Crop & Weed Sciences

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

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
Select one of the following:		4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	
BOT 372	Structure and Diversity of Plants and Fungi	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory (May satisfy general education category S)	4
ECON 201	Principles of Microeconomics (May satisfy general education category B and G)	3
ENT 350	General Entomology	3
PLSC 110	World Food Crops (May satisfy general education category S)	3
PLSC 215	Weed Identification	1
PLSC 225	Principles of Crop Production	3
PLSC 312	Expanding the Boundaries of Learning with Service	1
PLSC 315 & 315L	Genetics and Genetics Laboratory (May satisfy general education category S)	4
PLSC 320	Principles of Forage Production	3
PLSC 323	Principles of Weed Science	3
PLSC 444	Applied Plant Breeding and Research Methods	3
PLSC 455	Cropping Systems:An Integrated Approach	3
PLSC 491	Seminar	1
PPTH 324	Introductory Plant Pathology	3
SOIL 210	Introduction to Soil Science	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Options: Select one of four options listed below.		19-30

The standard option for this major is Agronomy. Students who wish to declare a specific option must officially declare that option with the Office of Registration and Records.

Total Credits	76

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

Agronomy Option - 19-20 Credits

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

Code	Title	Credits
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
BOT 380	Plant Physiology	3
CHEM 240	Survey of Organic Chemistry	3-4
or BIOC 260	Elements of Biochemistry	
or BOT 460	Plant Ecology	
MATH 103	College Algebra (or higher)	3
PLSC 300-400	(no more than 2 credits of co-op)	4
SOIL 322	Soil Fertility and Fertilizers	3
Total Credits		19-20

Biotechnology Option - 19-21 Credits

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

Code	Title	Credits
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
BOT 380	Plant Physiology	3
MATH 105	Trigonometry	3-4
or MATH 146	Applied Calculus I	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
PLSC 453	Advanced Weed Science	2-3
or PLSC 431	Intermediate Genetics	
PLSC 484	Plant Tissue Culture and Biotechnology	3
Total Credits		19-21

Science Option - 30 Credits

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

Code	Title	Credits
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
BOT 380	Plant Physiology	3
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
MATH 146	Applied Calculus I	4
PLSC 300-400	(No more than 2 credits of co-op may be used)	4
Science and Math Electives		12
Total Credits		30

Weed Science Option - 27-28 Credits

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

Code	Title	Credits
AGEC 375	Applied Agricultural Law	3
or AGEC 484	Agricultural Policy	
or BUSN 431	Business Law I-Contracts, Property and Torts	
or SAFE 452	Food Laws and Regulations	
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
BOT 380	Plant Physiology	3
CHEM 240	Survey of Organic Chemistry	3-4
or BIOC 260	Elements of Biochemistry	
MATH 103	College Algebra (or higher level)	3
PLSC 433	Weed Biology and Ecology	2
PLSC 453	Advanced Weed Science	2
PLSC 300-400		2
PPTH 454	Diseases Of Field and Forage Crops	3
SOIL 322	Soil Fertility and Fertilizers	3
Total Credits		27-28

Degree Requirements and Notes

- The program of study allows no more than 6 credits of cooperative education (co-op) to be counted toward degree requirements.

Minor Requirements

Crop & Weed Science Minor

Minor Requirements

Required Credits: 18

Code	Title	Credits
Required		
PLSC 110	World Food Crops	3
PLSC 225	Principles of Crop Production	3
Elective Courses: Select two of the following:		6-7
PLSC 315 & 315L	Genetics and Genetics Laboratory (both must be taken to count as one selection)	
PLSC 320	Principles of Forage Production	
PLSC 323	Principles of Weed Science	
Elective Courses:		5-6
Other courses approved by the department:		
PLSC 215	Weed Identification	
SOIL 210	Introduction to Soil Science	
ENT 350	General Entomology	
PPTH 324	Introductory Plant Pathology	
PLSC 300-400	Level Course	
Total Credits		18-19

Minor Requirements and Notes

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

Dietetics

Department Information

- **Department Location:**
  E. Morrow Lebedeff Hall

- **Department Phone:**
  701-231-7487
- **Department Web Site:**
  www.ndsu.edu/undergraduate_programs/dietetics/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/dietetics/

Major Requirements

Major: Dietetics
Option: Dietitian Education Program with Gerontology Concentration (DEP)
Option: Didactic Program in Dietetics (DPD)

Degree Type: B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

A grade of "C" or better is required in all HNES prefix courses.

Code	Title	Credits
Dietetics Core Requirements		
ANTH 111	Introduction to Anthropology (May satisfy general education category B and D)	3
BIOC 260	Elements of Biochemistry	4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory (May satisfy general education category S)	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
CHEM 117	Chemical Concepts and Applications (May satisfy general education category S)	3
COMM 110	Fundamentals of Public Speaking (Will satisfy general education category C)	3
ECON 105	Elements of Economics (May satisfy general education category B and G)	3
ENGL 110	College Composition I (Will satisfy general education category C)	4
ENGL 120	College Composition II (Will satisfy general education category C)	3
Select one upper division writing course from the following (Will satisfy general education category C):		3
ENGL 320	Business and Professional Writing	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
HNES 141	Food Sanitation	1
HNES 250	Nutrition Science (May satisfy general education category W)	3
HNES 251	Nutrition, Growth and Development	3
HNES 261 & 261L	Food Selection and Preparation Principles and Food Selection and Preparation Principles Laboratory	5
HNES 291	Seminar	1
HNES 351	Metabolic Basis of Nutrition	4
HNES 354	Introduction to Medical Nutrition Therapy	4
HNES 361 & 361L	Foodservice Systems Management I and Foodservice Systems Management I Laboratory	6
HNES 442 & 442L	Community Health and Nutrition Education and Community Health and Nutrition Laboratory	5
HNES 452	Nutrition,Health and Aging	3
MATH 103	College Algebra	3
or MATH 104	Finite Mathematics	
HNES 458	Advanced Medical Nutrtion Therapy *	4
HNES 460	Foodservice Systems Management II *	3
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab (May satisfy general education category S)	3
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
PSYC 211	Introduction To Behavior Modification	3
or PSYC 280	Introduction to Health Psychology	
STAT 330	Introductory Statistics (May satisfy general education category R)	3
VETS 115	Medical Terminology for the Paraprofessional	1
Select one of the following Dietetics Options listed below to complete the major:		5-23
Dietitian Education Program (DEP) - 23 credits		
Didactic Program in Dietetics (DPD) - 5 credits		
Total Credits		97-98

Code	Title	Credits
Dietitian Education Program (DEP)		
HNES 354L	Introduction to Medical Nutrition Therapy Laboratory	2
HNES 458L	Advanced Medical Nutrition Therapy Laboratory	3
HNES 480	Dietetics Practicum (Capstone Experience)	12

HNES 460L	Foodservice Systems Management II Laboratory	3
HNES 400	Interprofessional Health Care Practice	3
Total Credits		23

Code	Title	Credits
Didatic Program in Dietetics (DPD)		
HNES 481	Dietetics: Capstone Course for DPD	1
HNES 491	Seminar	1
HNES 400	Interprofessional Health Care Practice	3
Total Credits		5

* Students approved to complete the accelerated program (bachelors to masters program) will complete HNES 658 Advanced Medical Nutrition Therapy and HNES 660 Foodservice Systems Management II in place of these 400 level courses.

Degree Requirements and Notes

- A grade of 'C' or better is required for transfer courses in dietetics and food and nutrition.
- Minimum GPA requirements must be met (3.0 overall and 2.75 in sciences including BIOC 260, BIOL 220/L, BIOL 221/L, CHEM 117, HNES 250, and MICR 202/L)
- A grade of 'C' or better is required for all required science courses (BIOC 260, BIOL 220/L, BIOL 221/L, CHEM 117, MICR 202/L)
- A grade of 'B' or better is required for HNES 250 - Nutrition Science
- SOC 110 Introduction to Sociology and a cultural diversity may be substituted for ANTH 111 Introduction to Anthropology.

Earth Science Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/earth-science-education/#planofstudytext

Major Requirements

Major: Earth Science Education

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 139

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Earth Science Education Requirements		
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
MATH 165	Calculus I (May satisfy general education category R)	4
STAT 330	Introductory Statistics	3
Teaching Specialty Requirements		
BIOL 124 & 124L	Environmental Science and Environmental Science Laboratory	4
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
Biological Sciences Elective	Elective	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
Chemistry Elective	Elective	4
GEOG 412	Geomorphology	3
GEOL 303 & GEOL 350	Paleontology Field Course and Invertebrate Paleontology	4
GEOL 420 & GEOL 421	Mineralogy and Mineralogy Laboratory	4
GEOL 422	Petrology	3
GEOL 423	Petrography	1
GEOL 491	Seminar	1
Geology Electives	Electives	6

PHYS 110	Introductory Astronomy	3
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4
SOIL 217	Introduction to Meteorology & Climatology	3
CSCI 122	Introduction to Programming Concepts	3
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Science)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		115

Degree Requirements and Notes

- Courses taken P/F may not be used to satisfy any requirements.
- GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A grade of 'C' or better is required in all Professional Education Requirement courses.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- See School of Education (https://www.ndsu.edu/education) for admission requirements.

Economics

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-7441
- **Department Web Site:**
  www.ag.ndsu.edu/agecon
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/economics/#planofstudytext

Major Requirements

Major: Economics (Standard Option)

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

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

7. At least 36 credits must be NDSU resident credits. Residence credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Required Courses for Economics		
ECON 201	Principles of Microeconomics (May satisfy general education category B)	3
ECON 202	Principles of Macroeconomics (May satisfy general education category B)	3
ECON 341	Intermediate Microeconomics	3
ECON 343	Intermediate Macroeconomics	3
Economics Electives: Select 15 credits from the following; 3 credits must be an approved capstone:		15
ECON 410	Econometrics	
ECON 440	Game Theory and Strategy (Approved as capstone)	
ECON 456	History of Economic Thought	
ECON 461	Economic Development (Approved as capstone)	
ECON 465	Labor Economics	
ECON 470	Public Economics (Approved as capstone)	
ECON 472	International Trade	
ECON 476	Monetary Theory and Policy	
ECON 480	Industrial Organization (Approved as capstone)	
ECON 481	Natural Resource Economics	
ECON 482	Environmental Economics	
Select no more than 3 credits from the following as part of the 15 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	
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	
BUSN 487	Managerial Economics	
Other Requirements		
ECON 189	Skills for Academic Success	1
MIS 116	Business Use of Computers	3
MATH 144	Mathematics for Business (or any higher math)	4
STAT 330	Introductory Statistics (May satisfy general education category R)	3
STAT 331	Regression Analysis	2 or 3
or ECON 410	Econometrics	
Additional Requirements		
Humanities & Fine Arts: May be selected from the currrent general education list or any course with a prefix of: ART, CLAS, ENGL, FREN, GERM, HIST, HUM, MUSC, PHIL, SPAN, or THEA.		3
Social & Behavioral Sciences: Three (3) credits must be selected from the current general education list while the remaining three (3) credits may be any course with a prefix of: ANTH, CJ, GEOG, POLS, PSYC, or SOC.		6
Total Credits		49-50

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

Degree Requirements and Notes

- Students must earn, at least, a 2.00 cumulative GPA that is based on the courses that satisfy major requirements.
- **Bachelor of Science (BS) Degree** - A minor program of study is required.
- **Bachelor of Arts (BA) Degree** - An additional 3 credits of 300-400 level humanities, social sciences or study abroad is required along with the successful completion of a second year language proficiency.

Link to view program description and 4-year Plan of Study (p. 90)

Major: Economics- Quantitative Option

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

The declaration of a MATHEMATICS or STATISTICS minor is required.

Code	Title	Credits
Required Core Courses for Economics Quantitative Option		
ECON 201	Principles of Microeconomics (May satisfy general education category B)	3
ECON 202	Principles of Macroeconomics (May satisfy general education category B)	3
ECON 341	Intermediate Microeconomics	3
ECON 343	Intermediate Macroeconomics	3
ECON 410	Econometrics	3
Economics Electives: Select 6 credits from the following; at least 3 credits must be an approved capstone.		6
ECON 440	Game Theory and Strategy (Approved as capstone)	
ECON 456	History of Economic Thought	
ECON 461	Economic Development (Approved as capstone)	
ECON 465	Labor Economics	
ECON 470	Public Economics (Approved as capstone)	
ECON 472	International Trade	
ECON 476	Monetary Theory and Policy	
ECON 480	Industrial Organization (Approved as capstone)	
ECON 481	Natural Resource Economics	
ECON 482	Environmental Economics	
Additional Electives:		
ECON 189	Skills for Academic Success	1
MIS 116	Business Use of Computers	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3-4
or MATH 265	Calculus III	
MATH 266	Introduction to Differential Equations	3
or STAT 368	Statistics	
STAT 367	Probability	3

or STAT 467	Probability and Mathematical Statistics I	
Additional Requirements		
Humanities & Fine Arts: May be selected from the currrent general education list or any course with a prefix of: ART, CLAS, ENGL, FREN, GERM, HIST, HUM, MUSC, PHIL, SPAN, or THEA.		3
Social & Behavioral Sciences: Three (3) credits must be selected from the current general education list while the remaining three (3) credits may be any course with a prefix of: ANTH, CJ, GEOG, POLS, PSYC, or SOC.		6
Total Credits		51-52

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

Degree Requirements and Notes

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

Minor Requirements

Economics Minor

Minor Requirements

Required Credits: 18-19

Code	Title	Credits
Required Courses		
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
ECON 341	Intermediate Microeconomics	3-4
or BUSN 487	Managerial Economics	
ECON 343	Intermediate Macroeconomics	3
Elective Courses		
ECON 300-400	Elective	3
ECON 400	Elective	3
Total Credits		18-19

Minor Requirements and Notes

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

Electrical Engineering

Department Information

- **Department Location:**
  Electrical and Computer Engineering
- **Department Phone:**
  701-231-7019
- **Department Web Site:**
  www.ndsu.edu/ece/
- **Degrees Offered:**
  B.S.E.E.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/electrical-engineering/#planofstudytext

Major Requirements

Major: Electrical Engineering

Degree Type: B.S.E.E.

Required Degree Credits to Graduate: 128

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Electrical Engineering Core Requirements		
ECE 111	Introduction to Electrical and Computer Engineering	3
ECE 173	Introduction to Computing *	4
ECE 275	Digital Design *	4
ECE 311	Circuit Analysis II	4
ECE 320	Electronics for Computer Engineers	3
ECE 321	Electronics for Electrical Engineers	2
ECE 331	Energy Conversion	4
ECE 341	Random Processes	3
ECE 343	Signals & Systems	4
ECE 351	Applied Electromagnetics	4
ECE 376	Embedded Systems	4
ECE 401	Design I (capstone)	1
ECE 403	Design II (capstone)	2
ECE 405	Design III (capstone)	3

MATH Courses Required		
MATH 129	Basic Linear Algebra *	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II *	4
MATH 265	Calculus III (w/ vectors) *	4
MATH 266	Introduction to Differential Equations *	3
Other Courses Required		
CHEM 121	General Chemistry I (May satisfy general education category S)	3
EE 206	Circuit Analysis I *	4
Select one of the following: (May satisfy general education category C)		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
ENGR 402	Engineering Ethics and Social Responsibility	1
PHYS 251	University Physics I (May satisfy general education category S)	4
PHYS 252	University Physics II (May satisfy general education category S)	4
Select one of the following lab courses (May satisfy general education category S):		1
CHEM 121L	General Chemistry I Laboratory	
PHYS 251L	University Physics I Laboratory	
PHYS 252L	University Physics II Laboratory	
ECE Electives	**Select 9 credits of ECE 400 level electives (excluding 494 and 496)**	9
Includes the cross listed courses of ECE 427/IME 427; ECE 429/IME 429; ECE 411/PHYS 411; & ECE 411L/PHYS 411L		
Tech Electives: Select 12 credits from the following:		12
ABEN 456	Biobased Energy	
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	
BIOL 315 & 315L	Genetics and Genetics Laboratory	
CE 309 & CE 310	Fluid Mechanics and Fluid Mechanics Laboratory	
CE/ME 486	Nanotechnology and Nanomaterials	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	
CHEM 342 & 342L	Organic Chemistry II and Organic Chemistry II Laboratory	
CHEM 364	Physical Chemistry I	
CHEM 365 & CHEM 471	Physical Chemistry II and Physical Chemistry Laboratory	
CHEM 425 & CHEM 429	Inorganic Chemistry I and Inorganic Chemistry Laboratory	
CSCI 161	Computer Science II	
CSCI 222	Discrete Mathematics	
CSCI 336	Theoretical Computer Science	
CSCI 366	Database Systems	
CSCI 372	Comparative Programming Languages	
CSCI 426	Introduction to Artificial Intelligence	
CSCI 458	Computer Graphics	

CSCI 459	Foundations of Computer Networks
CSCI 467	Algorithm Analysis
CSCI 474	Operating Systems Concepts
CSCI 477	Object-Oriented Systems
ECE 374	Computer Organization
ECE 494	Individual Study (max. of 6 cr.)
ECE 4XX	Any ECE 400 level didactic course
ECE 496	Field Experience (max. of 3 cr.)
ENGR 310	Entrepreneurship for Engineers and Scientists
IME 440	Engineering Economy
IME 456	Program and Project Management
IME 461	Quality Assurance and Control
MATH 270	Introduction to Abstract Mathematics
MATH 420	Abstract Algebra I
MATH 421	Abstract Algebra II
MATH 429	Topics in Linear Algebra
MATH 450	Real Analysis I
MATH 451	Real Analysis II
MATH 452	Complex Analysis
MATH 480	Applied Differential Equations
MATH 481	Fourier Analysis
MATH 483	Partial Differential Equations
MATH 488	Numerical Analysis I
MATH 489	Numerical Analysis II
ME 221	Engineering Mechanics I
ME 222	Engineering Mechanics II
ME 223	Mechanics of Materials
ME 350	Thermodynamics and Heat Transfer
ME 470	Renewable Energy Technology
MICR 445	Animal Cell Culture Techniques
PHYS 350	Modern Physics
PHYS 360	Modern Physics II
PHYS 413	Lasers for Scientists and Engineers
PHYS 415	Elements of Photonics
PHYS 485	Quantum Mechanics I
STAT 450	Stochastic Processes
STAT 468	Probability and Mathematical Statistics II
ZOO 460	Animal Physiology
Total Credits	104

* No grade less than a C accepted in these courses and before enrolling in ECE 300 level courses, excluding ECE 311.

Degree Requirements and Notes

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.
- In order to graduate, an ECE student must have at least a 2.0 GPA in all required EE and ECE courses taken at NDSU. Elective ECE courses are not included in this GPA requirement.
- Transfer Students – Transfer courses with grades less than 'C' in Biology, Chemistry, Computer Science, Mathematics, Physics, and any type of engineering class will not be accepted as a major requirement.
- All Students – Students are required to attain a grade of 'C' or better in ECE 173 Introduction to Computing, ECE 275 Digital Design, EE 206 Circuit Analysis I, and all required MATH courses.

Note: *For students interested in pursuing one of the areas of specialization, lists of recommendations for specific electives are available from the ECE Department* (https://www.ndsu.edu/ece).

Electrical Engineering & Physics

Department Information

- **Department Location:**
  Electrical and Computer Engineering or South Engineering
- **Department Phone:**
  701-231-7019
- **Department Web Site:**
  www.ndsu.edu/ece or www.ndsu.edu/physics/
- **Degrees Offered:**
  B.S.E.E. and B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/electrical-engineering-physics/#planofstudytext

Link to view program description and 4-year Plan of Study (http://bulletin.ndsu.edu/programs-study/undergraduate/electrical-engineering-physics)

Major Requirements

Double Major: Electrical Engineering & Physics

Degree Type: B.S.E.E.
Minimum Degree Credits to Graduate: 136

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Electrical Engineering Core Requirements		
ECE 111	Introduction to Electrical and Computer Engineering	3
ECE 173	Introduction to Computing *	4
ECE 275	Digital Design *	4
ECE 311	Circuit Analysis II	4
ECE 320	Electronics for Computer Engineers	3
ECE 321	Electronics for Electrical Engineers	2
ECE 331	Energy Conversion	4
ECE 341	Random Processes	3
ECE 343	Signals & Systems	4
ECE 351	Applied Electromagnetics	4
ECE 376	Embedded Systems	4
ECE 401	Design I	1
ECE 403	Design II	2
ECE 405	Design III	3
ECE Electives		
Select 6 credits of ECE 400 level electives (excluding 494 & 496).		6
Physics Core Requirements		
PHYS 171	Introductory Projects in Physics *	1
PHYS 251	University Physics I *	4
PHYS 251L	University Physics I Laboratory *	1
PHYS 251R	University Physics I Recitation *	1
PHYS 252	University Physics II *	4
PHYS 252L	University Physics II Laboratory *	1
PHYS 252R	University Physics II Recitation *	1
PHYS 350	Modern Physics *	3
PHYS 355	Classical Mechanics *	3
PHYS 360	Modern Physics II *	3
PHYS 370	Introduction to Computational Physics *	3
PHYS 462	Thermal and Statistical Physics *	3
PHYS 485	Quantum Mechanics I *	3
Select one from the following: *		3-4
PHYS 411 & 411L	Optics for Scientists & Engineers and Optics for Scientists and Engineers Lab (or ECE 411 & ECE 411L))	
PHYS 413	Lasers for Scientists and Engineers	
PHYS 415	Elements of Photonics	
Physics Electives: Select one from the following *		3
PHYS 215	Research For Undergraduates (2 credit minimum)	
PHYS 481	Condensed Matter Physics	
PHYS 486	Quantum Mechanics II	
PHYS 489	Senior Project II	
MSUM Astronomy Courses (AST 300-400 level - with dept. permission)		
Mathematics Courses Required		
MATH 129	Basic Linear Algebra *	3

MATH 165	Calculus I *	4
MATH 166	Calculus II *	4
MATH 265	Calculus III *	4
MATH 266	Introduction to Differential Equations *	3
Other Required Courses		
EE 206	Circuit Analysis I *	4
ENGR 402	Engineering Ethics and Social Responsibility	1
Select one upper division writing course from the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Total Credits		114-115

* No grade less than a 'C' accepted in these courses and before enrolling in ECE 300 level courses, excluding ECE 311.

Degree Requirements and Notes:

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the College of Engineering. Students transferring into the College of Engineering from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.
- In order to graduate, an EE/PHYS student must have at least a 2.00 GPA in all required EE, ECE, and PHYS courses taken at NDSU. Elective ECE and PHYS courses are not included in this GPA requirement.
- Transfer Students: Transfer courses with grades less than a 'C' in Biology, Chemistry, Computer Science, Mathematics, Physics, and any type of engineering class will not be accepted as a major in this program.
- All Students: See footnote regarding a grade of 'C' required in identified courses.

Elementary Education & Human Development and Family Science Dual Degree Program

Department Information

- **Department Location:**
  E. Morrow Lebedeff Hall
- **Department Phone:**
  701-231-8286
- **Department Web Site:**
  www.ndsu.edu/hdfs/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/elementary-education-human-development-family-science/#planofstudytext

Link to view program description and 4-year Plan of Study (p. 93)

Major Requirements

Dual Degree Program
Major at NDSU: Human Development & Family Science
Major at VCSU: Elementary Education

Degree Type at: B.A. or B.S.
Required Degree Credits to Graduate: 126

University Degree Requirements

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

4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses number 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institituion.
   a. Of these 60, at least 36 must be NDSU residence credits as defined in #7.
   b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Residence credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
HDFS & Elementary Education Requirements		
HD&E 189	Skills for Academic Success [1]	1
HDFS 135	Family Science (May satisfy general education category B)	3
HDFS 230	Life Span Development (May satisfy general education category B)	3
or PSYC 250	Developmental Psychology	
HDFS 242	Couples, Marriages and Families (May satisfy general education category W)	3
HDFS 250	Introduction to Research Methods in Human Development and Family Sciences	3
HDFS 330	Child Development	3
HDFS 475	Children and Families Across Cultures (May satisfy general education category B and D)	3
EDUC 210	Creative Activities	2
EDUC 240	Educating Exceptional Students	3
EDUC 250	Introduction to Education	3
EDUC 283	Understanding Cultural Diversity	3
EDUC 300	Educational Technology	2
EDUC 315	Math in the Elementary School	3
EDUC 320	Social Studies in the Elementary School	3
EDUC 321	Foundations of Reading Instruction	3
EDUC 322	Methods of Language Arts Instruction	3
EDUC 323	Reading in Elementary School	2
EDUC 330	Children's Literature	3

EDUC 350	Elementary School Practicum and Classroom Management (2 cr.) & HDFS 496: Field Experience (1 cr.)	3
EDUC 352	Culturally Diverse Practicum	1
EDUC 355	Science Methods/Elementary Teachers	3
EDUC 400	Educational Psychology	2
EDUC 450	Trends in Assessment & Education Issues	2
EDUC 490	Student Teaching (Elementary - 10 cr.) & HDFS 496: Field Experience (1 cr.)	11
GEOL 105	Physical Geology (May satisfy general education category S and G)	3
or GEOL 106	The Earth Through Time	
HIST 103	U.S. to 1877 (May satisfy general education category A)	3
or HIST 104	U.S. Since 1877	
MATH 104	Finite Mathematics (May satisfy general education category R)	3
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
Select one from the following:		3
ENGL 320	Business and Professional Writing	
ENGL 325	Writing in the Health Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
HDFS Electives: (Cannot take HDFS 230 or HDFS 496)		
HDFS	Elective	3
HDFS	300-400 level	6
Other Elementary Education Requirements		
Biology Elective		3
Chemistry or Physics Elective or STEM ED 160		3
CSCI 114	Microcomputer Packages (May satisfy general education category S)	3
or MIS 116	Business Use of Computers	
GEOG 111	Survey of Geography	2
MATH 277	Math for Elementary Teachers I	3
MATH 278	Math for Elementary Teachers II	2
EDUC 491	Seminar (Senior Portfolio)	1
College Requirement		
HD&E 320	Professional Issues	1
Total Credits		113

[1] HD&E 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 HD&E 189.

NDSU HDFS Degree Requirements and Notes

- A grade of 'C' or better is required for all HDFS courses for graduation.
- A 2.50 cumulative GPA is required in major courses for graduation.
- Course taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.

VCSU Elementary Education Degree Requirements and Notes

- Though not required, many majors pursue a Reading or STEM credential or an endorsement in Kindergarten, Middle School, English Language Learners (ELL), or as a Special Education Strategist.
- A 2.75 cumulative GPA is required for admission to teacher education.
- A 2.5 cumulative GPA is required to begin coursework in elementary education program.
- Students will need to take Praxis CORE I sophomore year and Praxis II subject matter and pedagogy exams senior year .

Emergency Management

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-5595
- **Department Web Site:**
  www.ndsu.edu/emgt/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/emergency-management/#planofstudytext

Major Requirements

Major: Emergency Management

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major Requirements

Code	Title	Credits
Emergency Management Core Courses:		
EMGT 101	Emergencies, Disasters, and Catastrophes	3
EMGT 261	Disaster Preparedness	3
EMGT 262	Disaster Mitigation	3
EMGT 263	Disaster Response	3
EMGT 264	Disaster Recovery	3
EMGT 291	Seminar	3
EMGT 410	Comprehensive Emergency Management Planning (Capstone)	3
EMGT 496	Field Experience	6
Emergency Management Electives: Select 5 courses from the following:		15
EMGT 150	Dealing with Terrorism, Cybersecurity and Other Emerging Threats	
EMGT 414	Spatial Analysis in Emergency Management	
EMGT 420	Hazard, Risk, and Vulnerability Assessments	
EMGT 425	International Emergency Management	
EMGT 435	Issues in Homeland Security and Emergency Management	
EMGT 445	Vulnerability and Functional Needs in Emergency Management	
EMGT 461	Business Continuity and Crisis Management	
EMGT 463	Voluntary Agency Disaster Services	
EMGT 464	Disaster and Culture	
EMGT 481	Disaster Analysis	
EMGT 491	Seminar	
SOC 443	International Disasters	
Total Credits		42

Recommended minors: Business Administration, Communication, Community Development, Criminal Justice, Environmental Science, Food Safety, Geography, Logistics Management, Political Science, Psychology, or Sociology.

Minor Requirements

Emergency Management Minor

Minor Requirements

Required Credits: 18

Students complete one of the four options listed below for the minor.

Option One: Comprehensive Emergency Management

Code	Title	Credits
Emergency Management Core		
EMGT 101	Emergencies, Disasters, and Catastrophes	3
EMGT 261	Disaster Preparedness	3
EMGT 262	Disaster Mitigation	3
EMGT 263	Disaster Response	3
EMGT 264	Disaster Recovery	3
Emergency Management Elective: Select one from the following		3
EMGT 150	Dealing with Terrorism, Cybersecurity and Other Emerging Threats	
EMGT 410	Comprehensive Emergency Management Planning	
EMGT 414	Spatial Analysis in Emergency Management	
EMGT 420	Hazard, Risk, and Vulnerability Assessments	
EMGT 425	International Emergency Management	
EMGT 435	Issues in Homeland Security and Emergency Management	
EMGT 445	Vulnerability and Functional Needs in Emergency Management	
EMGT 461	Business Continuity and Crisis Management	
EMGT 463	Voluntary Agency Disaster Services	
EMGT 496	Field Experience	
Total Credits		18

Option Two: Homeland security

Code	Title	Credits
Emergency Management Core		
EMGT 101	Emergencies, Disasters, and Catastrophes	3
EMGT 150	Dealing with Terrorism, Cybersecurity and Other Emerging Threats	3
EMGT 435	Issues in Homeland Security and Emergency Management	3
Emergency Management Elective: Select one from the following		3
EMGT 261	Disaster Preparedness	
EMGT 263	Disaster Response	
EMGT 425	International Emergency Management	
Expanded Electives: Select two from the following *		6
CJ 315	Federal Law Enforcement & Crime Policy	
COMM 434	Communication Law	
COMM 485	Risk and Crisis Communication	
EMGT 261	Disaster Preparedness	
EMGT 263	Disaster Response	
EMGT 425	International Emergency Management	
POLS 120	Terrorism	
POLS 220	International Politics	
POLS 225	Comparative Politics	
Total Credits		18

* Cannot count an EMGT elective core course taken toward the required 6 elective credits in this category.

Option Three: Risk and Resilience Management

Code	Title	Credits
Emergency Management Core		
EMGT 101	Emergencies, Disasters, and Catastrophes	3
EMGT 262	Disaster Mitigation	3
EMGT 264	Disaster Recovery	3
Emergency Management Elective: Select one from the following		3
EMGT 410	Comprehensive Emergency Management Planning	
EMGT 414	Spatial Analysis in Emergency Management	
EMGT 420	Hazard, Risk, and Vulnerability Assessments	
EMGT 445	Vulnerability and Functional Needs in Emergency Management	
EMGT 463	Voluntary Agency Disaster Services	
Expanded Electives: Select two from the following *		6
COMM 484	Organizational Advocacy and Issue Management	
COMM 487	Organizational Power and Leadership	
COMM 488	Social Influence and Organizational Change	
EMGT 410	Comprehensive Emergency Management Planning	
EMGT 414	Spatial Analysis in Emergency Management	
EMGT 420	Hazard, Risk, and Vulnerability Assessments	
EMGT 445	Vulnerability and Functional Needs in Emergency Management	
EMGT 461	Business Continuity and Crisis Management	
EMGT 463	Voluntary Agency Disaster Services	
HDFS 310	Citizenship & Social Activism	
SOC 404	Community Assessment	
SOC 405	Community Development	
Total Credits		18

* Cannot count an EMGT elective core course taken toward the required 6 elective credits in this category.

Option Four: Vulnerability and Capacity building

Code	Title	Credits
Emergency Management Core		
EMGT 101	Emergencies, Disasters, and Catastrophes	3
EMGT 445	Vulnerability and Functional Needs in Emergency Management	3
EMGT 463	Voluntary Agency Disaster Services	3
Emergency Management Electives: Select one from the following		3
EMGT 263	Disaster Response	
EMGT 264	Disaster Recovery	
EMGT 420	Hazard, Risk, and Vulnerability Assessments	
EMGT 435	Issues in Homeland Security and Emergency Management	
Expanded Electives: Select two from the following *		6
COMM 216	Intercultural Communication	
COMM 488	Social Influence and Organizational Change	
EMGT 261	Disaster Preparedness	
EMGT 263	Disaster Response	
EMGT 264	Disaster Recovery	
EMGT 420	Hazard, Risk, and Vulnerability Assessments	
EMGT 435	Issues in Homeland Security and Emergency Management	
EMGT 461	Business Continuity and Crisis Management	
HDFS 135	Family Science	
HDFS 182	Wellness and Aging	
HDFS 310	Citizenship & Social Activism	

HDFS 475	Children and Families Across Cultures
SOC 235	Cultural Diversity
SOC 410	Social Inequality
SOC 412	Sociology of Gender
SOC 440	Sociology of Aging
Total Credits	18

* Cannot count an EMGT elective core course taken toward the required 6 elective credits in this category.

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU.

English

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7143
- **Department Web Site:**
  www.ndsu.edu/english/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/english/#text

Major Requirements

Major: English

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Quantitative Reasoning (R) †		3
Science and Technology (S) †		10
Humanities and Fine Arts (A) †		6

Social and Behavioral Sciences (B) †	6
Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major requirements

Students must earn a grade of 'C' or better in all courses used to fulfill requirements for the English major. These courses may only be repeated once.

Code	Title	Credits
Major Requirements		
ENGL 167	Introduction to English Studies	3
ENGL 272	Literary Analysis	3
ENGL 275	Introduction to Writing Studies	3
ENGL 358	Writing in the Humanities and Social Sciences (May satisfy general education category C)	3
ENGL 467	English Studies Capstone Experience	3
Lower Division Elective Courses - Select one of the following:		3
ENGL 209	Introduction to Linguistics	
ENGL 220	Introduction to Literature	
ENGL 222	Introduction to Poetry	
ENGL 229	Introduction to Creative Writing	
Literature Survey Courses - Select one of the following:		3
ENGL 240	World Literature Masterpieces	
ENGL 315	British Literature I	
ENGL 317	American Literature I	

Select one of the following:		3
ENGL 316	British Literature II	
ENGL 318	American Literature II	
Cultural Diversity Courses - Select two of the following:		6
ENGL 231	The Bible as Literature	
ENGL 330	British and American Women Writers	
ENGL 331	Contemporary Women Writers	
ENGL 335	Multicultural Writers	
ENGL 336	Literature and The Environment	
ENGL 340	19th Century American Fiction	
ENGL 341	20th Century American Fiction	
ENGL 345	Themes in American Culture	
ENGL 379	Study Tour Abroad	
ENGL 385	British Fiction	
ENGL 435	Young Adult Literature in a Multicultural World	
ENGL 453	Social and Regional Varieties of English	
ENGL 454	Language Bias	
ENGL 455	International Technical Writing	
ENGL 456	Literacy, Culture and Identity	
ENGL 474	Native American Literature	
Upper Division Elective Courses: 300-400 level courses		
ENGL	300-400 Level Courses	6
ENGL	400 Level Courses	9
Total Credits		45

- A grade of 'C' or better is required in all English specialty and Professional Education Requirement courses.

Minor Requirements

Minor: English - Literature Option

Required Credits: 21

Code	Title	Credits
Required Course		
ENGL 272	Literary Analysis	3
Early Period Literature Survey Course: Select one		3
ENGL 240	World Literature Masterpieces	
ENGL 315	British Literature I	
ENGL 317	American Literature I	
Later Period Literature Survey Courses: Select one		3
ENGL 316	British Literature II	
ENGL 318	American Literature II	
Minor Electives: Select 9 credits from the following:		9
200 Level Coursework (no more than 3 credits):		
ENGL 220	Introduction to Literature	
ENGL 222	Introduction to Poetry	
ENGL 225	Introduction to Film	
ENGL 231	The Bible as Literature	
300 Level Coursework:		
ENGL 330	British and American Women Writers	
ENGL 331	Contemporary Women Writers	
ENGL 333	Fantasy and Science Fiction	
ENGL 335	Multicultural Writers	
ENGL 336	Literature and The Environment	

ENGL 340	19th Century American Fiction	
ENGL 341	20th Century American Fiction	
ENGL 345	Themes in American Culture	
ENGL 376	Poetry of Rock	
ENGL 377	Modern Poetry	
ENGL 380	Shakespeare	
ENGL 381	American Road Book	
ENGL 382	Film Genres and Styles	
ENGL 385	British Fiction	
ENGL 389	Non-fiction Prose	
400 Level Coursework (must take at least 3 credits):		
ENGL 435	Young Adult Literature in a Multicultural World	
ENGL 471	American Realistic Literature	
ENGL 472	20th Century American Writers	
ENGL 474	Native American Literature	
ENGL 476	Topics in American Literature	
ENGL 480	Medieval Literature	
ENGL 482	Renaissance Literature	
ENGL 483	Topics in British Literature	
ENGL 485	18th Century Literature	
ENGL 486	Romantic Literature	
Writing Elective: Select from the following:		3
ENGL 322	Writing and the Creative Process	
ENGL 323	Creative Writing	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 423	Creative Writing Studio	
Total Credits		21

Minor Requirements and Notes

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

Minor Requirements

Minor: English - Writing Option

Minor Requirements

Required Credits: 21

Code	Title	Credits
Required Course		
ENGL 275	Introduction to Writing Studies	3
Electives: Select from the following:		15
ENGL 301	Peer Tutoring and Writing in the Disciplines	
ENGL 313	Literary Publications II	
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 322	Writing and the Creative Process	
ENGL 323	Creative Writing	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 326	Writing in the Design Professions	
ENGL 357	Visual Culture and Language	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 413	Literary Publications III	

ENGL 423	Creative Writing Studio	
ENGL 455	International Technical Writing	
ENGL 456	Literacy, Culture and Identity	
ENGL 457	Electronic Communication	
ENGL 458	Advanced Writing Workshop	
ENGL 459	Researching and Writing Grants and Proposal	
Literature, Film or Linguistics Course: Select from the following:		3
ENGL 315	British Literature I	
ENGL 316	British Literature II	
ENGL 317	American Literature I	
ENGL 318	American Literature II	
ENGL 330	British and American Women Writers	
ENGL 331	Contemporary Women Writers	
ENGL 333	Fantasy and Science Fiction	
ENGL 335	Multicultural Writers	
ENGL 336	Literature and The Environment	
ENGL 340	19th Century American Fiction	
ENGL 341	20th Century American Fiction	
ENGL 345	Themes in American Culture	
ENGL 360	Grammatical Structure/English	
ENGL 377	Modern Poetry	
ENGL 380	Shakespeare	
ENGL 381	American Road Book	
ENGL 382	Film Genres and Styles	
ENGL 385	British Fiction	
ENGL 389	Non-fiction Prose	
ENGL 452	History of the English Language	
ENGL 453	Social and Regional Varieties of English	
ENGL 454	Language Bias	
Total Credits		21

Minor Requirements and Notes

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

English Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/english-education/#planofstudytext

Major Requirements

Major: English Education Standard Option

Degree Type: B.S. or B.A.
Required Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.

Code	Title	Credits
Teaching Specialty Requirements		
ENGL 209	Introduction to Linguistics	3
ENGL 222	Introduction to Poetry	3
ENGL 240	World Literature Masterpieces	3
ENGL 272	Literary Analysis	3
ENGL 315	British Literature I	3
or ENGL 316	British Literature II	
ENGL 317	American Literature I	3
or ENGL 318	American Literature II	
ENGL 358	Writing in the Humanities and Social Sciences (May satisfy general education category C)	3
ENGL 360	Grammatical Structure/English	3
ENGL 380	Shakespeare	3
ENGL 435	Young Adult Literature in a Multicultural World	3
ENGL 458	Advanced Writing Workshop	3
ENGL	300-400 Literature Electives (2 courses)	6

Modern Foreign Language		
A modern foreign language through the intermediate competency (200) level is required.		14
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (English)	3
EDUC 482	Classroom Practice/Methods of Teaching II: (English)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		87

Degree Requirements and Notes

- A grade of 'C' or better is required in all Professional Education Requirement courses.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- See School of Education (https://www.ndsu.edu/education) for admission requirements.

Bachelor of Arts (BA) Degree – Two years of one modern foreign language at the college level or the equivalent are required.

Link to view program description and 4-year Plan of Study (p. 99)

Major Requirements

Major: English Education with Communication Option

Degree Type: B.S.
Required Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Quantitative Reasoning (R) †		3
Science and Technology (S) †		10
Humanities and Fine Arts (A) †		6
Social and Behavioral Sciences (B) †		6
Wellness (W) †		2

Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

GPA of 2.75 or better in the Teaching Specialty is required for placement in student teaching and exit from the program.

Code	Title	Credits
Teaching Specialty Requirements		
ENGL 209	Introduction to Linguistics	3
ENGL 222	Introduction to Poetry	3
ENGL 240	World Literature Masterpieces	3
ENGL 315	British Literature I	3
or ENGL 316	British Literature II	
ENGL 272	Literary Analysis	3
ENGL 317	American Literature I	3
or ENGL 318	American Literature II	
ENGL 358	Writing in the Humanities and Social Sciences (May satisfy general education category C)	3
ENGL 360	Grammatical Structure/English	3
ENGL 380	Shakespeare	3
ENGL 435	Young Adult Literature in a Multicultural World	3
ENGL 458	Advanced Writing Workshop	3
ENGL	300-400 Literature Electives (2 courses)	6
Communication Courses		
COMM 112	Understanding Media and Social Change (includes)	3
COMM 114	Human Communication (includes)	3
COMM 216	Intercultural Communication	3
COMM 301	Rhetorical Traditions	3
COMM 312	Oral Performance Studies	3
COMM 318	Argumentation and Advocacy	3
COMM 451	Directing Forensics	2
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (English)	3
EDUC 482	Classroom Practice/Methods of Teaching II: (English)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		87

Degree Requirements and Notes

- A grade of 'C' or better is required in all English Specialty and Professional Education Requirement courses.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- See School of Education (https://www.ndsu.edu/education) for admission requirements.

Entrepreneurship

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-8651
- **Department Web Site:**
  www.ndsu.edu/business/departments/mm/
- **Degrees Offered:**
  Minor; Certificate
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/entrepreneurship/

Minor Requirements

Entrepreneur Minor

Minor Requirements

Required Credits: 16

Code	Title	Credits
ENTR 201	Introduction to Entrepreneurship	3
ENTR 301	Entrepreneurship Toolbox I	3
ENTR 302	Entrepreneurship Toolbox 2	3
ENTR 401	Entrepreneurship Capstone	3
ENTR 496		4
Total Credits		16

Minor Requirements

Entrepreneurship Certificate

Minor Requirements

Required Credits: 16

Certificate Requirements

Code	Title	Credits
ENTR 201	Introduction to Entrepreneurship	3
ENTR 301	Entrepreneurship Toolbox I	3
ENTR 302	Entrepreneurship Toolbox 2	3
ENTR 401	Entrepreneurship Capstone	3
ENTR 496		4
Total Credits		16

Environmental Design

Department Information

- **Department Location:**
  Renaissance Hall
- **Department Phone:**

701-231-6151

- **Department Email:**
  ndsu.ala@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/ala/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/environmental-design/

Major Requirements

Major: Environmental Design

Degree Type: B.S.
Minimum Degree Credits to Graduate: 130

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Code	Title	Credits
ANTH 111	Introduction to Anthropology	3
ARCH 321	History and Theory of Architecture I	3
ENGL 326	Writing in the Design Professions	3

or 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
LA 231	Landscape Architecture Graphics	3
LA 232	Design Technology	3
LA 271	Introduction to Landscape Architecture Studio	6
LA 272	Parks & Open Spaces Studio	6
LA 321		4
LA 331	Graphics III: Design Communication	3
LA 341	Site Development and Detailing I	4
LA 342	Site Development and Detailing II	4
LA 371	Site Planning & Design Studio	6
LA 372	Community Planning & Design Studio	6
LA 422	Planting Theory and Practice	3
LA 441	Site Development and Detailing III	4
LA 471	Urban Design Studio	6
LA 472	Remediation & Planting Design Studio	6
or ARCH 474	International Design Studio	
PSYC 111	Introduction to Psychology	3
or SOC 110	Introduction to Sociology	
Total Credits		87

Environmental Geology

Department Information

- **Department Location:**
  Geosciences Building
- **Department Phone:**
  701-231-8455
- **Department Web Site:**
  www.ndsu.edu/geosci/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/environmental-geology/

Minor Requirements

Environmental Geology Minor

Minor Requirements

Required Credits: 19

Code	Title	Credits
Required Courses		
GEOL 105	Physical Geology	3
GEOL 105L	Physical Geology Lab	1
GEOL 300	Environmental Geology	3
GEOL 412	Geomorphology	3
GEOL 414	Hydrogeology	3
GEOL 428	Geochemistry	3

Select one from the following:		3 or 4
GEOL 413	Glacial Geology	
GEOL 350 & GEOL 303	Invertebrate Paleontology and Paleontology Field Course	
Total Credits		19-20

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- This minor is not available to students pursuing a Geology major.

Equine Assisted Activites and Therapies

Department Information

- **Department Location:**
  Hultz Hall
- **Department Phone:**
  701-231-7641
- **Department Email:**
  ndsu.ansc@ndsu.edu
- **Department Web Site:**
  www.ag.ndsu.edu/ansc/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/equine-assisted-activites-therapies/

Minor Requirements

Minor Requirements

Required Credits: 18

Code	Title	Credits
Required Courses		
ANSC 210	Introduction to Therapeutic Horsemanship	3
ANSC 260L	Equine Care and Management Practicum	1
ANSC 260	Introduction to Equine Studies	2
ANSC 261	Basic Equitation & Horsemanship	1
ANSC 361	Intermediate Horsemanship	1
ANSC 310	Principles of Therapeutic Horsemanship Instruction	3
ANSC 410	Therapeutic Horsemanship Teaching Practicum	1
Electives: Select 6 credits from the following (Please note some courses below require a prerequisite that may not be listed):		6
HDFS 230	Life Span Development	
HDFS 320	Prenatal, Infant and Toddler Development	
HDFS 330	Child Development	
HDFS 340	Adolescent Development	
HDFS 360	Adult Development and Aging	
PSYC 211	Introduction To Behavior Modification	
PSYC 212	Psychological Aspects of Drug Use and Abuse	
PSYC 214	Social Interaction	
PSYC 250	Developmental Psychology	
PSYC 270	Abnormal Psychology	
BIOL 220	Human Anatomy and Physiology I	
BIOL 221	Human Anatomy and Physiology II	
First Aid & CPR Certification *		0

American Heart Association or American Red Cross First Aid and CPR Certification	
Total Credits	18

* Students must earn their First Aid and CPR certification and present their current cards to the department of Animal Science for verification of this certification. The student will submit copies of the front and back of their First Aid and CPR cards to the Office of Registration and Records as proof of completion.

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a 2.0 minimum GPA for the minor requirements.

Equine Science

Department Information

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

Major Requirements

Major: Equine Science

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Quantitative Reasoning (R) †		3
Science and Technology (S) †		10
Humanities and Fine Arts (A) †		6

Social and Behavioral Sciences (B) †	6
Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Required Core Courses for Equine Science		
ANSC 223	Introduction to Animal Nutrition	2
ANSC 235	Equine Evaluation	2
ANSC 260	Introduction to Equine Studies	2
ANSC 260L	Equine Care and Management Practicum	1
ANSC 261	Basic Equitation & Horsemanship	1
ANSC 357	Animal Genetics	3
or ANSC 358	Equine Genetics	
ANSC 360	Equine Nutrition	3
ANSC 364	Equine Anatomy and Physiology	3
ANSC 480	Equine Industry and Production Systems	3
ANSC 478	Research and Issues in Animal Agriculture	3
ANSC 393	Undergraduate Research	2
or ANSC 396	Field Experience	
ANSC 463	Physiology of Reproduction	3
ANSC 463L	Physiology of Reproduction Laboratory	1
RNG 136	Introduction to Range Management	3
or PLSC 320	Principles of Forage Production	
ANSC	Electives	6
Supporting Courses		
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
AGRI 189	Skills for Academic Success [1]	1
Select one of the following (Not required for students transferring in 24 or more credits):		1
AGRI 150	Agriculture Orientation	
ANSC 101	Student Success Techniques - Animal and Equine Science	
VETS 150	Introduction to the Veterinary Profession	
ANSC 370	Fundamentals/Animal Disease	3
BIOC 260	Elements of Biochemistry	4
BIOL 111 & 111L	Concepts of Biology and Concepts of Biology Lab	4
or BIOL 150 & 150L	General Biology I and General Biology I Laboratory	
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab (May satisfy general education category S)	4
ECON 201	Principles of Microeconomics (May satisfy general education category B)	3
Select one of the following:		3
MATH 103	College Algebra	
MATH 105	Trigonometry	

MATH 107	Precalculus	
MATH 146	Applied Calculus I	
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab (May satisfy general education category S)	3
PLSC 110	World Food Crops (May satisfy general education category S)	3
PLSC 315	Genetics (May satisfy general education category S)	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
VETS 135	Anatomy and Physiology of Domestic Animals	3
Total Credits		82

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

Degree Requirements and Notes:

- Students must earn at least a 2.00 GPA that is based on the courses that are used to satisfy major requirements.
- Transfer grades of 'C' or better to count towards major requirements.

Minor Requirements

Equine Science Minor

Minor Requirements

Required Credits: 16

Code	Title	Credits
Required Courses		
ANSC 223	Introduction to Animal Nutrition	2
ANSC 260	Introduction to Equine Studies	2
ANSC 260L	Equine Care and Management Practicum	1
or ANSC 261	Basic Equitation & Horsemanship	
ANSC 360	Equine Nutrition	3
or ANSC 364	Equine Anatomy and Physiology	
Elective Courses: Select a minimum of 8 credits from the following:		8
ANSC 235	Equine Evaluation	
ANSC 300	Domestic Animal Behavior and Management	
ANSC 357	Animal Genetics	
or ANSC 358	Equine Genetics	
ANSC 361	Intermediate Horsemanship	
ANSC 362	Colts in Training	
ANSC 375	Methods of Horsemanship Instruction	
ANSC 461	Advanced Horsemanship and Equitation	
ANSC 463	Physiology of Reproduction	
ANSC 480	Equine Industry and Production Systems	
ANSC 496	Field Experience	
Total Credits		16

Minor Requirements and Notes:

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

Exercise Science

Department Information

- **Department Location:**
  Bentson/Bunker Field House
- **Department Phone:**
  701-231-7484
- **Department Web Site:**
  www.ndsu.edu/hnes/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/exercise-science/#planofstudytext

Major Requirements

Major: Exercise Science

Degree Type: B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Exercise Science Requirements		
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory (May satisfy general education category S) *	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
CHEM 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
CSCI 114 or CSCI 116	Microcomputer Packages (May satisfy general education category S) Business Use of Computers	3 or 4
HNES 170	Introduction to Exercise Science *	2
HNES 250	Nutrition Science (May satisfy general education category W)	3
HNES 365	Kinesiology	3
HNES 368	Biomechanics of Exercise	3
HNES 370	Exercise and Disease	3
HNES 371	Worksite Health Promotion	3
HNES 374	Methods in Resistance Training and Cardiovascular Conditioning	3
HNES 375	Research Methods and Design in Exercise Science	3
HNES 465	Physiology Of Exercise	3
HNES 466	Physiology Exercise Laboratory	1
HNES 472	Exercise Assessment and Prescription	3
HNES 475	Exercise Science Internship	12
HNES 476	Exercise Testing Laboratory	2
HNES 491	Seminar	1
HNES 496	Field Experience	1
HNES 496	Field Experience	1
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
PSYC 211	Introduction To Behavior Modification (May satisfy general education category B)	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Total Credits		79-80

* Requires a grade of 'B' or better.

Degree Requirements and Notes

- A cumulative GPA of 3.00 is required for graduation. No more than two grades of 'C' and no grades of 'D' or 'F' may be used to satisfy Exercise Science major courses.
- With the exception of field experiences, seminar, and internship, courses under the Exercise Science requirements may not be taken Pass/Fail.
- Department Requirements:BIOL 220 Human Anatomy and Physiology I, BIOL 220L Human Anatomy and Physiology I Laboratory, CHEM 121 General Chemistry I, PSYC 111 Introduction to Psychology and PSYC 211 Introduction To Behavior Modification, and HNES 250 Nutrition Science are listed within the General Education categories of Science & Technology, Social & Behavioral Sciences, and Wellness.

Extension Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921

- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  https://bulletin.ndsu.edu/programs-study/undergraduate/extension-education/

Minor Requirements

Extension Education Minor

Minor Requirements

Required Credits: 16-17

Code	Title	Credits
Required Courses		
H&CE 446	Extension Education (Required)	2
EDUC 322	Educational Psychology	3
or HDFS 230	Life Span Development	
NRM 421	Environmental Outreach Methods	3
or H&CE 468	Methods of Teaching Family and Consumer Sciences I: Techniques	
Select one from the following:		3
H&CE 480	Science, Technology, Engineering & Mathematics Teaching Methods in Agricultural Education	
HDFS 310	Citizenship & Social Activism (OR)	
HDFS 360	Adult Development and Aging	
H&CE 496	Field Experience (Internship) *	5-6
Total Credits		16-17

* Additional Field Experience credit may be warranted if additional time in the internship experience is required.

Minor Requirements and Notes

Coursework within the Extension Minor should total at least 11 credit hours, internship will fulfill the balance of minor credit hours

A minimum of 8 credits must be taken at NDSU.

Discuss options of courses with either Dr. Mari Borr or Dr. Adam Marx depending upon your intended Extension direction.

Family and Consumer Sciences Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/family-consumer-sciences-education/#planofstudytext

Major Requirements

Major: Family & Consumer Sciences Education

Degree Type: B.S.
Required Degree Credits to Graduate: 124

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

The Family & Consumer Sciences Education Specialty requirements also includes those courses listed in the general education categories of Social & Behavioral Sciences and Science & Technology.

Code	Title	Credits
Family & Consumer Sciences Education Requirements		
CHEM 117	Chemical Concepts and Applications (May satisfy general education category S)	3
CSCI 114	Microcomputer Packages (May satisfy general education category S)	3
or CSCI 116	Business Use of Computers	
ENGL 358	Writing in the Humanities and Social Sciences (May satisfy general education category C)	3
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
SOC 110	Introduction to Sociology (May satisfy general education category B)	3
Teaching Specialty Requirements		
ADHM 155	Apparel Construction and Fit	3
or ADHM 101	Beginning Apparel Construction	
ADHM 366	Textiles	3
ADHM 410	Dress in World Cultures	3
or ADHM 486	Dress and Human Behavior	
HDFS 135	Family Science	3

HDFS 186	Consumer and Society	3
HDFS 230	Life Span Development	3
or PSYC 250	Developmental Psychology	
HDFS 242	Couples, Marriages and Families	3
HDFS 341	Parent-Child Relations	3
HDFS 357	Personal and Family Finance	3
HDFS 462	Methods of Family Life Education	3
HDFS 475	Children and Families Across Cultures	3
H&CE 469	Housing Education and Issues	3
HNES 141	Food Sanitation	1
HNES 200	Principles of Nutrition (May satisfy general education category W)	3
HNES 217	Personal and Community Health	3
HNES 261 & 261L	Food Selection and Preparation Principles and Food Selection and Preparation Principles Laboratory	5
Housing/Design/Consumer Education: Select one of the following:		1-3
ADHM 151	Design Fundamentals	
ADHM 315	History of Interiors I	
ADHM 316	History of Interiors II	
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
H&CE 232	Philosophy and Policy	3
H&CE 467	Advising Family, Career, and Community Leaders of America	3
H&CE 468	Methods of Teaching Family and Consumer Sciences I: Techniques	3
H&CE 482	Methods of Teaching Family and Consumer Sciences II: Professional Practices	3
H&CE 483	Student Teaching Seminar	1
H&CE 487	Student Teaching	9
H&CE 488	Applied Student Teaching	3
Total Credits		104-106

Degree Requirements and Notes

- The following courses are recommended but not required for the program: ADHM 151 Design Fundamentals AND ADHM 367 Textiles Laboratory.

- GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A grade of 'C' or better is required in all Professional Education Requirement courses.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- See School of Education (https://www.ndsu.edu/education) for admission requirements.

Finance

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-8651
- **Department Web Site:**
  www.ndsu.edu/business/departments/afis/
- **Degrees Offered:**
  B.S.

- **Plan Of Study Sample:**
  https://bulletin.ndsu.edu/programs-study/undergraduate/finance/#planofstudytext

Major Requirements

Major: Finance

Degree Type: B.S.
Minimum Credits Required for Degree: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Pre-College of Business Requirements		
ACCT 200	Elements of Accounting I *	3
ACCT 201	Elements of Accounting II *	3
COMM 110	Fundamentals of Public Speaking (May satisfy general education category C) *	3
ECON 201	Principles of Microeconomics (May satisfy general education category B and G) *	3
MIS 116	Business Use of Computers (May satisfy general education category S)	3
ECON 202	Principles of Macroeconomics (May satisfy general education category B and G) *	3
ENGL 110	College Composition I (May satisfy general education category C) *	4

ENGL 120	College Composition II (May satisfy general education category C) [*]	3
MATH 144	Mathematics for Business [*]	4
PHIL 216	Business Ethics (May satisfy general education category A) [*]	3
PSYC 111	Introduction to Psychology (May satisfy general education category B) [*]	3
or SOC 110	Introduction to Sociology	
STAT 330	Introductory Statistics (May satisfy general education category R) [*]	3
STAT 331	Regression Analysis [*]	2
Finance Major Requirements [**]		
ENGL 320	Business and Professional Writing (May satisfy general education category C)	3
FIN 320	Principles of Finance (requires a grade of C or better) [1]	3
MGMT 320	Foundations of Management [1]	3
MRKT 320	Foundations of Marketing [1]	3
BUSN 430	Legal and Social Environment of Business [1]	3
FIN 410	Investment Analysis and Management	3
FIN 430	Management of Financial Institutions	3
FIN 460	Corporate Finance	3
BUSN 489	Strategic Management (Capstone Course) [1]	4
MIS 320	Management Information Systems [1]	3
Finance Courses [**]		
FIN 420	Options, Futures, and Other Derivatives	3
FIN 440	International Finance	3
FIN 470	Analysis of Fixed-Income Securities	3
FIN 480	Applied Portfolio Management	3
300-400 level Courses [**]		18
Select 9 credits from three of the following six areas (includes courses cross-listed with CoB courses):		
1) ACCT		
2) MGMT		
3) MRKT		
4) MIS		
5) Environment of Business:		
BUSN 318	Taxation in Management Decisions	
BUSN 340	International Business	
BUSN 341	Global Business Environment	
BUSN 347	Principles of Real Estate	
BUSN 383	Organizational Communication I	
BUSN 431	Business Law I-Contracts, Property and Torts	
BUSN 432	Business Law II-Business Organization and Commercial Transactions	
BUSN 440	International Business Law	
BUSN 474	Cooperatives	
BUSN 487	Managerial Economics	
6) Internship up to three credits:		
FIN 397	Fe/Coop Ed/Internship	
FIN 413	Finance Service Internship	
Select 9 credits (minimum) from the following eleven areas (must be 300-400 level); includes courses cross-listed with CoB courses:		
1) FIN		
2) ACCT		
3) AGEC		
4) BUSN		
5) CSCI		
6) ECON		
7) MATH		
8) MGMT		

9) MIS	
10) MRKT	
11) STAT	
Total Credits	101

* Pre-college and pre-finance major courses: A grade of 'C' or better is required in these courses for admission to the Finance major.

** Students must earn a grade of 'C' or better and have a minimum 2.5 cumulative GPA in ALL courses included in the professional program (i.e., all required courses, elective requirements, and additional 300-400 level College of Business electives or breadth electives).

[1] Denotes Common Body of Knowledge (CBK) course.

Degree Requirements and Notes

- Students must include one of the following international courses in their plan of study:

Code	Title	Credits
BUSN 340	International Business	3
BUSN 341	Global Business Environment	3
FIN 440	International Finance	3
MGMT 440	International Management	3
MRKT 440	International Marketing	3

- Students follow the published curricula for the finance program of study from the semester/year of entrance in the College of Business to graduation provided enrollment at NDSU has not been discontinued for more than one year. Students who change their major are subject to meeting the curricular requirements in effect at the time the new major is declared.
- Business courses from programs that do not hold AACSB International accreditation cannot be used for major or minor requirements in the College of Business (CoB); such courses may be eligible for use as free electives.
- The CoB accepts a maximum of nine credits of non-NDSU 300-400 level business courses from AACSB programs with approval of the department.
- Admission into the finance major: Students must earn a 'C' or better in the pre-college and pre-finance major courses that are indicated with an asterisk (*), achieve junior standing (60 credits), and earn a 2.50 institutional cumulative grade point average. Students must submit an online application to the CoB.
- Admission to the finance major is required to enroll in the advanced 300 or 400 level courses in the CoB.
- A grade of 'C' or better is required in transfer courses accepted for ACCT 200 Elements of Accounting I and ACCT 201 Elements of Accounting II and all 300-400 level accounting, business administration, finance, management, management information systems, and marketing courses.
- A letter grade must be earned in any course that fulfills a major requirement (with the exception of some practicum options).
- A 2.50 cumulative grade point average is required to enroll in 300-400 level CoB courses.
- Students must earn a 2.50 institutional GPA to graduate.
- Of the credits completed in residence at least 30 credits must be in 300-400 level CoB courses.
- Students must be accepted to the finance major prior to the completion of the last 30 credits in 300 and 400 level CoB courses.
- A Business Administration minor is NOT offered with this major.
- For multiple majors within the CoB, at least 15 unique credits of 300-400 level CoB courses must exist between the majors.
- Prerequisite for Finance Internship: FIN 320 with a grade of C or better.
- Students should refer to www.ndsu.edu/business for current and complete listing of the major requirements.

Certificate Requirements

Certificate: Finance

Required Credits: 16

Certificate Requirements

Code	Title	Credits
FIN 320	Principles of Finance	3
FIN 410	Investment Analysis and Management	3
FIN 494	(Integrated Project)	1
Select 3 courses from the following:		9
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
Total Credits	16

Degree Notes:

- Students must earn a 2.50 cumulative GPA, which is based on the courses used to satisfy the certificate requirements.
- Courses may not be taken Pass/Fail.
- All 300-400 level courses in require junior standing (60+ credits) and a 2.50 cumulative GPA to enroll. Required courses for the certificate may require prerequisites.

Food Safety

Department Information

- **Department Location:**
  Morrill Hall
- **Department Phone:**
  701-231-8944
- **Department Web Site:**
  www.ag.ndsu.edu/foodsafety/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/food-safety/

Minor Requirements

Food Safety Minor

Minor Requirements

Required Credits: 16

Code	Title	Credits
Required Courses		
SAFE 401	Food Safety Information & Flow of Food	1
SAFE 402	Foodborne Hazards	1
SAFE 403	Food Safety Risk Assessment	1
SAFE 404	Epidemiology of Foodborne Illness	1
SAFE 405	Costs of Food Safety	1
SAFE 406	Food Safety Crisis Communication	1
SAFE 407	Food Safety Risk Management	1
SAFE 409	Food Safety Risk Communication & Education	1
Elective Courses: Select 8 credits from the following:		8
AGEC 339	Quantitative Methods & Decision Making	
AGEC 344	Agricultural Price Analysis	
AGEC 375	Applied Agricultural Law	
AGEC 484	Agricultural Policy	
ANSC 340	Principles of Meat Science	
ANSC 344	Fundamentals of Meat Processing	
ANSC 370	Fundamentals/Animal Disease	
ANSC 482	Sheep Industry and Production Systems	
ANSC 484	Swine Production/Pork Industry Systems	
ANSC 486	Beef Industry and Production Systems	
ANSC 488	Dairy Industry and Production Systems	
CFS 471	Food Processing Laboratory	
CFS 480	Food Product Development	

EMGT 261	Disaster Preparedness
EMGT 263	Disaster Response
EMGT 461	Business Continuity and Crisis Management
HNES 141	Food Sanitation
HNES 361 & 361L	Foodservice Systems Management I and Foodservice Systems Management I Laboratory
HNES 460 & 460L	Foodservice Systems Management II and Foodservice Systems Management II Laboratory
MICR 350 & 350L	General Microbiology and General Microbiology Lab
MICR 453	Food Microbiology
MICR 460 & 460L	Pathogenic Microbiology and Pathogenic Microbiology Laboratory
MICR 470	Basic Immunology
MICR 471	Immunology and Serology Laboratory
MICR 474	Epidemiology
PLSC 110	World Food Crops
PPTH 460	Fungal Biology
SAFE 440	Hazard Analysis Critical Control Point (HACCP) and Food Safety Systems
SAFE 452	Food Laws and Regulations
SAFE 484	Food Safety Practicum
Total Credits	16

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU

Food Science

Department Information

- **Department Location:**
  Harris Hall
- **Department Phone:**
  701-231-8790
- **Department Web Site:**
  www.ag.ndsu.edu/foodscience/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/food-science/#planofstudytext

Major Requirements

Major: Food Science

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

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

7. At least 36 credits must be NDSU resident credits. Residence credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Required Core Courses for Food Science		
AGRI 189	Skills for Academic Success [1]	1
ABEN 263	Biological Materials Processing	2-3
or CFS 430	Food Unit Operations	
ANSC 340	Principles of Meat Science	3
CFS 210	Introduction to Food Science and Technology	2-3
or CFS 200	Introduction to Food Systems	
CFS 370	Food Processing I	3
CFS 450	Cereal Technology	3
MICR 453	Food Microbiology	3
CFS 460	Food Chemistry	3
CFS 461	Food Chemistry Laboratory	1
CFS 464	Food Analysis	3
CFS 470	Food Processing II	3
CFS 471	Food Processing Laboratory	1
CFS 474	Sensory Science of Foods	3
CFS 480	Food Product Development (Capstone)	3
SAFE/CFS/AGEC 452	Food Laws and Regulations	3
Supporting Courses		
Select one of the following:		3-4
BIOC 260	Elements of Biochemistry	
BIOC 460 & 460L	Foundations of Biochemistry and Molecular Biology I and Foundations of Biochemistry I Laboratory	

BIOL 150	General Biology I	3
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	Microcomputer Packages (May satisfy general education category S)	3
or MIS 116	Business Use of Computers	
ECON 201	Principles of Microeconomics (May satisfy general education category B and G)	3
HNES 250	Nutrition Science (May satisfy general education category W)	3
MATH 146	Applied Calculus I (May satisfy general education category R)	4
or MATH 165	Calculus I	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
PHYS 211 & 211L	College Physics I and College Physics I Laboratory (May satisfy general education category S)	4
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Total Credits		80-83

[1] PLSC189 is only required for first-time, first-year students--A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take PLSC189.

Degree Requirements and Notes:

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

Food Science and Technology

Department Information

- **Department Location:**
  Harris Hall
- **Department Phone:**
  701-231-8790
- **Department Web Site:**
  www.ag.ndsu.edu/foodscience/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/food-science-technology/

Minor Requirements

Food Science & Technology

Minimum Required Credits: 18

A grade of C or better required for all minor courses.

Code	Title	Credits
Required Core		
CFS 210	Introduction to Food Science and Technology	2
CFS 370	Food Processing I	3
CFS 464	Food Analysis	3
CFS 470	Food Processing II	3
CFS 471	Food Processing Laboratory	1
SAFE 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	
SAFE 401	Food Safety Information & Flow of Food	
SAFE 402	Foodborne Hazards	
SAFE 403	Food Safety Risk Assessment	
SAFE 404	Epidemiology of Foodborne Illness	
SAFE 405	Costs of Food Safety	
SAFE 406	Food Safety Crisis Communication	
SAFE 407	Food Safety Risk Management	
SAFE 408	Food Safety Regulatory Issues	
SAFE 409	Food Safety Risk Communication & Education	

Minor Requirements and Notes:

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

Fraud Investigation

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-8651
- **Department Web Site:**
  www.ndsu.edu/business/departments/afis/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/fraud-investigation/

Minor Requirements

Fraud Investigation Minor

Minor Requirements

Required Credits: 24

Code	Title	Credits
Requirements		
ACCT 200	Elements of Accounting I [1]	3
ACCT 201	Elements of Accounting II [1]	3
ACCT 410	Fraud Examination [2]	3
ACCT 411	Advanced Fraud Examination [3]	3
CJ 201	Introduction to Criminal Justice	3
or CJ 230	Criminology	
Select three from the following:		9

ACCT 412	Computer Crime, Forensics, and Investigation
ACCT 421	Auditing I
CJ 315	Federal Law Enforcement & Crime Policy
CJ 330	Criminal Law and Procedure
CSCI 469	Network Security
MIS 499.1	
Total Credits	24

1 ACCT 200 and ACCT 201 require a grade of 'B' or better to enroll in 300-400 level accounting courses.

2 ACCT 410 Fraud Examination may be waived if the student has taken ACCT 610 Fraud Examination

3 ACCT 411 Advanced Fraud Examination may be waived if the student has taken ACCT 611 Advanced Fraud Examination

Minor Requirements and Notes

- This minor must be declared (https://www.ndsu.edu/business/programs/majors/minors) with the College of Business.
- Acceptance into this minor program requires students to earn a grade of 'C' or better in all courses and maintain a minimum institutional cumulative GPA of 2.50. Students must be junior standing (60 credits). **Courses may not be taken pass/fail.**
- If the cumulative GPA falls below the 2.50 after acceptance into the program, the student will not be allowed to register for the College of Business courses until his/her cumulative GPA returns to 2.50 or better.
- Approval for a minor does not guarantee enrollment in specific courses.
- A minimum of 8 credits must be taken at NDSU.

French

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7887
- **Department Email:**
  ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/modernlanguages/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/french/#planofstudytext

Major Requirements

Major: French

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major Requirements

- A minimum grade of "B" is required for all FREN courses counted toward the major.

Code	Title	Credits
French Major Requirements		
Of the 28 credits required for the French major, 15 must be NDSU resident credits in addition to the capstone (i.e. cannot be taken Tri-College or study abroad). Note: Other University-wide residency requirements will apply.		
Required Core Courses:		
FREN 311	French Conversation and Composition I	3

FREN 312	French Conversation and Composition II	3
FREN 315	Contemporary France	3
FREN 350	Introduction to French Linguistics and Pronunciation	3
FREN 401	Approaches to Literature	3
Elective Courses: Select four of the following:		12
FREN 340	The French-Speaking World	
FREN 345	Women in French Literature	
FREN 360	Studies in Language and Style	
FREN 365	Advanced Conversation Through Contemporary Culture	
FREN 370	Translation: Practice and Theory	
FREN 410	French Literature & Culture before 1800	
FREN 412	French Literature & Culture since 1800	
FREN 420	Themes & Topics in French Literature & Culture	
FREN 422	Genres in French Literature	
One Year of a Second Language		
A minimum of one year of a second foreign language is required, with grades of 'C' or better in both semesters.		8
Ancillary Courses:		6
Choose at least two courses. Consult department or adviser for current list of approved ancillary electives. Western Civilization, History of Europe or Africa, World Literature, or any area of linguistics. Courses selected from current General Education course list may count here.		
Study Abroad & Capstone Experience:		
FREN 492	Study Abroad (Requires a minimum of one semester-14 weeks at 300+ level in a program pre-approved by the Modern Languages Dept.)	1-15
FREN 489	Senior Thesis (Consult dept/adviser semester before enrolling)	1
Total Credits		43-57

Minor Requirements

French Minor

Minor Requirements

Required Credits: 18

- A minimum grade of B is required for all courses used for the French minor.

Code	Title	Credits
Core Requirements		
FREN 311	French Conversation and Composition I	3
FREN 312	French Conversation and Composition II	3
FREN 315	Contemporary France	3
Select one of the following:		3
FREN 350	Introduction to French Linguistics and Pronunciation	
FREN 360	Studies in Language and Style	
FREN 365	Advanced Conversation Through Contemporary Culture	
Electives: Select 2 courses from the following or what wasn't used above:		6
FREN 340	The French-Speaking World	
FREN 345	Women in French Literature	
FREN 370	Translation: Practice and Theory	
FREN 401	Approaches to Literature	
FREN 410	French Literature & Culture before 1800	
FREN 412	French Literature & Culture since 1800	
FREN 420	Themes & Topics in French Literature & Culture	
FREN 422	Genres in French Literature	
Total Credits		18

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU. Courses may not be taken Tri-College or study abroad.

French Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/french-education/#planofstudytext

Major Requirements

Major: French Education

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Teaching Specialty Requirements		
A GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.		
A minimum grade of 'B' is required in the teaching specialty courses.		
FREN 311	French Conversation and Composition I	3
FREN 312	French Conversation and Composition II	3
FREN 315	Contemporary France	3
FREN 350	Introduction to French Linguistics and Pronunciation	3
FREN 360	Studies in Language and Style (May satisfy general education category C)	3
FREN 401	Approaches to Literature	3
Select four of the following:		12
FREN 340	The French-Speaking World	
FREN 345	Women in French Literature	
FREN 365	Advanced Conversation Through Contemporary Culture	
FREN 370	Translation: Practice and Theory	
FREN 410	French Literature & Culture before 1800	
FREN 412	French Literature & Culture since 1800	
FREN 420	Themes & Topics in French Literature & Culture	
FREN 422	Genres in French Literature	
Study Abroad & Capstone Experience		
FREN 492	Study Abroad (min 1 semester-14 weeks-at 300+ level in a program pre-approved by Modern Languages Dept.)	1-15
FREN 489	Senior Thesis (Consult department/adviser semester before enrolling)	1
Foreign Language		8
A minimum of one year of a second foreign language is required with grades of 'C' or better in both courses.		
Ancillary Electives		6
Choose at least two courses from the following areas: Western Civilization, History of Europe or Africa, World Literature or Mythology, or any area of linguistics. Consult department or adviser for approved list. May count towards general education requirements.		
Professional Education Requirements		
A grade of 'C' or better is required inthe following courses.		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Lang)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		77-91

Degree Requirements and Notes

- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- Of the 28 required credits of French, a minimum of 15, in addition to the capstone, must be resident credit (i.e. taken at NDSU, cannot be Tri-College nor study abroad).

- Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.
- See School of Education (https://www.ndsu.edu/education) for admission requirements

Bachelor of Arts (BA) Degree – An additional 6 credits of Humanities and Social Sciences and two years of one modern foreign language at the college level or equivalent are required.

French Studies

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7887
- **Department Email:**
  ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/modernlanguages/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/french-studies/

Minor Requirements

French Studies Minor

Minor Requirements

Required Credits: 18

Code	Title	Credits
French Studies Core Requirements		
FREN 311	French Conversation and Composition I	3
FREN 312	French Conversation and Composition II	3
FREN 315	Contemporary France (May be done through Study Abroad)	3
History Electives		
Must be a sequence. A student may also select a sequence appropriate to his/her area of study.		
HIST 101	Western Civilization I	3
HIST 102	Western Civilization II	3
Additional Electives: Select one of the following:		3
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
GEOG 151	Human Geography	
GEOG 161	World Regional Geography	
POLS 220	International Politics	
FREN 492	Study Abroad	
Total Credits		18

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU.

General Agriculture

Department Information

- **Department Location:**
  Morrill Hall
- **Department Phone:**
  701-231-8790

- **Department Web Site:**
  www.ag.ndsu.edu/academics/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/general-agriculture/#planofstudytext

Major Requirements

General Agriculture Major

Degree Type: B.S.
Minimum Degree Credits to Graduate: 128

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Major Requirements for General Agriculture		
AGRI 189	Skills for Academic Success (or other Freshman Experience class in a CAFSNR department) [3]	1
CSCI 114	Microcomputer Packages (May satisfy a general education category S)	3
or MIS 116	Business Use of Computers	
MATH 103	College Algebra (or higher level mathematics)	3

PLSC 315	Genetics (May satisfy a general education category S)	3
STAT 330	Introductory Statistics (May satisfy a general education category R)	3
Select one of the following	(May satisfy a general education category S)	3
CHEM 117	Chemical Concepts and Applications	
CHEM 121	General Chemistry I	
BIOL 111	Concepts of Biology	
Required Discipline Courses for General Agriculture [1,2]		
Discipline One: Must include a minimum of 5 credits of 300-400 level		15
Discipline Two: Must include a minimum of 5 credits of 300-400 level		12
Discipline Three: Must include a minimum of 3 credits of 300-400 level		9
Discipline Four		9
Additional Agriculture Electives: 18 credits required; at least 5 credits must be at 300-400 level [2]		18
Total Credits		79

1
- Four (4) agriculture disciplines are required. Two disciplines require a minimum of 9 credits, a third discipline requires a minimum of 12 credits and the fourth discipline requires a minimum of 15 credits.
- A capstone experience is required in one of the disciplines.
- Disciplines which may be combined are: (AGEC, ECON); (ANSC, VETS); (NRM, PLSC, RNG); (ASM, ABEN); (NRM, RNG, SOIL); (CFS, SAFE); (ANSC, RNG); (PLSC, PPTH, SOIL)

2 The student and adviser will complete a *General Agriculture Plan of Study* with the courses to be used for the discipline groups and agriculture electives. This form will also require the signature of the department chairperson before being submitted to the Office of Registration and Records for verification of major program completion.

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

Degree and Major Notes

- If a course is used to fulfill General Education or Major Requirements it cannot be used towards the disciplines. This includes; PLSC 315 Genetics, ECON 201 Principles of Microeconomics and STAT 330 Introductory Statistics.
- A *General Agriculture Plan of Study* must be completed with the student's assigned academic adviser prior to the completion of 75 credits. See department for this process. The *Plan of Study*, with signatures, must be filed with the Office of Registration and Records once complete.
- This major will not be available for view in the Student Advisement/Requirement Report in Campus Connection.
- The total number of credits for this degree program is 128.

Minor Requirements

General Agriculture Minor

Minor Requirements

Required Credits: 24

General Agriculture

Code	Title	Credits
Required Courses *		
Select six (6) credits minimum in any four (4) disciplines offered by the College of Agriculture, Food Systems, and Natural Resources with the approval of the academic department.		
Discipline One		6
Discipline Two		6
Discipline Three		6
Discipline Four		6
Total Credits		24

* The student and adviser will complete a substitution form with the courses to be used for the discipline groups. This form will also require the signature of the department chairperson before being submitted to the Office of Registration and Records for verification of minor program completion.

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a minimum 2.00 GPA for the minor requirements.
- This minor will not be available for view in the Student Advisement/Requirement Report in Campus Connection until the substitution form has been received and processed.

Geography

Department Information

- **Department Location:**
  Stevens Hall
- **Department Phone:**
  701-231-8455
- **Department Web Site:**
  www.ndsu.edu/geosci/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/geography/

Minor Requirements

Geography Minor

Minor Requirements

Required Credits: 18

Code	Title	Credits
Required Courses		
All minor courses must be selected in consultation with a Department of Geosciences adviser.		18
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- The student and adviser will complete a substitution form with the courses to be used for the geography minor. This form will also require the signature of the department chairperson before being submitted to the Office of Registration and Records for verification of minor program completion.
- Note: This minor will not be available for view in the Student Advisement/Requirement Report in Campus Connection until the substitution form has been received and processed.

Geology

Department Information

- **Department Location:**
  Stevens Hall
- **Department Phone:**
  701-231-8455
- **Department Web Site:**
  www.ndsu.edu/geosci/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/geology/#planofstudytext

Major Requirements

Major: Geology

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

Code	Title	Credits
Geology Core Requirements		
Students must have at least a 2.0 cumulative GPA in the geology core requirements.		
GEOG 455	Introduction to Geographic Information Systems	4
GEOL 105 & 105L	Physical Geology and Physical Geology Lab (May satisfy general education category S)	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
Select one of the following:		2
GEOL 301	Lake Superior Field Course	
GEOL 302	Black Hills Field Course	
GEOL 496	Field Experience	
GEOL 350 & GEOL 303	Invertebrate Paleontology and Paleontology Field Course	4
GEOL 410	Sedimentology/Stratigraphy	4
GEOL 412	Geomorphology	3
GEOL 420 & GEOL 421	Mineralogy and Mineralogy Laboratory	4
GEOL 422	Petrology	3
GEOL 423	Petrography	1
GEOL 450	Field Geology	3
GEOL 457	Structural Geology	4
GEOL 491	Seminar (Junior Year)	1
GEOL 491	Seminar (Senior Year)	1
SOIL 444	Soil Genesis and Survey	3
Related Required Courses		
Select one of the following chemistry sequences :		8
Sequence A:		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Sequence B:		
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
ENGL 324	Writing in the Sciences	3
MATH 165	Calculus I (May satisfy general education category S)	4
MATH 166	Calculus II	4
Select one of the following physics sequences:		8-10
Sequence A:		
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	
Sequence B:		
PHYS 251 & 251L	University Physics I and University Physics I Laboratory	
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	
Select one of the following:		3-4
CSCI 122	Introduction to Programming Concepts	

CSCI 160	Computer Science I	
CSCI 227	Computing Fundamentals I	
Total Credits		75-78

Program notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.
- Majors planning on graduate studies should be aware that a summer field camp course may be required for graduate admission. This course is recommended to be taken during the summer following the junior or senior year. Information on field camp courses and a small departmental scholarship to support these studies may be obtained from an adviser.

Geology Minor

Minor Requirements

Required Credits: 18

Code	Title	Credits
Required Courses		
All minor courses must be selected in consultation with a Department of Geosciences adviser.		18
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Select geography and soil science courses may be substituted for geology courses. A substitution form must be submitted to the Office of Registration and Records for approved substitutions.
- The student and adviser will complete a substitution form with the courses to be used for the geology minor. This form will also require the signature of the department chairperson before being submitted to the Office of Registration and Records for verification of minor program completion.
- Note: This minor will not be available for view in the Student Advisement/Requirement Report in Campus Connection until the substitution form has been received and processed.

German Studies

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7887
- **Department Email:**
  ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/modernlanguages/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/german-studies/

Minor Requirements

German Studies Minor

Minor Requirements

Required Credits: 18

Code	Title	Credits
German Studies Core Requirements		
GERM 220	German Culture & Society (may be completed through study abroad)	3
GERM 311	German Conversation and Composition I	3

GERM 312	German Conversation and Composition II	3
History Electives		
Must be a sequence. Or a history sequence appropriate to student's area of study		
HIST 101	Western Civilization I	3
HIST 102	Western Civilization II	3
Additional Electives: Select one of the following:		3
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
GEOG 151	Human Geography	
GEOG 161	World Regional Geography	
POLS 220	International Politics	
GERM 492	Study Abroad	
Total Credits		18

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU.

Gerontology

Department Information

- **Department Location:**
  E. Morrow Lebedeff Hall
- **Department Phone:**
  701-231-8211
- **Department Web Site:**
  www.ndsu.edu/undergraduate_studies/minors/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/gerontology/

Minor Requirements

Gerontology Minor

Minor Requirements

Required Credits: 19

Code	Title	Credits
Area One: Social Gerontology		
SOC 440	Sociology of Aging	3
Area Two: Developmental Psychology of Aging (Select one from the following):		3
HDFS 360	Adult Development and Aging	
PSYC 471	The Psychology Of Aging	
Area Three: Wellness and Aging (Select one from the following):		3
HNES 452	Nutrition,Health and Aging	
HDFS 230	Life Span Development	
Area Four: Macrosystems		
HDFS 480	Community Resources of Later Life	3
Area Five: Internship/Practicum		4
A minimum of 4 credits of internship or practicum is required for this area.		
Area Six: Elective (Select one from the following):		3
ANTH 332	Medical Anthropology	
HDFS 357	Personal and Family Finance	
HDFS 491	Seminar (Topic must be aging related)	
H&CE 468	Methods of Teaching Family and Consumer Sciences I: Techniques	

SOC 426	Sociology of Medicine
SOC 441	Death and Dying
HDFS 482	Family Dynamics of Aging
Total Credits	19

Minor Requirements and Notes

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

Global Business

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-8651
- **Department Web Site:**
  www.ndsu.edu/business/
- **Degrees Offered:**
  Offered as a second major only
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/global-business/

Second Major Requirements

Major: Global Business

Required Credits: 40

I. Primary Major Requirement

Global Business is offered as a second major only. Students may pursue Global Business after declaring and being admitted into one of the College of Business' primary professional programs of Accounting, Business Administration, Finance, Management, Management Information Systems, or Marketing (see admission requirements (http://bulletin.ndsu.edu/undergraduate/colleges/business) for *all* College of Business majors).

II. Core Requirement

Code	Title	Credits
I. Core Requirement		
FIN 320	Principles of Finance	3
MGMT 320	Foundations of Management	3
MRKT 320	Foundations of Marketing	3
MIS 320	Management Information Systems	3
BUSN 430	Legal and Social Environment of Business	3
BUSN 340	International Business	3
BUSN 341	Global Business Environment (or a UNIV 492 study abroad course) *	3
BUSN 489	Strategic Management	4
Complete 3 courses from the following:		9
MRKT 372	Global Retailing	
MGMT 440	International Management	
FIN 440	International Finance	
MRKT 440	International Marketing	
BUSN 440	International Business Law	
AGEC 371	Export Management	
II. Language Proficiency Requirement **		3-14
III. Study Abroad Requirement ***		3
Total Credits		40-51

* The intent of BUSN 341 is to ensure that students participate in a study abroad experience that includes an academic component related to the country where the study abroad takes place. In addition to BUSN 341 (business environment, institutions, history, and cultures of the European Union) BUSN 394: Individual Study (business environment, institutions, history, and culture of China) may also fulfill this requirement. NDSU Study Tour (Prefix 379) courses from across campus (faculty directed experience or field study in a foreign country) or other study abroad transfer courses approved by the department chair may also fulfill this requirement. While these courses will fulfill the academic requirement portion of the study abroad experience, the student must study abroad for at least three weeks as described in study abroad footnote***.

** A second year language proficiency at the college-level is required. Completion of any 300 or 400 level language course with a grade of B or higher will also fulfill this requirement. For non-native English speakers, completion of any 300 or 400 level ENGL course (this includes ENGL 320) with a grade of B or higher will fulfill this requirement.
Second Year Language Proficiency includes:
(Prefix) 101: First Year Language I
(Prefix) 102: First Year Language II
(Prefix) 201: Second Year Language I
(Prefix) 202: Second Year Language II

*** Each student must complete an approved study abroad experience (Prefix 492). Although the core requirement of BUSN 341 or equivalent already encompasses a study abroad experience, students earning a second major in global business must study abroad for at least three weeks. In some cases, the study abroad requirement is fulfilled by one study abroad experience - e.g., a five week program in Europe or a full semester abroad. However, two shorter programs may be substituted for a longer program (e.g., the ten-day CoB spring break experience in Eastern Europe and the twelve-day CoB summer trip to China).

notes

International students who are enrolled at NDSU will not be required to complete a study abroad experience. Instead, students must complete one of the following North American history courses: HIST 382, 421, 422, 423, 424, 425, 429, 431, 434, 436, 437, or 476. This history course will substitute for the BUSN 341 "European Business Environment or equivalent study abroad course" from core requirement group A.

Pre-Business Core Suggestions: While not required, students are encouraged to take either ANTH 111 (Introduction to Anthropology) or COMM 216 (Intercultural Communication) as a general education cultural diversity requirement option. Students will also benefit from taking GEOG 161 (World Regional Geography) as an elective.

Health Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www/ndsu.edu/education/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/health-education/

Major Requirements

Major: Health Education

Degree Type: B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

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

7. At least 36 credits must be NDSU resident credits. Residence credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Health Education Requirements		
ENGL 358	Writing in the Humanities and Social Sciences (May satisfy general education category C)	3
HNES 217	Personal and Community Health (May satisfy general education category W) *	3
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
SOC 110	Introduction to Sociology (May satisfy general education category B)	3
Teaching Specialty Requirements		
HDFS 135	Family Science **	3
HDFS 230	Life Span Development	3
or PSYC 250	Developmental Psychology	
HNES 110	Introduction to Health and Physical Education *	3
HNES 200	Principles of Nutrition *	3
or HNES 250	Nutrition Science	
HNES 341	Psychosocial Aspects of Health *	3
HNES 345	Materials and Concepts of Health Education *	3
HNES 367	Principles of Conditioning *	3
HNES 445	Organization and Administration of Coordinated School Health Programs *	3
PSYC 210	Human Sexuality **	3
PSYC 212	Psychological Aspects of Drug Use and Abuse **	3
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Health Ed K-12)	3

EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
College Requirement		
HD&E 320	Professional Issues	1
Total Credits		74

* Students must earn a grade of 'B' or better in these courses.

** Students must earn a grade of 'C' or better in these courses.

Degree Requirements and Notes

- A GPA of 2.75 or better in the teaching specialty is required to stay in full standing in the program, for placement in student teaching, and to exit from the program.
- A GPA of 2.75 or better in professional education requirements and completion of Praxis II and PLT exams, are required to exit the program.
- Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.
- See School of Education (https://www.ndsu.edu/education) for admission requirements.

History

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-8654
- **Department Web Site:**
  ndsuhprs.org/ (http://ndsuhprs.org)
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/history/#planofstudytext

Major Requirements

Major: History

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major Requirements

24 credits must be taken at the 300-400 level and 20 credits must be taken in residence at NDSU for a history major.

Code	Title	Credits
History Major Requirements		
Foundation Core: Select 2 courses from the following:		6
HIST 101	Western Civilization I (May satisfy general education category A)	
HIST 102	Western Civilization II (May satisfy general education category A)	
HIST 103	U.S. to 1877 (May satisfy general education category A)	

HIST 104	U.S. Since 1877 (May satisfy general education category A)	
Transitional Courses: Select one course from the following:		3
HIST 135	Race in U.S. History (May satisfy general education category A and D)	
HIST 220	North Dakota History	
HIST 251	Introduction To Public History	
HIST 252	Introduction to Museum Work	
HIST 259	Women in European History 1400-1800	
HIST 261	American Indian History (May satisfy general education category A and D)	
HIST 270	American Religious History (May satisfy general education category A)	
HIST 271	Introduction to Latin American History (May satisfy general education category A and D)	
HIST 280	History of East Asia to 1600	
HIST 281	History of East Asia from 1600	
Distribution Requirement: Minimum credit required for each distribution area.		
North American History: Select 6 credits from the following:		6
RELS 340	New Religious Movements	
RELS 345	Religion and Politics	
HIST 382	Canada	
HIST 415	Public Memory and Memorialization in America	
HIST 420	Colonial American History	
HIST 421	Revolutionary America	
HIST 422	American Civil War and Reconstruction	
HIST 423	The Gilded Age and Progressive America	
HIST 424	U.S. History 1917-1960	
HIST 425	U.S. History 1917-Present II	
HIST 428	War and Society in Early America	
HIST 431	The North American Plains	
HIST 434	Environmental History	
HIST 436	American Frontier to 1850	
HIST 437	American West Since 1850	
European History: Select 6 credits of the following:		6
HIST 320	History of Christianity	
HIST 450	Ancient History	
HIST 451	Medieval History	
HIST 454	Renaissance And Reformation	
HIST 455	The Eighteenth Century	
HIST 456	Europe 1815-1914	
HIST 457	Europe Since 1914	
HIST 464	Imperial Spain	
HIST 465	Germany since 1750	
HIST 467	History Of Russia II	
Widening Horizons: Select 6 credits of the following:		6
HIST 355	History of Global Islam	
HIST 381	Australia & New Zealand (May satisfy general education category A and G)	
HIST 440	The Ottoman Empire	
HIST 470	Modern Latin America I	
HIST 471	Modern Latin America II	
HIST 473	Colonial Mexico	
HIST 474	Modern Mexico	
HIST 477	Slavery in the Atlantic World	
HIST 480	History of Modern China from 1600	
HIST 481	History of Japan	
HIST 482	Vietnam: 125 Years of Conflict	

HIST 484	Cultures and Civilizations of the Pre-modern World	
HIST 485	Cultural Exchange and the Making of the Modern World	
Senior Seminar:		
HIST 489	Senior Seminar (Capstone) *	3
Additional Electives: A minimum of 6 credits of history courses required.		6
Total Credits		36

* Prerequisite for HIST 489 Capstone: HIST 390

Minor Requirements

History Minor

Minor Requirements

Required Credits: 18

Code	Title	Credits
Electives		
HIST	100-200 level courses	9
HIST	300-400 level courses	9
Total Credits		18

Minor Requirements and Notes

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

History Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/history-education/#planofstudytext

Major Requirements

Major: History Education

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
History 100-200 Level Courses		9
History 300-400 Level Courses		9
HIST 390	Historical Research and Writing (May satisfy general education category C)	3
HIST 489	Senior Seminar (Capstone)	3
Distribution Requirement: Select 6 credits from each of the 3 categories.		18
North American History (6 cr):		
HIST 382	Canada	
HIST 421	Revolutionary America	
HIST 422	American Civil War and Reconstruction	
HIST 423	The Gilded Age and Progressive America	
HIST 424	U.S. History 1917-1960	
HIST 425	U.S. History 1917-Present II	
HIST 431	The North American Plains	
HIST 434	Environmental History	
HIST 436	American Frontier to 1850	
HIST 437	American West Since 1850	
European History (6 cr):		
HIST 320	History of Christianity	
HIST 450	Ancient History	
HIST 451	Medieval History	
HIST 454	Renaissance And Reformation	
HIST 455	The Eighteenth Century	
HIST 456	Europe 1815-1914	
HIST 457	Europe Since 1914	
HIST 465	Germany since 1750	
HIST 464	Imperial Spain	
HIST 467	History Of Russia II	

Widening Horizons (6 cr):		
HIST 381	Australia & New Zealand	
HIST 440	The Ottoman Empire	
HIST 470	Modern Latin America I	
HIST 471	Modern Latin America II	
HIST 473	Colonial Mexico	
HIST 474	Modern Mexico	
HIST 477	Slavery in the Atlantic World	
HIST 480	History of Modern China from 1600	
HIST 481	History of Japan	
HIST 482	Vietnam: 125 Years of Conflict	
HIST 484	Cultures and Civilizations of the Pre-modern World	
HIST 485	Cultural Exchange and the Making of the Modern World	
Additional Major/Minor/Electives		9
Of these nine credits, at least one course in political science, geography, economics, sociology, anthropology or psychology is required beyond the introductory level.		
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Soc Sci)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		82

Degree Requirements and Notes

- A GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A grade of 'C' or better is required in all Professional Education Requirement courses.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.

Honors Program

Department Information

- **Department Location:**
  Library 06
- **Department Phone:**
  701-231-9616
- **Department Email:**
  ndsu.honors@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/honors/
- **Degrees Offered:**
  Minor

Minor Requirements

Honors Program Minor

Minor Requirements

Required Credits: 16

Code	Title	Credits
Core Requirements		
HON 191	Seminar	3
HON 193	Undergraduate Research	1
HON 291	Seminar	2
Honors Electives - Select 6 Credits from the following:		6
HON 340	Colloquium in the Humanities	
HON 341	Colloquium in the Social Sciences	
HON 342	Colloquium in the Sciences	
ART 380	Topics in Photography	
HON 391	Seminar	
HON 396	Field Experience (1-3 credits)	
UNIV 492	Study Abroad (1-3 credits)	
Graduate Level Course [1]		
Honors Capstone Project		4
HON 491	Seminar (1 credit)	
HON 489	Senior Thesis (2 credits)	
HON 494	Individual Study (1 credit) [2]	
Total Credits		16

[1] Students must submit a proposal to take a graduate level course as a junior with the intent to complete the course as a senior. Students will work with their program advisor to ensure all Graduate School paperwork is complete.

[2] Students must take at least 1 credit of independent study in the department of the thesis advisor.

Honor Capstone Project Notes

- Students in the Honors program must complete the honors capstone project to complete the honors minor. The honors capstone project is the culmination of the Honors experience. Students will work with a faculty mentor to design and carry out the project. Students may complete a research thesis, online portfolio, experiential-based project, creative/performative project or an innovation project.
- Projects should be conceptualized as a project that cannot be completed within the confines of one class or one semester. This means that the project should be sufficiently broad in scope and in-depth in analysis. Students can select one of five options for the honors capstone project.

Horticulture

Department Information

- **Department Location:**
  Loftsgard Hall
- **Department Phone:**
  701-231-7971
- **Department Email:**
  ndsu.plantsciences@ndsu.edu
- **Department Web Site:**
  www.ag.ndsu.edu/plantsciences/undergraduate/horticulture
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/horticulture/#planofstudytext

Major Requirements

Major: Horticulture

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Required Core Courses for Horticulture		
PLSC 189	Skills for Academic Success	1
BIOL 150	General Biology I	3
BIOL 151	General Biology II	3
BOT 380	Plant Physiology	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122	General Chemistry II (May satisfy general education category S)	3
CSCI 114	Microcomputer Packages (May satisfy general education category S)	3
or MIS 116	Business Use of Computers	
ECON 105	Elements of Economics (May satisfy general education category B and G)	3
or ECON 201	Principles of Microeconomics	
or ECON 202	Principles of Macroeconomics	
ENT 350	General Entomology	3
MATH 103	College Algebra	3
PLSC 210	Horticulture Science	3

PLSC 211	Horticulture Science Lab	1
PLSC 323	Principles of Weed Science	3
PLSC 355	Woody Landscape Plants	3
PLSC 365	Herbaceous Landscape Plants	2
PLSC 457	Horticulture and Turfgrass Systems (Capstone)	3
PLSC 496	Field Experience	2
or PLSC 494	Individual Study	
PLSC 491	Seminar	1
PPTH 324	Introductory Plant Pathology	3
SOIL 210	Introduction to Soil Science	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Options: Select one of the six options listed below.		32-34
Option information: Students must select one of the options listed below to complete the major. The standard option is Production Business; if students wish to complete one of the other options availalbe they must officially declare their option with the Office of Registration and Records.		
Total Credits		88-90

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

Production-Business Option (Standard) - 33 Credits

Code	Title	Credits
ACCT 102	Fundamentals of Accounting	3
ENT 431	Principles of Insect Pest Management	3
MGMT 320	Foundations of Management	3
MRKT 320	Foundations of Marketing	3
or MGMT 430	Leadership in Organizations	
PLSC 368	Plant Propagation	3
PPTH 455	Plant Disease Management	3
or PPTH 457	Landscape Plant Pathology	
Electives: Select 15 credits of the following:		15
ASM 373	Tractors & Power Units	
PLSC 177	Floral Design I	
PLSC 296	Field Experience	
PLSC 375	Turfgrass Management	
PLSC 375L	Turfgrass Management Laboratory	
PLSC 412	Nursery Production and Management	
PLSC 415	Vegetable Crop Production	
PLSC 416	Fruit Crop Production	
PLSC 422	Greenhouse Production and Management	
PLSC 425	Potato Science	
PLSC 453	Advanced Weed Science	
PLSC 465	Advanced Landscape Plants	
PLSC 484	Plant Tissue Culture and Biotechnology	
PLSC 486	Applied Crop Physiology	
SOIL 322	Soil Fertility and Fertilizers	
Total Credits		33

Horticulture Science Option - 33 Credits

Code	Title	Credits
BIOC 260	Elements of Biochemistry	4
CHEM 122L	General Chemistry II Laboratory	1

CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
MATH 146	Applied Calculus I	4
PLSC 315	Genetics	3
PLSC 315L	Genetics Laboratory	1
PLSC 368	Plant Propagation	3
PLSC 486	Applied Crop Physiology	3
Electives: Select 10 credits of the following:		10
CLAS 180	Scientific Term: Greek & Latin	
PLSC 296	Field Experience	
PLSC 375 & 375L	Turfgrass Management and Turfgrass Management Laboratory	
PLSC 411	Genomics	
PLSC 412	Nursery Production and Management	
PLSC 415	Vegetable Crop Production	
PLSC 416	Fruit Crop Production	
PLSC 422	Greenhouse Production and Management	
PLSC 425	Potato Science	
PLSC 431	Intermediate Genetics	
PLSC 444	Applied Plant Breeding and Research Methods	
PLSC 453	Advanced Weed Science	
PLSC 485	Arboriculture Science	
PPTH 455	Plant Disease Management	
or PPTH 457	Landscape Plant Pathology	
SOIL 465	Soil And Plant Analysis	
STAT 331	Regression Analysis	
STAT 367	Probability	
STAT 462	Introduction to Experimental Design	
Total Credits		33

Landscape Design Option - 34 Credits

This option also requires the completion of the Landscape Architecture minor (19 credits).

Code	Title	Credits
PLSC 177	Floral Design I	2
PLSC 341	Landscape Bidding, Contracting and Operations	2
PLSC 465	Advanced Landscape Plants	2
Electives: Select 9 credits of the following:		9
PLSC 296	Field Experience	
PLSC 375	Turfgrass Management	
PLSC 375L	Turfgrass Management Laboratory	
PLSC 412	Nursery Production and Management	
PLSC 422	Greenhouse Production and Management	
PLSC 468	Landscape Irrigation Design	
PLSC 469	Landscape Irrigation Installation and Management	
PLSC 485	Arboriculture Science	
PPTH 457	Landscape Plant Pathology	
Landscape Architecture Minor		
Core Courses		
LA 231	Landscape Architecture Graphics	3
LA 271	Introduction to Landscape Architecture Studio	6
Electives: Select 10 credits of the following:		10
LA 232	Design Technology	

LA 272	Parks & Open Spaces Studio	
LA 322	History of Landscape Architecture	
LA 341	Site Development and Detailing I	
LA 342	Site Development and Detailing II	
LA 441	Site Development and Detailing III	
Total Credits		34

Landscape management Option - 32 Credits

Code	Title	Credits
ACCT 102	Fundamentals of Accounting	3
MGMT 320	Foundations of Management	3
PLSC 341	Landscape Bidding, Contracting and Operations	2
PLSC 370	Landscape Management	3
PLSC 465	Advanced Landscape Plants	2
PLSC 468	Landscape Irrigation Design	2
PLSC 469	Landscape Irrigation Installation and Management	2
PPTH 457	Landscape Plant Pathology	3
Electives: Select 12 credits of the following:		12
ENT 431	Principles of Insect Pest Management	
PLSC 296	Field Experience	
PLSC 368	Plant Propagation	
PLSC 375	Turfgrass Management	
PLSC 375L	Turfgrass Management Laboratory	
PLSC 412	Nursery Production and Management	
PLSC 480	Advanced Turfgrass Topics	
PLSC 485	Arboriculture Science	
SOIL 322	Soil Fertility and Fertilizers	
Total Credits		32

Sports & Urban Turfgrass management Option - 33 Credits

Code	Title	Credits
ACCT 102	Fundamentals of Accounting	3
MGMT 320	Foundations of Management	3
PLSC 215	Weed Identification	1
PLSC 375 & 375L	Turfgrass Management and Turfgrass Management Laboratory	4
PLSC 381	Sports Turf Operations	3
PLSC 468	Landscape Irrigation Design	2
PLSC 469	Landscape Irrigation Installation and Management	2
PPTH 457	Landscape Plant Pathology	3
SOIL 322	Soil Fertility and Fertilizers	3
Electives: Select 9 credits of the following:		9
ASM 373	Tractors & Power Units	
ASM 374	Power Units Laboratory	
ENT 431	Principles of Insect Pest Management	
HNES 128	Golf	
PLSC 219	Introduction to Prairie & Community Forestry	
PLSC 296	Field Experience	
PLSC 341	Landscape Bidding, Contracting and Operations	
PLSC 465	Advanced Landscape Plants	
PLSC 480	Advanced Turfgrass Topics	
PLSC 485	Arboriculture Science	
PPTH 455	Plant Disease Management	

SOIL 217	Introduction to Meteorology & Climatology	
Total Credits		33

Urban Forestry & Parks Option - 33 Credits

Code	Title	Credits
ACCT 102	Fundamentals of Accounting	3
MGMT 320	Foundations of Management	3
PLSC 219	Introduction to Prairie & Community Forestry	2
PLSC 386	Arboriculture Climbing and Rigging Operations	2
PLSC 465	Advanced Landscape Plants	2
PLSC 485	Arboriculture Science	3
PPTH 457	Landscape Plant Pathology	3
Electives: Select 15 credits of the following:		15
ENT 431	Principles of Insect Pest Management	
NRM 264	Natural Resource Management Systems	
NRM 401	Urban-Ecosystem Management	
PLSC 296	Field Experience	
PLSC 315	Genetics	
PLSC 368	Plant Propagation	
PLSC 370	Landscape Management	
PLSC 375	Turfgrass Management	
PLSC 375L	Turfgrass Management Laboratory	
PLSC 412	Nursery Production and Management	
PLSC 468	Landscape Irrigation Design	
PLSC 469	Landscape Irrigation Installation and Management	
SOIL 322	Soil Fertility and Fertilizers	
Total Credits		33

Minor Requirements

Horticulture Minor

Minor Requirements

Required Credits: 18

Code	Title	Credits
Required Courses		
PLSC 210	Horticulture Science	3
PLSC 211	Horticulture Science Lab	1
Select 6 credits from the courses listed below:		6
ENT 350	General Entomology	
PPTH 324	Introductory Plant Pathology	
SOIL 210	Introduction to Soil Science	
Elective Courses: Select 8 credits from the following:		8
PLSC 355	Woody Landscape Plants	
PLSC 365	Herbaceous Landscape Plants	
PLSC 368	Plant Propagation	
PLSC 370	Landscape Management	
PLSC 375	Turfgrass Management	
PLSC 375L	Turfgrass Management Laboratory	
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 465	Advanced Landscape Plants	
PLSC 485	Arboriculture Science	
Total Credits		18

Minor Requirements and Notes

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

Hospitality and Tourism Management

Department Information

- **Department Location:**
  E. Morrow Lebedeff Hall
- **Department Phone:**
  701-231-8604
- **Department Web Site:**
  www.ndsu.edu/adhm/hospitality-tourism/about.html
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/hospitality-tourism-management/#planofstudytext

Major Requirements

Major: Hospitality & Tourism Management

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Hospitality & Tourism Management Requirements		
ADHM 140	Introduction to the Hospitality Industry	3
ADHM 141	Tourism and Travel Management	3
ADHM 241	Hospitality Accounting	3
ADHM 360	Lodging Operations Management	3
ADHM 381	Hospitality Marketing and Sales	3
ADHM 404 & 404L	Restaurant Operations Management and Restaurant Operations Management Laboratory	5
ADHM 435	Cost Controls in Hospitality and Food Service Systems	3
ADHM 467	Hospitality Law	3
ADHM 479	Hospitality Industry Management Strategies	3
ADHM 496	Field Experience	3
CHEM 117	Chemical Concepts and Applications (May satisfy general education category S)	3
or CHEM 121	General Chemistry I	
CSCI 114	Microcomputer Packages (May satisfy general education category S)	3
or CSCI 116	Business Use of Computers	
HNES 141	Food Sanitation	1
HNES 261	Food Selection and Preparation Principles	3
HNES 261L	Food Selection and Preparation Principles Laboratory	2
HD&E 320	Professional Issues	1
Professional Elective Courses: Select 13-15 credits from the following:		13-15
ADHM 372	Global Retailing	
ADHM 379	Study Tour Abroad	
ADHM 384	Beverage Operations	
ADHM 401	Convention and Meeting Planning	
ADHM 402	Professional Catering Management	
ADHM 403	Resort Development and Management	
ADHM 405	Casino Operations	
ADHM 406	Professional Club Management	
ADHM 411	Food and World Cultures	
ADHM 425	Experiential Retailing	
ADHM 489	Study Tour	
ADHM 491	Seminar	
EMGT 461	Business Continuity and Crisis Management	
Business Administration Minor requires an application to the College of Business and a minimum 2.5 GPA in courses used for the minor.		24
MGMT 320	Foundations of Management	
MRKT 320	Foundations of Marketing	
MGMT 450	Human Resource Management	
Select one of the following:		
ACCT 102	Fundamentals of Accounting	
ACCT 200 & ACCT 201	Elements of Accounting I and Elements of Accounting II	

Select one of the following: (May satisfy general education category B and G)	
ECON 105	Elements of Economics
ECON 201 & ECON 202	Principles of Microeconomics and Principles of Macroeconomics
College of Business 300-400 level (9 credits)	
Total Credits	82-84

Degree Requirements and Notes

- Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.

Minor Requirements

Hospitality & Tourism Management Minor

Minor Requirements

Required Credits: 18

Code	Title	Credits
Required Courses		
ADHM 140	Introduction to the Hospitality Industry	3
or ADHM 141	Tourism and Travel Management	
Elective Courses: Select 15 credits from the following:		15
ADHM 140	Introduction to the Hospitality Industry (if not used above)	
ADHM 141	Tourism and Travel Management (if not used above)	
ADHM 241	Hospitality Accounting	
ADHM 360	Lodging Operations Management	
ADHM 379	Study Tour Abroad	
ADHM 381	Hospitality Marketing and Sales	
ADHM 384	Beverage Operations	
ADHM 401	Convention and Meeting Planning	
ADHM 402	Professional Catering Management	
ADHM 403	Resort Development and Management	
ADHM 404 & 404L	Restaurant Operations Management and Restaurant Operations Management Laboratory	
ADHM 405	Casino Operations	
ADHM 406	Professional Club Management	
ADHM 411	Food and World Cultures	
ADHM 435	Cost Controls in Hospitality and Food Service Systems	
ADHM 467	Hospitality Law	
ADHM 489	Study Tour	
ADHM 491	Seminar	
Total Credits		18

Minor Requirements and Notes

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

Human Development and Family Science

Department Information

- **Department Location:**
  E. Morrow Lebedeff Hall
- **Department Phone:**
  701-231-8268
- **Department Web Site:**
  www.ndsu.edu/hdfs/

- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/human-development-family-science/

Major Requirements

Major: Human Development & Family Science

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

A grade of 'C' or better is required for all HDFS prefix courses for graduation.

Code	Title	Credits
Human Development & Family Science Core Requirements		
CSCI 114	Microcomputer Packages (May satisfy general education category S)	3
or MIS 116	Business Use of Computers	
Select one of the following: (May satisfy general education category C)		3
ENGL 320	Business and Professional Writing	

ENGL 325	Writing in the Health Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
HD&E 189	Skills for Academic Success [1]	1
HDFS 135	Family Science (May satisfy general education category B)	3
HDFS 230	Life Span Development (May satisfy general education category B)	3
HDFS 250	Introduction to Research Methods in Human Development and Family Sciences	3
HDFS 353	Children, Families and Public Policy	3
HDFS 475	Children and Families Across Cultures (May satisfy general education category B and D)	3
Select one of the following:		5
HDFS 496	Field Experience [2]	
HDFS 496 & HDFS 491	Field Experience and Seminar (and Senior Thesis) [2]	
HD&E 320	Professional Issues	1
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
SOC 110	Introduction to Sociology (May satisfy general education category B)	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Option Selection: Select one option from the three listed below.		18
Minor Plan of Study: A minor plan of study is required outside of the HDFS department for all options.		
Total Credits		55

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
HDFS 300-400 Level	Major Electives (cannot include HDFS 496)	9

Child and Adolescent Development Option

Code	Title	Credits
HDFS 320	Prenatal, Infant and Toddler Development	3
HDFS 330	Child Development	3
HDFS 340	Adolescent Development	3
HDFS 300-400 Level	Major Electives (cannot include HDFS 496)	9

Family Science Option

Code	Title	Credits
HDFS 242	Couples, Marriages and Families	3
HDFS 357	Personal and Family Finance	3
HDFS 462	Methods of Family Life Education	3
HDFS 300-400 Level	Major Electives (cannot include HDFS 496)	9

1 HD&E 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 HD&E 189.

2 In the semester prior to taking field experience credits, students are required to attend an informational meeting during advising week. Students should NOT take all field experience credits in one semester.

Degree Requirements and Notes

- A 2.50 cumulative GPA is required in major courses for graduation.
- Courses taken *Pass/Fail* will not be used to satisfy any requirement other than total credits.

Accelerated Program in HDFS

- A combined/accelerated program will allow high-achieving students to complete both a bachelor's and master's degree in HDFS in five years.
- Only students with a cumulative undergraduate GPA of at least 3.50 and who have completed at least 60 credits are eligible to apply. Interested students should speak with an HDFS advisor about how to proceed.
- 15 credits at the master's level may be used to meet the requirements for a bachelor's degree.
- The programs will map as follows:
  - BS-HDFS program with an option in Adult Development and Aging may enter the master's option Gerontology.
  - BS-HDFS program with an option in Child and Adolescent Development may enter the master's option in Youth Development.
  - BS-HDFS program with an option in Family Science may enter the master's option in Family Financial Planning

Minor Requirements

Human Development & Family Science Minor

Minor Requirements

Required Credits: 18

Code	Title	Credits
Required Courses		
HDFS 135	Family Science	3
HDFS 230	Life Span Development	3
Elective Courses *		
HDFS	Elective	3
HDFS 300-400	Level Electives	9
Total Credits		18

* No more than 3 credits may be a field experience, practicum, or student teaching.

Minor Requirements and Notes

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

Industrial Engineering and Management

Department Information

- **Department Location:**
  Civil & Industrial Engineerng
- **Department Phone:**
  701-231-9818
- **Department Web Site:**
  www.ndsu.edu/ime/
- **Degrees Offered:**
  B.S.I.E.Mgt.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/industrial-engineering-management/#planofstudytext

Major Requirements

Major: Industrial Engineering & Management

Degree Type: B.S.I.E.Mgt.
Required Degree Credits to Graduate: 131

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specific by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Industrial Engineering & Management Core Requirements		
IME 111	Introduction to Industrial and Manufacturing Engineering	3
IME 311	Work/Station Design and Measurement	3
IME 330	Manufacturing Processes	3
IME 440	Engineering Economy	3
IME 450	Systems Engineering and Management	3
IME 456	Program and Project Management	3
IME 460	Evaluation of Engineering Data	3
IME 461	Quality Assurance and Control	3
IME 470	Operations Research I	3
IME 472	Simulation of Business and Industrial Systems	3
IME 480	Production and Inventory Control	3
IME 482	Automated Manufacturing Systems	3
IME 485	Industrial and Manufacturing Facility Design	3
IME 489	Industrial and Manufacturing Engineering Capstone	3
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
ME 212	Fundamentals of Visual Communication for Engineers	3

ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122	General Chemistry II (May satisfy general education category S)	3
ENGL 321	Writing in the Technical Professions (May satisfy general education category C)	3
ENGR 402	Engineering Ethics and Social Responsibility	1
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
Industrial Engineering and Management Electives		
Computer Science Electives: Select one of the following:		3
CSCI 122	Introduction to Programming Concepts	
CSCI 126	Beginning FORTRAN	
CSCI 160	Computer Science I	
ECE 173	Introduction to Computing	
Programming Language: Any programming language course must be approved by your adviser.		
Engineering Science Electives: Select 12 credits from the following:		
CE 309	Fluid Mechanics	3
ME 223	Mechanics of Materials	3
ME 350	Thermodynamics and Heat Transfer	3
Select one of the following:		3-4
EE 206	Circuit Analysis I	
ECE 275	Digital Design	
ECE 301	Electrical Engineering I	
Technical Electives: Select 9 credits from the following:		9
IME 335	Welding Technology	
IME 380	CAD/CAM for Manufacturing	
IME 411	Human Factors Engineering	
IME 427	Packaging for Electronics	
IME 430	Process Engineering	
IME 431	Production Engineering	
IME 432	Composite Materials Manufacturing	
IME 437	Methods for Precision Manufacturing	
IME 433	Additive Manufacturing	
IME 451	Logistics Engineering and Management	
IME 452	Integrated Industrial Information Systems	
IME 453	Hospital Management Engineering	
IME 455	Management of People Systems	
IME 462	Total Quality In Industrial Management	
IME 463	Reliability Engineering	
Only one of the following 5 courses may be counted as a technical elective.		
BUSN 340	International Business	
BUSN 431	Business Law I-Contracts, Property and Torts	
MGMT 320	Foundations of Management	
MRKT 320	Foundations of Marketing	
MIS 320	Management Information Systems	
Total Credits		108-109

Degree Requirements and Notes

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.
- Grades less than 'C' will not be accepted for required courses in CHEM, MATH, and PHYS.

- Students may request approval for other 300-400 level engineering or related courses to be approved as technical electives. To request approval, a student should submit a memo to the IME Department indicating the course of interest and why the course should be approved as a technical elective. This memo will be reviewed by the IME Department Chair for approval.
- 300-400 level BUSN courses require at least junior standing and a minimum 2.50 cumulative GPA.

Minor Requirements

Industrial Engineering & Management Minor

Minor Requirements

Required Credits: 18

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	3
IME 451	Logistics Engineering and Management	3
IME 452	Integrated Industrial Information Systems	3
IME 453	Hospital Management Engineering	3
IME 455	Management of People Systems	2
IME 456	Program and Project Management	3
IME 461	Quality Assurance and Control	3
IME 462	Total Quality In Industrial Management	3
IME 463	Reliability Engineering	3
IME 470	Operations Research I	3
IME 472	Simulation of Business and Industrial Systems	3
IME 480	Production and Inventory Control	3
IME 482	Automated Manufacturing Systems	3
IME 485	Industrial and Manufacturing Facility Design	3

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Only students majoring in an engineering discipline or with department permission agricultural or physical science majors may elect a minor in Industrial Engineering & Management.

Interior Design

Department Information

- **Department Location:**
  E. Morrow Lebedeff Hall
- **Department Phone:**
  701-231-8604
- **Department Web Site:**
  www.ndsu.edu/adhm/interior-design/about.html
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  https://bulletin.ndsu.edu/programs-study/undergraduate/interior-design/#planofstudytext

Major Requirements

Major: Interior Design

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

Required Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Students must maintain a 3.00 cumulative GPA and a minimum grade of 'C' in all major core requirements.

Code	Title	Credits
Interior Design Core Requirements		
ADHM 151	Design Fundamentals	3
ADHM 160	Interior Design Careers	1
ADHM 161	Introduction to Manual Drafting	3
ADHM 162	Intermediate Manual Drafting	3
ADHM 251	Interior Design Studio I-Residential	3
ADHM 253	Interior Design Studio II-Small Scale Contract	3
ADHM 261	Visual Communications	3
ADHM 264	Residential Systems	2
ADHM 300	Design Resource Management	1-3
ADHM 315	History of Interiors I (May satisfy general education category A)	3
ADHM 316	History of Interiors II (May satisfy general education category A)	3
ADHM 351	Interior Design Studio III-Advanced Residential	3

ADHM 353	Interior Design Studio IV-Large Scale Contract Design	3
ADHM 363	Commercial Lighting Design and Building Systems	3
ADHM 365	CADD for Interiors	3
ADHM 366	Textiles	3
ADHM 367	Textiles Laboratory	1
ADHM 368	Interior Materials	2
ADHM 450	Research and Project Development in Interior Design	3
ADHM 452	Comprehensive Interior Design Project	6
ADHM 460	Career Development and Professional Practice	3
ADHM 461	Building Information Modeling	3
ADHM 491	Seminar	2-3
ADHM 496	Field Experience	3
CSCI 114	Microcomputer Packages (May satisfy general education category S)	3
or MIS 116	Business Use of Computers	
HD&E 320	Professional Issues	1
Department Requirement: Select one of the following:		3
ART 111	Introduction to Art History	
ART 210	Art History I	
ART 211	Art History II	
Minor Program of Study Required		16
One of the following minors is required: Art; Business; Hospitality and Tourism Management; Apparel, Retail Merchandising and Design; Foreign Language (French, German, Spanish); History; Gerontology; Emergency Mangement; Natural Resource Managment; other minor options may be approved by interior design faculty. (Total credits required to complete minors will vary).		
Total Credits		89-92

Degree Requirements and Notes

- Course taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.

Minor Requirements

Interior Design Minor

Required Credits: 22

Code	Title	Credits
ADHM 151	Design Fundamentals	3
ADHM 161	Introduction to Manual Drafting	3
ADHM 251	Interior Design Studio I-Residential	3
ADHM 261	Visual Communications	3
ADHM 264	Residential Systems	2
ADHM 315	History of Interiors I	3
or ADHM 316	History of Interiors II	
ADHM 365	CADD for Interiors	3
ADHM 368	Interior Materials	2
Total Credits		22

Minor notes:

- To complete a minor, students must earn at least a 2.50 GPA that is based on the courses used to satisfy the minor requirements.
- Courses may not be taken pass/fail. Students must also earn a grade of 'C' or better in all courses required for the minor.
- Students are subject to the minor requirements in effect during the year in which the minor was declared.
- Students must satisfy all minor course prerequisites.

- Minors must meet program computer requirements.

International Studies

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-8845
- **Department Web Site:**
  ndsu-studyabroad.applicationgateway.com/index.cfm?FuseAction=Abroad.ViewLink&Parent_ID=0&Link_ID=84ED8C0B-26B9-564D-D6D3F9968C0D3616 (http://ndsu-studyabroad.applicationgateway.com/index.cfm?FuseAction=Abroad.ViewLink&Parent_ID=0&Link_ID=84ED8C0B-26B9-564D-D6D3F9968C0D3616)
- **Degrees Offered:**
  Offered as a second major only
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/international-studies/

Major Requirements

Major: International Studies

Offered as a secondary major only; students must select a primary major before adding International Studies.

Required Credits: 32

Code	Title	Credits
International Studies Core Requirements		
Group A:		
INTL 110	Introduction to International Studies	3
Group B: Select two courses from the following:		6
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World *	
GEOG 161	World Regional Geography	
HIST 355	History of Global Islam	
or RELS 100	World Religions	
POLS 220	International Politics	
POLS 225	Comparative Politics	
Group C: Select one from the following:		3
HIST 101	Western Civilization I	
HIST 102	Western Civilization II	
Group D: Select one from the following:		3
ANTH 111	Introduction to Anthropology	
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World *	
SOC 116	Global Social Problems	
Electives		
Select courses with a significant international focus from the categories listed below. At least 3 credits MUST come from outside the student's primary major of study. Courses used for the International Studies Core cannot also count as electives. Other courses may be approved for this area with the approval of the College International Studies Advisor. A substitution form submitted to the Office of Registration and Records will be required in these instances.		
Select 9 credits from the following:		9
Agriculture:		
AGEC 220	World Agricultural Development	
AGEC 360	International Agribusiness Experience	
ECON 456	History of Economic Thought	
ECON 461	Economic Development	
ECON 472	International Trade	

NRM 225	Natural Resources & Agrosystems
PLSC 110	World Food Crops
Business Admintration:	
BUSN 340	International Business
BUSN 341	Global Business Environment
BUSN 440	International Business Law
FIN 440	International Finance
MGMT 440	International Management
MRKT 372	Global Retailing
MRKT 440	International Marketing
Architecture:	
ARCH 321	History and Theory of Architecture I
ARCH 322	History and Theory of Architecture II
ARCH 323	History and Theory of Architecture III
ARCH 474	International Design Studio
LA 322	History of Landscape Architecture
Human Development and Education:	
ADHM 372	Global Retailing
ADHM 410	Dress in World Cultures
ADHM 411	Food and World Cultures
ADHM 485	Global Consumer Analysis
HDFS 475	Children and Families Across Cultures
HNES 355	International Health
Humanities and Social Sciences:	
ANTH 111	Introduction to Anthropology
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World
ANTH 443	Peoples and Cultures of the Middle East & North Africa
ANTH 444	Peoples of the Pacific Islands
ANTH 446	Latin America & Carribean: Afro-Latino/as, Gender, Indigeneity
ANTH 453	Magic and Religion
ANTH 455	Language and Expressive Culture
ANTH 459	Global Cultural Heritage
ART 111	Introduction to Art History
ART 210	Art History I
ART 211	Art History II
COMM 216	Intercultural Communication
ENGL 209	Introduction to Linguistics
ENGL 240	World Literature Masterpieces
ENGL 330	British and American Women Writers
ENGL 335	Multicultural Writers
ENGL 455	International Technical Writing
EMGT 425	International Emergency Management
HIST 101	Western Civilization I
HIST 102	Western Civilization II
HIST 259	Women in European History 1400-1800
HIST 271	Introduction to Latin American History
HIST 280	History of East Asia to 1600
HIST 281	History of East Asia from 1600
RELS/HIST 355	History of Global Islam
HIST 381	Australia & New Zealand
HIST 435	World Environmental History
HIST 440	The Ottoman Empire

HIST 451	Medieval History
HIST 456	Europe 1815-1914
HIST 457	Europe Since 1914
HIST 464	Imperial Spain
HIST 465	Germany since 1750
HIST 466	History Of Russia I
HIST 467	History Of Russia II
HIST 470	Modern Latin America I
HIST 471	Modern Latin America II
HIST 473	Colonial Mexico
HIST 474	Modern Mexico
HIST 475	The Aztec, Maya, and Inca
HIST 477	Slavery in the Atlantic World
HIST 480	History of Modern China from 1600
HIST 481	History of Japan
HIST 482	Vietnam: 125 Years of Conflict
HIST 485	Cultural Exchange and the Making of the Modern World
FREN 315	Contemporary France
FREN 340	The French-Speaking World
FREN 345	Women in French Literature
FREN 365	Advanced Conversation Through Contemporary Culture
FREN 410	French Literature & Culture before 1800
FREN 412	French Literature & Culture since 1800
FREN 420	Themes & Topics in French Literature & Culture
FREN 422	Genres in French Literature
GERM 220	German Culture & Society
SPAN 330	Introduction to Spanish Civilization
SPAN 331	Introduction to Spanish American Civilization
SPAN 332	Introduction to Hispanic Cinema
SPAN 440	Traditions in Spanish American Literature
SPAN 441	Contemporary Spanish American Literature
SPAN 442	Introduction to Chicano Literature
SPAN 443	Spanish American Women Writers
SPAN 450	Traditions in Spanish Literature
SPAN 451	Contemporary Spanish Literature
SPAN 453	Spanish Women Writers
MUSC 340	Music History I
MUSC 341	Music History II
PHIL 215	Contemporary Moral Issues
PHIL 321	Ancient Philosophy
PHIL 322	Medieval Philosophy
PHIL 323	Modern Philosophy
PHIL 370	Social and Political Philosophy
PHIL 476	History of Philosophy: Modern Period
POLS 120	Terrorism
POLS 220	International Politics
POLS 225	Comparative Politics
POLS 240	Political Ideologies
POLS 442	Global Policy Issues
POLS 444	International Law
POLS 445	Ethnic Conflicts
POLS 446	Current Topics in International Law

POLS 450	Politics of the Developing Countries	
POLS 451	Politics of the Industrialized Countries	
POLS 452	Comparative Political Economy	
SOC 443	International Disasters	
THEA 115	World Film	
THEA 280	World Theatre	
WGS 370	Transnational/Global Women	
Science and Mathematics:		
BIOL 124	Environmental Science	
BIOL 124L	Environmental Science Laboratory	
GEOG 151	Human Geography	
GEOG 161	World Regional Geography	
Any College: 3 credit limit from the following:		
(Prefix) 379	Study Abroad Tour	
(Prefix) 494	Individual Study	
Foreign Language Proficiency Requirement		
Language proficiency must be satisfied prior to the 10-week abroad experience		
Proposal for Integrative Senior Project		
A written proposal is to be submitted to the Director of the International Studies Major and the student's senior project advisor. The proposal will be graded and must be done PRIOR to project completion.		
INTL 488	Integrated Senior Project Proposal	1
Completion of Study, Work Experience, or Research Abroad Requirement		
Approved, 10-week or equivalent experience spent abroad in an approved program. Must be 10 consecutive weeks.		5
Integrative Senior Project Requirement		
INTL 489	Integrative Senior Project	2
Total Credits		32

* ANTH 206 may fulfill the Group B **OR** the Group D requirements but not both.

Major Requirements and Notes

- The General Education component is to be completed with the student's choice of primary major.
- Courses for the International Studies core may not double count to meet the major requirements of the primary major. However, courses meeting general education requirements and requirements for global perspectives and cultural diversity may count in the International Studies major.
- The electives list is not all inclusive; other courses meeting this requirement may be selected with the assistance of an International Studies major adviser and submission of a substitution form to the Office of Registration and Records (https://www.ndsu.edu/registrar).

Journalism

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7705
- **Department Web Site:**
  www.ndsu.edu/communication/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/journalism/#planofstudytext

Major Requirements

Major: Journalism

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

Required Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		

Area Two: Social Sciences	3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS	
Area Three: Fine Arts	3
ARCH, ART, ENVD, LA, MUSC, or THEA	
Total Credits	9

Major requirements

Code	Title	Credits
Pre-Communication Requirements		
Students must complete the following 19 credits of coursework with a minimum GPA of 3.0 to be admitted to the professional major.		
ENGL 120	College Composition II	3
COMM 110	Fundamentals of Public Speaking	3
COMM 112	Understanding Media and Social Change	3
COMM 114	Human Communication	3
COMM 189	Skills for Academic Success	1
COMM 212	Interpersonal Communication	3
COMM 220	Persuasion	3
Professional Journalism Major		
COMM 200	Introduction to Media Writing	3
COMM 310	Advanced Media Writing	3
COMM 320	Communication Research Methods	3
COMM 431	Communication Ethics and Law	3
COMM 465	Convergence Media	3
COMM 496	Field Experience	3
Select one of the following for upper division writing requirement:		3
ENGL 320	Business and Professional Writing	
ENGL 322	Writing and the Creative Process	
ENGL 323	Creative Writing	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 357	Visual Culture and Language	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Electives: Seven COMM courses selected in consultation with one's advisor. Only 3 credits of COMM 496 can be counted toward this requirement.		21
Total Credits		61

Program Notes:

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

Minor Requirements

Journalism Minor

Minor Requirements

Required Credits: 21

Code	Title	Credits
COMM 112	Understanding Media and Social Change	3
COMM 200	Introduction to Media Writing	3
COMM 245	Principles of Broadcast Production	3
or COMM 310	Advanced Media Writing	
Professional Specialization Electives:		12
COMM 245	Principles of Broadcast Production	

COMM 310	Advanced Media Writing
COMM 313	Editorial Processes
COMM 330	Photography for the Media
COMM 347	Television On-Air Performance
COMM 349	Television Studio Production
COMM 362	Principles of Design For Media
COMM 421	History of Journalism
COMM 445	Advanced Broadcast Production
COMM 465	Convergence Media
Total Credits	21

Minor Requirements and Notes

- Student enrollment is limited to one degree program offered by the Department of Communication.
- A minimum of 9 credits must be taken at NDSU.

Landscape Architecture

Department Information

- **Department Location:**
  Renaissance Hall
- **Department Phone:**
  701-231-6151
- **Department Email:**
  ndsu.ala@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/ala/
- **Degrees Offered:**
  B.S; B.L.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/landscape-architecture/#planofstudytext

Major Requirements

Major: Landscape Architecture

Degree Types: B.S. (Environmental Design) & B.L.A. (Bachelor of Landscape Architecture)
Required Degree Credits to Graduate: B.S. - 130; B.L.A. - 160

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Environmental Design Requirements		
ANTH 111	Introduction to Anthropology (May satisfy general education category B and D)	3
ARCH 321	History and Theory of Architecture I (May satisfy general education category A and G)	3
ENVD 101	Introduction to Environmental Design (May satisfy general education category A)	3
ENVD 130	Drawing Skills for Environmental Designers	3
ENVD 172	Environmental Design Fundamentals Studio	3
LA 231	Landscape Architecture Graphics	3
LA 232	Design Technology	3
LA 271	Introduction to Landscape Architecture Studio	6
LA 272	Parks & Open Spaces Studio	6
LA 322	History of Landscape Architecture	4
LA 331	Graphics III: Design Communication	3
LA 341	Site Development and Detailing I	4
LA 342	Site Development and Detailing II	4
LA 371	Site Planning & Design Studio	6
LA 372	Community Planning & Design Studio	6
LA 441	Site Development and Detailing III	4
LA 471	Urban Design Studio	6
LA 472	Environmental Planning Studio	6
LA 552	Advanced Landscape Planning	3
PLSC 355	Woody Landscape Plants	3
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
or SOC 110	Introduction to Sociology	
Landscape Design Requirements		
LA 563	Programming and Thesis Preparation	3
LA 571	Environmental Planning Studio	6
LA 572	Design Thesis (Capstone) A grade of "C" or better is required)	8
LA 581	Professional Practice	3
LA 590	Seminar	3
Total Credits		108

Degree Requirements and Notes

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

Minor Requirements

Landscape Architecture Minor

Minor Requirements

Required Credits: 19

Code	Title	Credits
Core Courses		
LA 231	Landscape Architecture Graphics	3
LA 271	Introduction to Landscape Architecture Studio	6
Electives: Select ten credits of the following:		10
LA 232	Design Technology	
LA 272	Parks & Open Spaces Studio	
LA 322	History of Landscape Architecture	
LA 341	Site Development and Detailing I	
LA 342	Site Development and Detailing II	
LA 441	Site Development and Detailing III	
Total Credits		19

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Architecture majors may substitute 6 credits of other LA courses in the core area. A substitution form signed by the LA department chairperson will be required to submit to the Office of Registration and Records for these substitutions.
- The studio is not required for architecture majors.

Large Animal Veterinary Technology

Department Information

- **Department Location:**
  Hultz Hall
- **Department Phone:**
  701-231-7641
- **Department Email:**
  ndsu.ansc@ndsu.edu
- **Department Web Site:**
  www.ag.ndsu.edu/ansc/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/large-animal-veterinary-technology/

Minor Requirements

Large Animal Veterinary Technology

Minor RequiremenTS

Required Credits: 16

Code	Title	Credits
Required Courses		
ANSC 220	Livestock Production	3
ANSC 260	Introduction to Equine Studies	2
VETS 482L	Large Animal Techniques Laboratory	1
ANSC 463	Physiology of Reproduction	3
Select one Production Course:		3
ANSC 480	Equine Industry and Production Systems	
ANSC 482	Sheep Industry and Production Systems	
ANSC 484	Swine Production/Pork Industry Systems	
ANSC 486	Beef Industry and Production Systems	
ANSC 488	Dairy Industry and Production Systems	
Elective Courses: Select 4 credits from the following:		4
AGEC 242	Introduction to Agricultural Management	
ANSC 260L	Equine Care and Management Practicum	
ANSC 300	Domestic Animal Behavior and Management	
ANSC 312	Bovine Pregnancy Diagnosis and Ultrasonography	
ANSC 323	Fundamentals of Nutrition	
ANSC 378	Animal Health Management ((Equine/domesticated livestock species only))	
ANSC 393	Undergraduate Research	
ANSC 463L	Physiology of Reproduction Laboratory	
Total Credits		16

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a minimum 2.00 GPA for the minor requirements.
- This minor can only be earned by students pursuing a Veterinary Technology major.

Logistics Management

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-8651
- **Department Web Site:**
  www.ndsu.edu/business/departments/mm/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/logistics-management/

Minor Requirements

Logistics Management Minor

Minor Requirements

Required Credits: 19

A grade of 'C' or better is required in all courses used to satisfy the minor.

Code	Title	Credits
Core Courses		
MGMT 320	Foundations of Management	3
MGMT 461	Supply Chain Management	3

BUSN 491	Seminar	1
AGEC 378	Introduction to Transportation & Logistics	3
IME 470	Operations Research I	3
IME 480	Production and Inventory Control	3
Approved Elective - Must have department approval *		3
Total Credits		19

* An additional 3-credit 300-400 level course in business, industrial engineering, or agribusiness. Under certain circumstances, a course from other departments may satisfy this requirement. Contact departments for a list of approved courses. Departmental approval is required for any course not completed at NDSU and used to satisfy the minor requirements. Courses may not be taken pass/fail unless approved as an internship.

Minor Requirements and Notes

- To be accepted into this minor program, students must have a cumulative institutional GPA of 2.50 and at least junior standing (60 credits).
- To complete this minor, students must earn at minimum 2.50 GPA in courses used to satisfy the minor requirements. Courses may not be taken pass/fail.
- If the cumulative GPA falls below the 2.50 after acceptance into the program, the student will not be allowed to register for College of Business courses until the cumulative GPA returns to 2.50 or above.
- Approval for a minor does not guarantee enrollment in specific courses.
- This minor must be officially declared (https://www.ndsu.edu/business/programs/majors/minors); see the College of Business for information.
- A minimum of 8 credits must be taken at NDSU.

Management

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-8651
- **Department Web Site:**
  www.ndsu.edu/business/departments/mm/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/management/#planofstudytext

Major Requirements

Major: Management

Degree Type: B.S.
Minimum Credits Required for Degree: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Pre-College of Business Requirements		
ACCT 200	Elements of Accounting I *	3
ACCT 201	Elements of Accounting II *	3
COMM 110	Fundamentals of Public Speaking (May satisfy general education category C) *	3
MIS 116	Business Use of Computers (May satisfy general education category S) *	3
ECON 201	Principles of Microeconomics (May satisfy general education category B and G) *	3
ECON 202	Principles of Macroeconomics (May satisfy general education category B and G) *	3
ENGL 110	College Composition I (May satisfy general education category C) *	4
ENGL 120	College Composition II (May satisfy general education category C) *	3
PHIL 216	Business Ethics (May satisfy general education category A) *	3
STAT 330	Introductory Statistics (May satisfy general education category R) *	3
STAT 331	Regression Analysis *	2
MATH 144	Mathematics for Business *	4
Pre-Management Requirements		
PSYC 111	Introduction to Psychology *	3
SOC 110	Introduction to Sociology *	3
Management Major Requirements **		
ENGL 320	Business and Professional Writing (May satisfy general education category C)	3
FIN 320	Principles of Finance [1]	3
MGMT 320	Foundations of Management [1]	3
MGMT 330	Foundations of Organizational Behavior	3
MGMT 360	Operations Management	3
MRKT 320	Foundations of Marketing [1]	3
BUSN 430	Legal and Social Environment of Business [1]	3
MGMT 450	Human Resource Management	3
BUSN 489	Strategic Management (Capstone Course) [1]	4
MIS 320	Management Information Systems [1]	3
300-400 Level Management Courses **		12

Select courses from current MGMT curriculum	
300-400 Level Courses **	9
Select 3 courses from within the CoB, (includes courses cross-listed with CoB courses):	
Additional 300-400 Level Course **	3
This additional 300-400 level elective cannot be used to satisfy other requirements; includes courses cross-listed with CoB courses; excludes ATHL credits	
Total Credits	98

* Pre-college and pre-management major courses. A grade of 'C' or better for pre-college and pre-management major courses is required for admission into the Management Major.

** Students must earn a grade of 'C' or better, and have a minimum 2.5 cumulative GPA, in ALL courses included in the professional program (i.e., all required courses, elective requirements, and additional 300-400 level CoB electives or breadth electives).

1 Denotes Common Body of Knowledge (CBK) course.

Degree Requirements and Notes

- Students must include one of the following international courses in their plan of study:

Code	Title	Credits
BUSN 340	International Business	3
BUSN 341	Global Business Environment	3
FIN 440	International Finance	3
MGMT 440	International Management	3
MRKT 440	International Marketing	3

- Students follow the published curricula for the management program of study from the semester/year of entrance in the College of Business to graduation provided enrollment at NDSU has not been discontinued for more than one year. Students who change their major are subject to meeting the curricular requirements in effect at the time the new major is declared.
- Business courses from programs that do not hold AACSB International accreditation cannot be used for major or minor requirements in the College of Business (CoB); such courses may be eligible for use as free electives.
- The CoB accepts a maximum of nine credits of non-NDSU 300-400 level business courses from AACSB programs with approval of the department.
- Admission into the Management major: Students must earn a 'C' or better in the pre-college and pre-management major courses that are indicated with an asterisk (*), achieve junior standing (60 credits), and earn a 2.50 institutional cumulative grade point average. Students must submit an online application to the CoB.
- Admission to the Management major is required to enroll in the advanced 300 or 400 level courses in the CoB.
- A grade of 'C' or better is required in transfer courses accepted for ACCT 200 Elements of Accounting I and ACCT 201 Elements of Accounting II and all 300-400 level accounting, business administration, finance, management, management information systems, and marketing courses.
- A letter grade must be earned in any course that fulfills a major requirement.
- Student may choose to take the Human Resource Management Track within the Management major:

Code	Title	Credits
MGMT 452	Compensation Management (Required)	3
Select two of the following:		
MGMT 454	Labor-Management Relations	3
MGMT 451	Negotiation and Alternative Dispute Resolution	3
MGMT 453	Understanding and Managing Diversity in Organizations	3

- Student may choose to take the Supply Chain Management Track within the Management major:

Code	Title	Credits
MGMT 461	Supply Chain Management (Required)	3
MGMT 462	Modeling the Supply Chain (Required)	3
Select one of the following:		3
MGMT 451	Negotiation and Alternative Dispute Resolution	

MRKT 430	Sales and Personal Selling
MRKT 438	Customer Relationship Management (CRM) and Sales Technology
MRKT 460	Marketing Strategy
AGEC 378	Introduction to Transportation & Logistics

- A 2.50 cumulative grade point average is required to enroll in 300-400 level CoB courses.
- Students must earn a 2.50 institutional GPA to graduate.
- Of the credits completed in residence at least 30 credits must be in 300-400 level CoB courses.
- Students must be accepted to the Management major prior to the completion of the last 30 credits in 300 and 400 level CoB courses.
- A Business Administration minor is NOT offered with this major.
- For multiple majors within the CoB, at least 15 unique credits of 300-400 level CoB courses must exist between the majors.
- Internship and cooperative education credits may be applied toward the total credits required for graduation as non-major electives or 300-400 level electives not used in pre-major categories.
- Students should refer to www.ndsu.edu/business for current and complete listing of the major requirements.

Management Communication

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7705
- **Department Web Site:**
  www.ndsu.edu/communication/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/management-communication/#planofstudytext

Major Requirements

Major: Management Communication

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	

Upper Division Writing †	
Quantitative Reasoning (R) †	3
Science and Technology (S) †	10
Humanities and Fine Arts (A) †	6
Social and Behavioral Sciences (B) †	6
Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major Requirements

Code	Title	Credits
Pre-Communication Requirements		
Students must complete the following 19 credits of coursework with a minimum GPA of 3.0 to be admitted to the professional major.		
ENGL 120	College Composition II	3
COMM 110	Fundamentals of Public Speaking	3
COMM 112	Understanding Media and Social Change	3
COMM 114	Human Communication	3
COMM 189	Skills for Academic Success	1
COMM 212	Interpersonal Communication	3
COMM 220	Persuasion	3
Professional Management Communication Major		
COMM 315	Small Group Communication	3
COMM 320	Communication Research Methods	3

COMM 383	Organizational Communication I	3
COMM 431	Communication Ethics and Law	3
COMM 483	Organizational Communication II	3
COMM 496	Field Experience	3
Select one of the following for upper division writing requirement:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 323	Creative Writing	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 357	Visual Culture and Language	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Electives:		21
COMM 216	Intercultural Communication	
COMM 308	Business and Professional Speaking	
COMM 316	Conflict Communication	
COMM 318	Argumentation and Advocacy	
COMM 412	Gender and Communication	
COMM 450	Issues in Communication	
COMM 484	Organizational Advocacy and Issue Management	
COMM 485	Risk and Crisis Communication	
COMM 487	Organizational Power and Leadership	
PSYC 221	Psychology Applied to Work	
SOC 233	Sociology of Organizations and Work	
Total Credits		61

Program Notes:

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

Minor Requirements

Management Communication Minor

Minor Requirements

Required Credits: 21

Code	Title	Credits
COMM 212	Interpersonal Communication	3
COMM 383	Organizational Communication I	3
COMM 483	Organizational Communication II	3
Professional Specialization Electives:		12
COMM 308	Business and Professional Speaking	
COMM 315	Small Group Communication	
COMM 316	Conflict Communication	
COMM 318	Argumentation and Advocacy	
COMM 412	Gender and Communication	
COMM 450	Issues in Communication	
COMM 484	Organizational Advocacy and Issue Management	
COMM 485	Risk and Crisis Communication	
COMM 487	Organizational Power and Leadership	
Total Credits		21

Minor Requirements and Notes

- Student enrollment is limited to one degree program offered by the Department of Communication.
- A minimum of 9 credits must be taken at NDSU.

Management Information Systems

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-8651
- **Department Web Site:**
  www.ndsu.edu/business/departments/afis/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/management-information-systems/#planofstudytext

Major Requirements

Major: Management Information Systems

Degree Type: B.S.
Minimum Credits Required for Degree: 127

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Pre-College of Business Requirements		
ACCT 200	Elements of Accounting I *	3
ACCT 201	Elements of Accounting II *	3
COMM 110	Fundamentals of Public Speaking (May satisfy general education category C) *	3
ECON 201	Principles of Microeconomics (May satisfy general education category B and G) *	3
ECON 202	Principles of Macroeconomics (May satisfy general education category B and G) *	3
ENGL 110	College Composition I (May satisfy general education category C) *	4
MIS 116	Business Use of Computers (May satisfy general education category S) *	3
ENGL 120	College Composition II (May satisfy general education category C) *	3
PHIL 216	Business Ethics (May satisfy general education category A) *	3
PSYC 111	Introduction to Psychology (May satisfy general education category B) *	3
or SOC 110	Introduction to Sociology	
STAT 330	Introductory Statistics (May satisfy general education category R) *	3
STAT 331	Regression Analysis *	2
MATH 144	Mathematics for Business *	4
Pre-MIS Requirements		
CSCI 227	Computing Fundamentals I (Fall) *	3
CSCI 228	Computing Fundamentals II (Spring) *	3
Management Information Systems Major Requirements **		
ENGL 320	Business and Professional Writing (May satisfy general education category C)	3
FIN 320	Principles of Finance [1]	3
MGMT 320	Foundations of Management [1]	3
MGMT 360	Operations Management	3
MRKT 320	Foundations of Marketing [1]	3
BUSN 430	Legal and Social Environment of Business [1]	3
BUSN 489	Strategic Management (Capstone Course) [1]	4
MIS 320	Management Information Systems [1]	3
MIS 315	System Analysis and Design (requires a grade of C or better)	3
MIS 350	Enterprise Systems	3
MIS 375	Database Design for Business Application (S)	3
MIS 376	Data and Telecommunications Administration (F)	3
MIS 470	Information Systems (S)	3
CSCI 312	Survey of Programming Languages (F)	3
CSCI 489	Social Implications of Computers (F)	3
Management Information Systems Practicum		
Select one of the following:		3
MIS 397	Fe/Coop Ed/Internship	
UNIV 492	Study Abroad	
MIS 413	MIS Service Internship	
CSCI 445	Software Projects Capstone	
AGEC 371	Export Management	
Elective Requirements for MIS Major. Complete 3 credits in each of the three areas below: **		
1) Technology Elective I: Select one course from the following:		3
CSCI 125	Beginning COBOL	

CSCI 172	Intermediate Programming Concepts	
CSCI 213	Modern Software Development	
CSCI 222	Discrete Mathematics	
CSCI 277	Introduction to UNIX	
or MIS 277	Introduction to UNIX	
CSCI 299	Special Topics	
or MIS 299	Special Topics	
CSCI 336	Theoretical Computer Science	
ECE 173	Introduction to Computing	
ECE 275	Digital Design	
Any 300-400 level CSCI or MIS course not used to satisfy another MIS major requirement		
2) Technology Elective II:		3
Any 300-400 level CSCI or MIS course not used to satisfy another MIS major requirement		
3) Business Elective:		3
Any 300-400 level CoB course not used to satisfy other requirements, or CSCI 473, or ECON 324; includes courses cross-listed with CoB courses; excludes internships, study abroad, LEAD courses & MIS 371		
Total Credits		104

* Pre-college and pre-management information systems major courses. A grade of 'C' or better for pre-college and pre-management information systems major courses is required for admission into the Management Information Systems major.

** Students must earn a 'C' or better, and have a minimum 2.5 cumulative GPA, in ALL courses included in the professional program (i.e., all required courses, elective requirements, and additional 300-400 level CoB electives or breadth electives).

[1] Denotes Common Body of Knowledge (CBK) course.

Degree Requirements and Notes

- Students follow the published curricula for management information systems program of study from the semester/year of entrance in the College of Business to graduation provided enrollment at NDSU has not been discontinued for more than one year. Students who change their major are subject to meeting the curricular requirements in effect at the time the new major is declared.
- Business courses from programs that do not hold AACSB International accreditation cannot be used for major or minor requirements in the College of Business (CoB); such courses may be eligible for use as free electives.
- The CoB accepts a maximum of nine credits of non-NDSU 300-400 level business courses from AACSB programs with approval of the department.
- Admission into the MIS Major: Students must earn a 'C' or better in the pre-college and pre-MIS courses that are indicated with an asterisk (*), achieve junior standing (60 credits), and earn a 2.50 institutional cumulative grade point average. Students must submit an online application to the CoB.
- Admission to the MIS major is required to enroll in the advanced 300 or 400 level courses in the CoB.
- A grade of 'C' or better is required in transfer courses accepted for ACCT 200 Elements of Accounting I and ACCT 201 Elements of Accounting II and all 300-400 level accounting, business administration, finance, management, management information systems, and marketing courses.
- A letter grade must be earned in any course that fulfills a major requirement (with the exception of some practicum options and BUSN 301).
- Requirements for graduation are those in existence at the time of admission to the MIS major.
- A 2.50 cumulative grade point average is required to enroll in 300-400 level CoB courses.
- Students must earn a 2.50 institutional GPA to graduate.
- Of the credits completed in residence at least 30 credits must be in 300-400 level CoB courses.
- Students must be accepted to the MIS major prior to the completion of the last 30 credits in 300 and 400 level CoB courses.
- A Business Administration minor is NOT offered with this major.
- For multiple majors within the CoB, at least 15 unique credits of 300-400 level CoB courses must exist between the majors.
- Prerequisite for Management Information Systems Practicum: MIS 315 with a grade of C or better.
- Students should refer to www.ndsu.edu/business for current and complete listing of the major requirements.

Minor Requirements

Management Information Systems Minor

Minor Requirements

Required Credits: 21

Students should refer to www.ndsu.edu/business for information on declaring the minor with the CoB.

Code	Title	Credits
Requirements		
MGMT 320	Foundations of Management	3
MIS 315	System Analysis and Design	3
MIS 375	Database Design for Business Application *	3
or CSCI 366	Database Systems	
MIS 376	Data and Telecommunications Administration *	3
or CSCI 459	Foundations of Computer Networks	
CSCI 227	Computing Fundamentals I **	3-4
or CSCI 160	Computer Science I	
Select one of the following:		3
ACCT 420	Accounting Information Systems	
MIS 470	Information Systems	
Or an MIS advisor-approved CoB course that is MIS related		
Select one of the following:		3
An MIS adviser approved 300-400 level CSCI course		
Or one of the following:		
CSCI 122	Introduction to Programming Concepts	
CSCI 161	Computer Science II	
CSCI 172	Intermediate Programming Concepts	
CSCI 228	Computing Fundamentals II **	
Total Credits		21-22

* Students who take CSCI 366 Database Systems & CSCI 459 Foundations of Computer Networks, must select an additional MIS advisor-approved CoB course.

** It is strongly recommended that students who take CSCI 227 select CSCI 228 as their elective in preparation for MIS 315.

Minor Requirements and Notes

- A minimum of 9 credits must be completed in the CoB.
- Approval forms must be submitted after completed CSCI 227 Computing Fundamentals I or CSCI 160 Computer Science I.
- To be accepted into the minor program, students must have a 2.50 institutional cumulative GPA and at least junior standing (60 credits). To complete a minor, students must earn at least a 2.50 GPA that is based on the courses used to satisfy the minor requirements. Courses may not be taken pass/fail.
- If the cumulative GPA falls below the 2.50 after acceptance into the program, the student will not be allowed to register for the CoB courses until the cumulative GPA returns to 2.50 or above.
- Students are subject to the minor requirements in effect during the year in which the minor was approved.
- Minors must satisfy all course prerequisites.
- Approval for a minor does not guarantee enrollment in specific courses.
- Graduation with a minor in Management Information Systems requires a grade of 'C' or better in all courses required for the minor.

Mangerial Psychology

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-8622
- **Department Web Site:**
  www.ndsu.edu/psychology/
- **Degrees Offered:**
  Minor

- **Program Overview:**
  https://bulletin.ndsu.edu/programs-study/undergraduate/managerial-psychology/

Minor Requirements

Managerial Psychology

Minor Requirements

Required Credits: 18

Code	Title	Credits
PSYC 111	Introduction to Psychology	3
PSYC 211	Introduction To Behavior Modification	3
PSYC/SOC 214	Social Interaction	3
or PSYC 216	Cultural Psychology	
PSYC 221	Psychology Applied to Work	3
PSYC 322	Judgment & Decision-Making	3
PSYC 453	Organizational Psychology	3
Total Credits		18

Minor Requirements and Notes

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

Manufacturing Engineering

Department Information

- **Department Location:**
  Civil & Industrial Engineerng
- **Department Phone:**
  701-231-9818
- **Department Web Site:**
  www.ndsu.edu/ime/
- **Degrees Offered:**
  B.S.Mfg.E.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/manufacturing-engineering/#planofstudytext

Major Requirements

Major: Manufacturing Engineering

Degree Type: B.S.Mfg.E.
Required Degree Credits to Graduate: 131

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Manufacturing Engineering Core Requirements		
IME 111	Introduction to Industrial and Manufacturing Engineering	3
IME 311	Work/Station Design and Measurement	3
IME 330	Manufacturing Processes	3
IME 380	CAD/CAM for Manufacturing	3
IME 430	Process Engineering	3
IME 431	Production Engineering	3
IME 440	Engineering Economy	3
IME 456	Program and Project Management	3
IME 460	Evaluation of Engineering Data	3
IME 461	Quality Assurance and Control	3
IME 480	Production and Inventory Control	3
IME 482	Automated Manufacturing Systems	3
IME 489	Industrial and Manufacturing Engineering Capstone	3
MATH 128	Introduction to Linear Algebra	1
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
ME 212	Fundamentals of Visual Communication for Engineers	3
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 223	Mechanics of Materials	3
ME 331	Materials Science and Engineering	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122	General Chemistry II (May satisfy general education category S)	3
ENGL 321	Writing in the Technical Professions (May satisfy general education category C)	3

ENGR 402	Engineering Ethics and Social Responsibility	1
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
Manufacturing Electives		
Computer Science Electives: Select 3 credits from the following:		3
CSCI 122	Introduction to Programming Concepts	
CSCI 126	Beginning FORTRAN	
CSCI 160	Computer Science I	
ECE 173	Introduction to Computing	
Engineering and Science Electives: Select 9 credits from the following:		
CE 309	Fluid Mechanics	3
ME 350	Thermodynamics and Heat Transfer	3
Select one of the following:		3-4
EE 206	Circuit Analysis I	
ECE 275	Digital Design	
ECE 301	Electrical Engineering I	
Technical Electives: Select 9 credits from the following:		9
IME 335	Welding Technology	
IME 411	Human Factors Engineering	
IME 427	Packaging for Electronics	
IME 432	Composite Materials Manufacturing	
IME 433	Additive Manufacturing	
IME 435	Plastics and Injection Molding Manufacturing	
IME 437	Methods for Precision Manufacturing	
IME 450	Systems Engineering and Management	
IME 451	Logistics Engineering and Management	
IME 452	Integrated Industrial Information Systems	
IME 455	Management of People Systems	
IME 462	Total Quality In Industrial Management	
IME 463	Reliability Engineering	
IME 470	Operations Research I	
IME 472	Simulation of Business and Industrial Systems	
IME 485	Industrial and Manufacturing Facility Design	
Only one of the following five courses may be counted as technical electives.		
BUSN 340	International Business	
BUSN 431	Business Law I-Contracts, Property and Torts	
MGMT 320	Foundations of Management	
MRKT 320	Foundations of Marketing	
MIS 320	Management Information Systems	
Total Credits		107-108

Degree Requirements and Notes

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.
- Grades less than 'C' will not be accepted for required courses in CHEM, MATH, and PHYS.
- Students may request approval for other 300-400 level engineering or related courses to be approved as technical electives. To request approval, a student should submit a memo to the IME Department indicating the course of interest and why the course should be approved as a technical elective. This memo will be reviewed by the IME Department Chair for approval.
- 300-400 level BUSN courses require at least junior standing and a minimum 2.50 cumulative GPA.

Minor Requirements

Manufacturing Engineering Minor

Minor Requirements

Required Credits: 18

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 Injection Molding Manufacturing	
IME 437	Methods for Precision Manufacturing	
IME 461	Quality Assurance and Control	
IME 482	Automated Manufacturing Systems	
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Only students majoring in an engineering discipline or with department permission agricultural or physical science majors may elect a minor in Manufacturing Engineering.

Marketing

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-8651
- **Department Web Site:**
  www.ndsu.edu/business/departments/mm/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/marketing/#planofstudytext

Major Requirements

Major: Marketing

Degree Type: B.S.
Minimum Credits Required for Degree: 120

University Degree Requirements

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

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

7. At least 36 credits must be NDSU resident credits. Residence credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Pre-College of Business Requirements		
ACCT 200	Elements of Accounting I *	3
ACCT 201	Elements of Accounting II *	3
COMM 110	Fundamentals of Public Speaking (May satisfy general education category C) *	3
MIS 116	Business Use of Computers (May satisfy general education category S) *	3
ENGL 110	College Composition I (May satisfy general education category C) *	4
ENGL 120	College Composition II (May satisfy general education category C) *	3
ECON 201	Principles of Microeconomics (May satisfy general education category B and G) *	3
ECON 202	Principles of Macroeconomics (May satisfy general education category B and G) *	3
PHIL 216	Business Ethics (May satisfy general education category A) *	3
STAT 330	Introductory Statistics (May satisfy general education category R) *	3
STAT 331	Regression Analysis *	2
MATH 144	Mathematics for Business *	4
Pre-Marketing Requirements		
PSYC 111	Introduction to Psychology *	3
SOC 110	Introduction to Sociology *	3
Marketing Major Requirements**		
ENGL 320	Business and Professional Writing (May satisfy general education category C)	3
FIN 320	Principles of Finance [1]	3
MGMT 320	Foundations of Management [1]	3
MRKT 320	Foundations of Marketing [1]	3
BUSN 430	Legal and Social Environment of Business [1]	3
MRKT 410	Consumer Behavior	3

MRKT 450	Marketing Research	3
MRKT 460	Marketing Strategy	3
BUSN 489	Strategic Management (Capstone Course) [1]	4
MIS 320	Management Information Systems [1]	3
300-400 Level Marketing Courses **		12
Select courses from current MRKT curriculum		
300-400 level Courses **		9
Select 3 courses from within the CoB, (includes courses cross-listed with CoB courses):		
Additional 300-400 Level Course **		3
This additional 300-400 level elective cannot be used to satisfy other requirements; includes courses cross-listed with CoB courses; excludes ATHL credits		
Total Credits		98

* Pre-college and pre-marketing major courses. A grade of 'C' or better for pre-college and pre-marketing major courses is required for admission into the Marketing major.

** Students must earn a grade of 'C' or better, and have a minimum 2.5 cumulative GPA, in ALL courses included in the professional program (i.e., all required courses, elective requirements, and additional 300-400 level CoB electives or breadth electives).

[1] Denotes Common Body of Knowledge (CBK) course.

Degree Requirements and Notes

- Students must include one of the following international courses in their plan of study:

Code	Title	Credits
BUSN 340	International Business	3
BUSN 341	Global Business Environment	3
FIN 440	International Finance	3
MGMT 440	International Management	3
MRKT 440	International Marketing	3

- Student may choose to take the Supply Chain Management Track within the Marketing major:

Code	Title	Credits
MGMT 461	Supply Chain Management (Required)	3
MGMT 462	Modeling the Supply Chain (Required)	3
Select one of the following:		3
MGMT 360	Operations Management	
MGMT 451	Negotiation and Alternative Dispute Resolution	
MRKT 430	Sales and Personal Selling	
MRKT 438	Customer Relationship Management (CRM) and Sales Technology	
AGEC 378	Introduction to Transportation & Logistics	

- Students follow the published curricula for the marketing program of study from the semester/year of entrance in the College of Business to graduation provided enrollment at NDSU has not been discontinued for more than one year. Students who change their major are subject to meeting the curricular requirements in effect at the time the new major is declared.
- Business courses from programs that do not hold AACSB International accreditation cannot be used for major or minor requirements in the College of Business (CoB); such courses may be eligible for use as free electives.
- The CoB accepts a maximum of nine credits of non-NDSU 300-400 level business courses from AACSB programs with approval of the department.
- Admission into the Marketing Major: Students must earn a 'C' or better in the pre-college and pre-marketing major courses that are indicated with an asterisk (*), achieve junior standing (60 credits), and earn a 2.50 institutional cumulative grade point average. Students must submit an online application to the CoB.
- Admission to the marketing major is required to enroll in the advanced 300 or 400 level courses in the CoB.
- A grade of 'C' or better is required in transfer courses accepted for ACCT 200 Elements of Accounting I and ACCT 201 Elements of Accounting II and all 300-400 level accounting, business administration, finance, management, management information systems, and marketing courses.
- A letter grade must be earned in any course that fulfills a major requirement.
- Requirements for graduation are those in existence at the time of admission to the marketing major.
- A 2.50 cumulative grade point average is required to enroll in 300-400 level CoB courses.

- Students must earn a 2.50 institutional GPA to graduate.
- Of the credits completed in residence at least 30 credits must be in 300-400 level CoB courses.
- Students must be accepted to the marketing major prior to the completion of the last 30 credits in 300 and 400 level CoB courses.
- A Business Administration minor is NOT offered with this major.
- For multiple majors within the CoB, at least 15 unique credits of 300-400 level CoB courses must exist between the majors.
- Internship and cooperative education credits may be applied toward the total credits required for graduation as non-major electives or 300-400 level electives not used in pre-major categories.
- Students should refer to www.ndsu.edu/business for current and complete listing of the major requirements.

Mathematics

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-8171
- **Department Web Site:**
  www.ndsu.edu/math/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/mathematics/#planofstudytext

Major Requirements

Major: Mathematics

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

A grade of 'C' or better is required in all MATH prefix courses.

Code	Title	Credits
Mathematics Major Requirements		
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (includes)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 270	Introduction to Abstract Mathematics	3
MATH 329	Intermediate Linear Algebra	3
MATH 346	Metric Space Topology	3
MATH 420	Abstract Algebra I	3
MATH 450	Real Analysis I	3
MATH 452	Complex Analysis	3
MATH 483	Partial Differential Equations	3
MATH 491	Seminar	2
Mathematics Electives		16
MATH prefix courses numbered 300 or higher, not including those listed above.		
Related Required Courses		15
A minor or second major in any other program or 15 credits of coursework that includes at least two 300-level (or higher) courses in another discipline.		
Total Credits		72

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Minor Requirements

Mathematics Minor

Minor Requirements

Required Credits: 21

Code	Title	Credits
Required Courses		
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 265	Calculus III	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	
Electives		
6 additional credits of MATH prefix courses numbered greater than or equal to 266 (at least one of which is not listed above).		6
Total Credits		21

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- A grade of 'C' or better is required in all courses used toward this minor.

Mathematics and Physics

Department Information

- **Department Location:**
  Minard Hall or South Engineering
- **Department Phone:**
  701-231-8171
- **Department Web Site:**
  www.ndsu.edu/math/ or www.ndsu.edu/physics/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/mathematics-physics/#planofstudytext

Major Requirements

Major: Mathematics & Physics

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

A grade of 'C' or better is required for all MATH, PHYS, and AST prefix courses.

Code	Title	Credits
Mathematics Major Requirements		
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 270	Introduction to Abstract Mathematics	3
MATH 329	Intermediate Linear Algebra	3
MATH 346	Metric Space Topology	3
Select any two of the following:		6
MATH 420	Abstract Algebra I	
MATH 450	Real Analysis I	
MATH 452	Complex Analysis	
MATH 483	Partial Differential Equations	
MATH 491	Seminar	2
Physics Major Requirements		
PHYS 171	Introductory Projects in Physics	1
PHYS 251 & 251L	University Physics I and University Physics I Laboratory (May satisfy general education category S)	5
PHYS 251R	University Physics I Recitation	1

PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
PHYS 252R	University Physics II Recitation	1
PHYS 350	Modern Physics	3
PHYS 355	Classical Mechanics (or PHY 330: Intermediate Mechanics at MSUM)	3
PHYS 360	Modern Physics II	3
PHYS 361	Electromagnetic Theory (or PHY 370: Electromagnetic Theory at MSUM)	3
PHYS 370	Introduction to Computational Physics	3
PHYS 462	Thermal and Statistical Physics	3
PHYS 485	Quantum Mechanics I	3
PHYS 486	Quantum Mechanics II	3
PHYS 489	Senior Project II	3
Physics Electives: Select 3 of the following:		9
PHYS 215	Research For Undergraduates	
PHYS 411	Optics for Scientists & Engineers	
PHYS 413	Lasers for Scientists and Engineers	
PHYS 415	Elements of Photonics	
PHYS 481	Condensed Matter Physics	
MSUM AST	Astronomy courses (300/400-level) with departmental pemission	
Related Required Courses		
Computer Science:		
CSCI 160	Computer Science I	4
Chemistry: Select one of the following (150/160 recommended):		4
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
Select one of the following (151/161 recommended):		4
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Total Credits		96

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Mathematics and Statistics

Department Information

- **Department Location:**
  Minard Hall or Morrill Hall
- **Department Phone:**
  701-231-8171
- **Department Web Site:**
  www.ndsu.edu/math/ or www.ndsu.edu/statistics/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/mathematics-statistics/

Major Requirements

Major: Mathematics & Statistics

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Mathematics & Statistics Major Requirements

A grade of 'C' or better is required in all MATH and STAT prefix courses.

Code	Title	Credits
Math Major Core Requirements		
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 270	Introduction to Abstract Mathematics	3
MATH 329	Intermediate Linear Algebra	3
MATH 346	Metric Space Topology	3
MATH 450	Real Analysis I	3
MATH 491	Seminar	2
Mathematics Electives	Any 300-400 level	3
Statistics Major Requirements		
STAT 330	Introductory Statistics	3
STAT 461	Applied Regression Models	3
STAT 462	Introduction to Experimental Design (Capstone)	3
STAT 467	Probability and Mathematical Statistics I	3
STAT 468	Probability and Mathematical Statistics II	3
Statistics Electives	400 level other than those listed above	18
Related Required Courses:		
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
Total Credits		76

Major Requirements

Major: Mathematics & Statistics Pre-Actuarial Option

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 124

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Quantitative Reasoning (R) †		3
Science and Technology (S) †		10
Humanities and Fine Arts (A) †		6

Social and Behavioral Sciences (B) †	6
Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

A grade of 'C' or better is required for all courses used toward the major.

Code	Title	Credits
Science and Mathematics College Requirements		6-12
Math Major Requirements		
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 270	Introduction to Abstract Mathematics	3
MATH 329	Intermediate Linear Algebra	3
MATH 346	Metric Space Topology	3
MATH 376	Actuarial Exam Study	1
MATH 450	Real Analysis I	3
Mathematics Elective	Any 300-400 level	3
Statistics Major Requirements		
STAT 330	Introductory Statistics	3
STAT 461	Applied Regression Models	3
STAT 462	Introduction to Experimental Design (Capstone)	3
STAT 467	Probability and Mathematical Statistics I	3
STAT 468	Probability and Mathematical Statistics II	3
STAT 476	Actuary Exam Study	1
Statistics Electives	Courses must be at the 400 level and not listed above	9
Related Required Courses		
ACCT 200	Elements of Accounting I	3
ACCT 201	Elements of Accounting II	3
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
ECON 201	Principles of Microeconomics (May satisfy general education category B and G)	3

ECON 202	Principles of Macroeconomics (May satisfy general education category B and G)	3
Electives: Select three courses from the following:		9
CSCI 453	Linear Programming and Network Flows	
CSCI 454	Operations Research	
ECON 341	Intermediate Microeconomics	
ECON 343	Intermediate Macroeconomics	
ECON 410	Econometrics	
ECON 440	Game Theory and Strategy	
ECON 456	History of Economic Thought	
ECON 461	Economic Development	
ECON 465	Labor Economics	
ECON 470	Public Economics	
ECON 472	International Trade	
ECON 476	Monetary Theory and Policy	
ECON 480	Industrial Organization	
ECON 481	Natural Resource Economics	
ECON 482	Environmental Economics	
FIN 320	Principles of Finance	
FIN 410	Investment Analysis and Management	
FIN 420	Options, Futures, and Other Derivatives	
FIN 450	Advanced Bank Management	
FIN 460	Corporate Finance	
Total Credits		94-100

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Mathematics Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/mathematics-education/#planofstudytext

Major Requirements

Major: Mathematics Education

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

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

7. At least 36 credits must be NDSU resident credits. Residence credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

A grade of 'C' or better is required in all Teaching Specialty requirement courses and the Professional Education requirement courses.

Code	Title	Credits
Teaching Specialty Requirements		
CSCI 160	Computer Science I	4
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 270	Introduction to Abstract Mathematics	3
MATH 329	Intermediate Linear Algebra	3
MATH 346	Metric Space Topology	3
MATH 374	Special Problems In Mathematics	1
MATH 420	Abstract Algebra I	3
MATH 440	Axiomatic Geometry	3
MATH 450	Real Analysis I	3
MATH 478	History of Mathematics	3
STAT 367	Probability	3
STAT 368	Statistics	3
Mathematics Courses		
Select one 300-400 level MATH prefix course approved by the department. MATH 266 may be used as one of these electives.		3
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Math)	3

EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		78

Degree Requirements and Notes

- A GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.
- Students pursuing both Mathematics Education and Mathematics majors are encouraged to take STAT 467/468 in place of STAT 367/368, and choose MATH 421 and 453 or 454 as part of their required Math credits.
- See School of Education (https://www.ndsu.edu/education) for admission requirements.

Mechanical Engineering

Department Information

- **Department Location:**
  Dolve Hall
- **Department Phone:**
  701-231-8671
- **Department Web Site:**
  www.ndsu.edu/me/
- **Degrees Offered:**
  B.S.M.E.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/mechanical-engineering/#planofstudytext

Major Requirements

Major: Mechanical Engineering

Degree Type: B.S.M.E.
Required Degree Credits to Graduate: 129

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		

Quantitative Reasoning (R) †	3
Science and Technology (S) †	10
Humanities and Fine Arts (A) †	6
Social and Behavioral Sciences (B) †	6
Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Code	Title	Credits
Mechanical Engineering Requirements:		
ME 212	Fundamentals of Visual Communication for Engineers	3
ME 213	Modeling of Engineering Systems	3
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 223	Mechanics of Materials	3
ME 331	Materials Science and Engineering	4
ME 351	Thermodynamics I	3
ME 352	Fluid Dynamics	3
ME 361	Introduction to Mechanical Engineering Profession	1
ME 412	Engineering Measurements	3
ME 421	Theory of Vibrations	3
ME 442	Machine Design I	3
ME 443	Machine Design II	3
ME 454	Heat and Mass Transfer	3
ME 457	Thermal Systems Laboratory	3
ME 461	Design Project I	3
ME 462	Design Project II	3
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
CHEM 121	General Chemistry I (May satisfy general education category S)	3
CHEM 122	General Chemistry II (May satisfy general education category S)	3
ECE 301	Electrical Engineering I	3
ECE 303	Electrical Engineering II	3
ECE 306	Electrical Engineering Lab I	1
ENGL 321	Writing in the Technical Professions (May satisfy general education category C)	3
ENGR 402	Engineering Ethics and Social Responsibility	1
IME 330	Manufacturing Processes	3
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
Technical Electives: Select 15 credits from the following:		15
ME 332	Engineering Materials II	
ME 353	Thermodynamics II	
ME 433	Composite Materials Science and Engineering	

ME 435	Plastics and Injection Molding Manufacturing
ME 437	Engineering Ceramics
ME 468	Introduction to Biomechanics
ME 470	Renewable Energy Technology
ME 471	Experimental Stress Analysis
ME 472	Fatigue and Fracture of Metals
ME 473	Engineering with Polymeric Materials
ME 474	Mechanics of Composite Materials
ME 475	Automatic Controls
ME 476	Mechatronics
ME 477	ME Finite Element Analysis
ME 480	Biofluid Mechanics
ME 481	Fundmentals of Energy Conversion
ME 482	Fuel Cell Science and Engineering
ME 483	Introduction to Computational Fluid Dynamics
ME 484	Gas Turbines
ME 485	Heating, Ventilation and Air Conditioning
ME 486	Nanotechnology and Nanomaterials
ME 487	Internal Combustion Engines
ME 488	Introduction to Aerodynamics
ME 489	Vehicle Dynamics
Approved technical electives from other departments - no more than three courses from the following:	
ABEN 456	Biobased Energy
CPM 473	Polymer Synthesis
CPM 474	Applied Polymer Science
CPM 475	Coatings' Materials Science
CPM 486	Corrosion and Materials
CSCI 485	Autonomous Command and Artificial Intelligence for Robots and Other Cyber-Physical Systems
ECE 485	Biomedical Engineering
ECE 487	Cardiovascular Engineering
ECE 488	Cardiovascular Engineering II
IME 430	Process Engineering
IME 431	Production Engineering
IME 432	Composite Materials Manufacturing
IME 440	Engineering Economy
IME 460	Evaluation of Engineering Data
PHYS 350	Modern Physics
PHYS 361	Electromagnetic Theory
PHYS 485	Quantum Mechanics I
Courses cross-listed with other departments:	
ME 435/IME 635	Plastics and Injection Molding Manufacturing
ME/ABEN 479	Fluid Power Systems Design
ME 486/CE 686	Nanotechnology and Nanomaterials
Total Credits	107

Degree Requirements and Notes

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.
- No grades less than 'C' will be accepted to fulfill a course requirement.
- No more than nine credits of approved technical electives may be taken outside the ME department.

- Admission to the Mechanical Engineering Professional program requires a minimum 2.80 Engineering GPA and a minimum 2.50 Cumulative GPA.
- A 2.50 cumulative GPA is required for graduation requirements.

Medical Laboratory Science

Department Information

- **Department Location:**
  Sudro Hall
- **Department Phone:**
  701-231-8713
- **Department Web Site:**
  www.ndsu.edu/alliedsciences/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/medical-laboratory-science/#planofstudytext

Major Requirements

Medical Laboratory Science Major

Degree Type: B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Medical Laboratory Science Major Requirements		
CHP 190	Critical Thinking and Academic Success	2
MLS 200	Introduction to Medical Laboratory Science	1
MLS 435	Hematology	2
MLS 496	Field Exp/Internship	30
Professional education (internship) within an accredited affiliated school of medical laboratory science includes the capstone experience.		
Related Courses Required:		
BIOC 460 & 460L	Foundations of Biochemistry and Molecular Biology I and Foundations of Biochemistry I Laboratory	4
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory (May satisfy a general education category S)	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy a general education category S)	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
CSCI 114	Microcomputer Packages (May satisfy a general education category S)	3
or CSCI 116	Business Use of Computers	
MATH 103	College Algebra (or higher level; excluding MATH 104)	3
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
MICR 463	Clinical Parasitology	2
MICR 460 & 460L	Pathogenic Microbiology and Pathogenic Microbiology Laboratory	5
MICR 470	Basic Immunology	3
MICR 471	Immunology and Serology Laboratory	2
STAT 330	Introductory Statistics (May satisfy a general education category R)	3
ZOO 315 & 315L	Genetics and Genetics Laboratory	4
Select one group of the following:		6-7
Group One:		
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	
CHEM 342	Organic Chemistry II	
Group Two:		
CHEM 240	Survey of Organic Chemistry	
BIOC 461	Foundations of Biochemistry and Molecular Biology II	
Total Credits		95-96

Degree Requirements and Notes

- All required courses must be completed with a grade of 'C' or above. All students must maintain a semester GPA of 2.0 or above for each semester in the College. A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the College.

- Completion of the prerequisites does not guarantee a student internship. Selection of interns is competitive. Please consult your MLS advisor for more information.

Microbiology

Department Information

- **Department Location:**
  Van Es Hall
- **Department Phone:**
  701-231-7667
- **Department Web Site:**
  www.ndsu.edu/micro/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/microbiology/#planofstudytext

Major Requirements

Major: Microbiology

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

A grade of 'C' or better is required for the microbiology core and elective requirements.

Code	Title	Credits
Required Courses for Microbiology Major		
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
MICR 352 & 352L	General Microbiology II and General Microbiology Lab II	5
MICR 354	Scientific Writing	3
MICR 480	Bacterial Physiology	3
MICR 482	Bacterial Genetics & Phage	3
MICR 486	Capstone Experience in Microbiology - Research Project	3
Elective Courses for Microbiology Major - Select a minimum of 21 credits from the following:		21
Fifteen (15) of the 21 credits must have a MICR prefix. No more than 3 credits may come from courses numbered 371-399 or 491-499 to fulfill this requirement.		
MICR 379	Study Tour Abroad	
or MICR 492	Study Abroad	
MICR 394	Individual Study	
MICR 445	Animal Cell Culture Techniques	
MICR 450	Infectious Disease Pathogenesis	
MICR 450L	Infectious Disease Pathogenesis Laboratory	
or MICR 460L	Pathogenic Microbiology Laboratory	
MICR 452	Microbial Ecology	
MICR 453	Food Microbiology	
MICR 463	Clinical Parasitology	
MICR 470	Basic Immunology	
MICR 471	Immunology and Serology Laboratory	
MICR 472	Clinical Immunology	
MICR 474	Epidemiology	
MICR 475	Virology	
MICR 481	Microbial Genomics with Computational Laboratory	
MICR 491	Seminar	
MICR 493	Undergraduate Research	
MICR 494	Individual Study	
MICR 496	Field Experience	
BIOC 473	Methods of Biochemical Research	
BIOC 474	Methods of Recombinant DNA Technology	
BIOC 483	Cellular Signal Transduction Processes and Metabolic Regulations	
BIOC 487	Molecular Biology of Gene Expression	
BIOL 359	Evolution	
BIOL 364	General Ecology	
BIOL 370	Cell Biology	
BIOL 481	Wetland Science	
GEOG 455	Introduction to Geographic Information Systems	
GEOL 460	Biogeochemistry	
MLS 435	Hematology	

PLSC 431	Intermediate Genetics	
PPTH 460	Fungal Biology	
SOIL 210	Introduction to Soil Science	
SOIL 351	Soil Ecology	
Related Requirements for the Microbiology Major		
MICR 189	Skills for Academic Success	1
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory (May satisfy general education category S)	4
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342	Organic Chemistry II	3
BIOC 460 & 460L	Foundations of Biochemistry and Molecular Biology I and Foundations of Biochemistry I Laboratory	4
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
PHYS 211 & 211L	College Physics I and College Physics I Laboratory (May satisfy general education category S)	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory (or higher (May satisfy general education category S)	4
PLSC 315 & 315L	Genetics and Genetics Laboratory (May satisfy general education category S)	4
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Select one of the following or higher level math:		3-4
MATH 105	Trigonometry	
MATH 107	Precalculus	
MATH 146	Applied Calculus I	
Total Credits		92

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

Degree Requirements and Notes

- A cumulative 2.50 GPA is required for graduation.

Minor Requirements

Microbiology Minor

Minor Requirements

Required Credits: 16

Code	Title	Credits
Required Courses		
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
Elective Courses: Select 11 credits from the following:		11
No more than 3 credits may come from courses numbered 491-499 to fulfill this requirement.		
MICR 352	General Microbiology II	
MICR 352L	General Microbiology Lab II	
MICR 379	Study Tour Abroad	

MICR 445	Animal Cell Culture Techniques
MICR 452	Microbial Ecology
MICR 453	Food Microbiology
MICR 460	Pathogenic Microbiology
or MICR 450	Infectious Disease Pathogenesis
MICR 460L	Pathogenic Microbiology Laboratory
or MICR 450L	Infectious Disease Pathogenesis Laboratory
MICR 463	Clinical Parasitology
MICR 470	Basic Immunology
MICR 471	Immunology and Serology Laboratory
MICR 472	Clinical Immunology
MICR 474	Epidemiology (see SAFE)
MICR 475	Virology
MICR 480	Bacterial Physiology
MICR 481	Microbial Genomics with Computational Laboratory
MICR 482	Bacterial Genetics & Phage
MICR 491	Seminar
MICR 494	Individual Study
MICR 496	Field Experience
MICR 499	Special Topics
Total Credits	16

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a 2.50 minimum GPA for the minor with a grade of 'C' or better in the courses used to satisfy the minor requirements.

Military Science

Department Information

- **Department Location:**
  Bentson/Bunker Field House
- **Department Phone:**
  701-231-7575
- **Department Web Site:**
  www.ndsuarmyrotc.com (http://www.ndsuarmyrotc.com)
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/military-science/

Minor Requirements

Military Science Minor

Minor Requirements

Required Credits: 25

Code	Title	Credits
Required Courses		
MS 101	Foundations of Officership	1
MS 102	Basic Leadership	1
MS 201	Individual Leadership Studies	2
MS 202	Leadership and Teamwork	2
MS 301	Leadership and Problem Solving	3
MS 302	Leadership and Ethics	3

MS 310	Leadership Laboratory	1
MS 320	Leadership Laboratory	1
MS 401	Leadership and Management	3
MS 402	Officership	3
MS 410	Leadership Laboratory	1
MS 420	Leadership Laboratory	1
Select one of the following history Courses:		3
NDSU Courses:		
HIST 103	U.S. to 1877	
HIST 104	U.S. Since 1877	
HIST 422	American Civil War and Reconstruction	
HIST 424	U.S. History 1917-1960	
Concordia Courses:		
HIST 314	U.S. Foreign Policy (3)	
HIST 338	Hitler's Germany (3)	
HIST 365	Global Issues (3)	
MSUM Courses:		
HIST 121	U.S. History I (3)	
HIST 122	U.S. History II (3)	
Total Credits		25

Minor Requirements and Notes

- This minor must be officially declared: see Office of Registration and Records.
- A minimum of 8 credits must be taken at NDSU.
- The following classes may be substituted for required classes after consultation with Military Science Dept Advisor - MS 110 Army ROTC Physical Fitness and MS 194 Individual Study.

Music

Department Information

- **Department Location:**
  Reineke Fine Arts Center
- **Department Phone:**
  701-231-7932
- **Department Email:**
  ndsu.performing.arts@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/performingarts/music/
- **Degrees Offered:**
  B.S.; B.A.; B.Mus.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/music/

Major Requirements

Major: Music

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 122

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specific by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major Requirements

A grade of 'C' or better is required in all MUSC prefix courses.

Code	Title	Credits
Music Core Requirements		
MUSC 103	Introduction to Music History (May satisfy general education category A)	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 189	Skills for Academic Success [1]	1
MUSC 230	Theory and Analysis III	3
MUSC 231	Theory and Analysis IV	3
MUSC 232	Ear Training & Sight Singing III	1
MUSC 233	Ear Training & Sight Singing IV	1
MUSC 340	Music History I	3
MUSC 341	Music History II	3
MUSC 385	Music Entrepreneurship	3
Capstone Experience (choose from following:) [2]		1
MUSC 380	Recital	
MUSC 480	Recital	
MUSC 494	Individual Study	
Applied Music: Select 6 credits from the following:		6
MUSC 165	Applied Piano	
MUSC 167	Applied Voice	
MUSC 168	Applied Wind Instruments	
MUSC 169	Applied Percussion Instruments	
MUSC 170	Applied Upper Strings	
MUSC 171	Applied Lower Strings	
MUSC 172	Applied Guitar	
MUSC 173	Supplementary Applied Study	
MUSC 265	Applied Piano	
MUSC 267	Applied Voice	
MUSC 268	Applied Wind Instruments	
MUSC 269	Applied Percussion Instruments	
MUSC 270	Applied Upper Strings	
MUSC 271	Applied Lower Strings	
MUSC 272	Applied Guitar	
MUSC 273	Supplementary Applied Study	
MUSC 365	Applied Piano	
MUSC 367	Applied Voice	
MUSC 368	Applied Wind Instruments	
MUSC 369	Applied Percussion Instruments	
MUSC 370	Applied Upper Strings	
MUSC 371	Applied Lower Strings	
MUSC 372	Applied Guitar	
MUSC 373	Supplementary Applied Study	
MUSC 465	Applied Piano	
MUSC 467	Applied Voice	
MUSC 468	Applied Wind Instruments	
MUSC 469	Applied Percussion Instruments	
MUSC 470	Applied Upper Strings	

MUSC 471	Applied Lower Strings	
MUSC 472	Applied Guitar	
MUSC 473	Supplementary Applied Study	
Major Ensemble: Select 6 credits from the following:		6
MUSC 111	Marching Band	
MUSC 112	University Band	
MUSC 116	Cantemus	
MUSC 117	Statesmen of NDSU	
MUSC 215	University Chamber Singers	
MUSC 303	Wind Symphony	
MUSC 304	University Symphony Orchestra	
MUSC 306	Concert Choir	
Music Electives or Emphasis Courses		15
Performance Attendance: Must enroll for 5 different semesters		
MUSC 180	Performance Attendance	0
Total Credits		57

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

[2] B.A./B.S. Recital Capstone or Individual Study Capstone is fulfilled by registration in MUSC 380 Recital, MUSC 480 Recital, or MUSC 494 Individual Study. The MUSC 494 Individual Study registration is approved by the music faculty and supervised by the adviser. Possibilities include:

- Half (MUSC 380 Recital) or full (MUSC 480 Recital) recital with program notes.
- Approved research project on a topic related to music; requires a formal written document (MUSC 494 Individual Study).
- Approved internship, such as directing an ensemble (e.g. church choir), teaching at the NDSU Academy, observed regularly by the advisor, with a formal written document of the experience (MUSC 494 Individual Study).
- Approved "lecture recital" with a formal presentation. Lecture recital should be at least the same length as a half recital (MUSC 494 Individual Study)
- Performance or major opera role or a major solo with ensemble in a formal concert, accompanied by a summary document (MUSC 494 Individual Study)

Degree Requirements and Notes

- Music majors may not declare a music minor.

Major Requirements

Major: Music - Instrumental Performance

Degree Type: B.Mus.
Required Degree Credits to Graduate: 128

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

A grade of 'C' or better is required in all MUSC prefix courses.

Code	Title	Credits
Music Core Requirements		
MUSC 103	Introduction to Music History (May satisfy general education category A)	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 189	Skills for Academic Success [1]	1
MUSC 230	Theory and Analysis III	3
MUSC 231	Theory and Analysis IV	3
MUSC 232	Ear Training & Sight Singing III	1
MUSC 233	Ear Training & Sight Singing IV	1
MUSC 250	Basic Conducting	2
MUSC 340	Music History I	3
MUSC 341	Music History II	3
MUSC 380	Recital	1
MUSC 385	Music Entrepreneurship	3
MUSC 480	Recital	1
Advanced Theory - select 2 of the following 3 courses		6
MUSC 411	Form and Analysis	
MUSC 430	Counterpoint	
MUSC 431	Contemporary Harmonic Techniques	
Pedagogy: Select 2 credits from the following:		2
MUSC 173	Supplementary Applied Study	
MUSC 273	Supplementary Applied Study	
MUSC 373	Supplementary Applied Study	
MUSC 473	Supplementary Applied Study	
Applied Music: Select 22 credits from the following: (2 semesters each of 100 level, 200 level, 300 level; 1 semester of 400 level)		22
Wind Instruments:		
MUSC 168	Applied Wind Instruments	1
MUSC 173	Supplementary Applied Study (1-2 credits)	
MUSC 268	Applied Wind Instruments	1

MUSC 273	Supplementary Applied Study (1-2 credits)	
MUSC 368	Applied Wind Instruments	1
MUSC 373	Supplementary Applied Study (2-3 credits)	
MUSC 468	Applied Wind Instruments	1
MUSC 473	Supplementary Applied Study (3-4 credits)	
Percussion:		
MUSC 169	Applied Percussion Instruments	1
MUSC 173	Supplementary Applied Study (1-2 credits)	
MUSC 269	Applied Percussion Instruments	1
MUSC 273	Supplementary Applied Study (1-2 credits)	
MUSC 369	Applied Percussion Instruments	1
MUSC 373	Supplementary Applied Study (2-3 credits)	
MUSC 469	Applied Percussion Instruments	1
MUSC 473	Supplementary Applied Study (3-4 credits)	
Upper Strings:		
MUSC 170	Applied Upper Strings	1
MUSC 173	Supplementary Applied Study (1-2 credits)	
MUSC 270	Applied Upper Strings	1
MUSC 273	Supplementary Applied Study (1-2 credits)	
MUSC 370	Applied Upper Strings	1
MUSC 373	Supplementary Applied Study (2-3 credits)	
MUSC 470	Applied Upper Strings	1
MUSC 473	Supplementary Applied Study (3-4 credits)	
Lower Strings:		
MUSC 171	Applied Lower Strings	1
MUSC 173	Supplementary Applied Study (1-2 credits)	
MUSC 271	Applied Lower Strings	1
MUSC 273	Supplementary Applied Study (1-2 credits)	
MUSC 371	Applied Lower Strings	1
MUSC 373	Supplementary Applied Study (2-3 credits)	
MUSC 471	Applied Lower Strings	1
MUSC 473	Supplementary Applied Study (3-4 credits)	
Guitar:		
MUSC 172	Applied Guitar	1
MUSC 173	Supplementary Applied Study (1-2 credits)	
MUSC 272	Applied Guitar	1
MUSC 273	Supplementary Applied Study (1-2 credits)	
MUSC 372	Applied Guitar	1
MUSC 373	Supplementary Applied Study (2-3 credits)	
MUSC 472	Applied Guitar	1
MUSC 473	Supplementary Applied Study (3-4 credits)	
Instrumental Track		
MUSC 331	Instrumental Arranging	2
MUSC 344	Wind Band Literature	2
MUSC 441	Symphonic Literature	2
Applied Piano: Class or individual study		4
MUSC 160	Piano Class I (Up to 2 semesters of MUSC 165 with permission)	
or MUSC 165	Applied Piano	
MUSC 161	Piano Class II	
MUSC 260	Piano Class III	
MUSC 261	Piano Class IV	
Jazz Studies: Select 4 credits from the following:		4

MUSC 311	Jazz Ensemble	
MUSC 357	Marching Band/Jazz Methods & Techniques	
MUSC 364	Jazz Improvisation	
MUSC 384	Composition I	
MUSC 484	Composition II	
Major Ensemble: Select 8 credits from the following:		8
MUSC 303	Wind Symphony (or as approved by adviser)	
MUSC 304	University Symphony Orchestra (for string majors)	
Minor Ensembles: Select 4 credits from the following:		4
MUSC 111	Marching Band	
MUSC 112	University Band	
MUSC 311	Jazz Ensemble	
MUSC 314	Brass Chamber Ensemble	
MUSC 315	Woodwind Chamber Ensemble	
MUSC 316	String Chamber Ensemble	
MUSC 318	Mixed Chamber Ensemble	
MUSC 322	Jazz Combo	
Or as approved by adviser		
Performance Attendance: Must enroll 5 different semesters		
MUSC 180	Performance Attendance	0
Total Credits		89

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

Degree Notes

- Music majors may not declare a music minor.

Major Requirements

Major: Music - Piano Performance

Degree Type: B.Mus.
Required Degree Credits to Graduate: 128

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		

Quantitative Reasoning (R) †	3
Science and Technology (S) †	10
Humanities and Fine Arts (A) †	6
Social and Behavioral Sciences (B) †	6
Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

A grade of 'C' or better is required in all MUSC prefix courses.

Code	Title	Credits
Music Core Requirements		
MUSC 103	Introduction to Music History (May satisfy general education category A)	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 189	Skills for Academic Success [1]	1
MUSC 230	Theory and Analysis III	3
MUSC 231	Theory and Analysis IV	3
MUSC 232	Ear Training & Sight Singing III	1
MUSC 233	Ear Training & Sight Singing IV	1
MUSC 250	Basic Conducting	2
MUSC 340	Music History I	3
MUSC 341	Music History II	3
MUSC 385	Music Entrepreneurship	3
MUSC 411	Form and Analysis	3
MUSC 430	Counterpoint	3
MUSC 431	Contemporary Harmonic Techniques	3
MUSC 380	Recital	1
MUSC 480	Recital	1
Applied Music: Select 22 credits from the following:		22
MUSC 165	Applied Piano	
MUSC 173	Supplementary Applied Study	
MUSC 265	Applied Piano	
MUSC 273	Supplementary Applied Study	
MUSC 365	Applied Piano	
MUSC 373	Supplementary Applied Study	
MUSC 465	Applied Piano	
MUSC 473	Supplementary Applied Study	
Piano Track		
MUSC 443	Keyboard Literature (Take two times.)	6
Additional Literature: Select one of the following:		2
MUSC 344	Wind Band Literature	
MUSC 346	Survey/Vocal Literature	

MUSC 441	Symphonic Literature	
MUSC 442	Opera Literature	
Pedagogy:		
MUSC 423	Piano Pedagogy I	2
MUSC 424	Piano Pedagogy II	2
Jazz Studies: Select 2 credits from the following:		2
MUSC 311	Jazz Ensemble	
MUSC 322	Jazz Combo	
MUSC 358	Jazz Methods	
MUSC 364	Jazz Improvisation	
Major Ensembles: Select 2 credits from the following:		2
MUSC 111	Marching Band	
MUSC 112	University Band	
MUSC 116	Cantemus	
MUSC 117	Statesmen of NDSU	
MUSC 303	Wind Symphony	
MUSC 304	University Symphony Orchestra	
MUSC 306	Concert Choir	
Minor Ensembles: Select 6 credits from the following:		6
MUSC 311	Jazz Ensemble	
MUSC 318	Mixed Chamber Ensemble	
MUSC 321	Piano Chamber Music	
MUSC 322	Jazz Combo	
Select 3 credits from the following:		3
MUSC 319	Opera Workshop	
MUSC 321	Piano Chamber Music	
MUSC 384	Composition I	
MUSC 484	Composition II	
MUSC 494	Individual Study	
Performance Attendance: Must enroll in 5 different semesters		
MUSC 180	Performance Attendance	0
Total Credits		89

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

Degree Notes

- Music majors may not declare a music minor.

Major Requirements

Major: Music - Vocal Performance

Degree Type: B.Mus
Required Degree Credits to Graduate: 142

University Degree Requirements

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

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

7. At least 36 credits must be NDSU resident credits. Residence credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

A grade of 'C' or better is required in all MUSC prefix courses.

Code	Title	Credits
Music Core Requirements		
MUSC 103	Introduction to Music History (May satisfy general education category A)	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 189	Skills for Academic Success [1]	1
MUSC 230	Theory and Analysis III	3
MUSC 231	Theory and Analysis IV	3
MUSC 232	Ear Training & Sight Singing III	1
MUSC 233	Ear Training & Sight Singing IV	1
MUSC 250	Basic Conducting	2
MUSC 340	Music History I	3
MUSC 341	Music History II	3
MUSC 380	Recital	1
MUSC 385	Music Entrepreneurship	3
MUSC 480	Recital	1
Advanced Theory - select 2 of the following 3 courses		6
MUSC 411	Form and Analysis	
MUSC 430	Counterpoint	
MUSC 431	Contemporary Harmonic Techniques	
Applied Music Select 22 credits from the following:		22

MUSC 167	Applied Voice	1
MUSC 173	Supplementary Applied Study (1-2 credits)	
MUSC 267	Applied Voice	1
MUSC 273	Supplementary Applied Study (1-2 credits)	
MUSC 367	Applied Voice	1
MUSC 373	Supplementary Applied Study (2-3 credits)	
MUSC 467	Applied Voice	1
MUSC 473	Supplementary Applied Study (3-4 credits)	
THEA 268	Acting the Song I (Students may take this course instead of 3 credits of Supplementary Applied Study)	3
Vocal Track		
MUSC 174	Pronunciation for Singers I	1
MUSC 175	Pronunciation for Singers II	1
MUSC 346	Survey/Vocal Literature	2
MUSC 349	Vocal Methods & Pedagogy I	2
MUSC 350	Vocal Methods & Pedagogy II	2
MUSC 442	Opera Literature	2
Language		
FREN 101	First-Year French I	4
FREN 102	First-Year French II	4
GERM 101	First-Year German I	4
GERM 102	First-Year German II	4
Applied Piano: Private (MUSC 165) or class (MUSC 160; MUSC 161; MUSC 260; MUSC 261)		4
MUSC 160	Piano Class I (Up to 2 semesters of MUSC 165 with permission)	
or MUSC 165	Applied Piano	
MUSC 161	Piano Class II	
MUSC 260	Piano Class III	
MUSC 261	Piano Class IV	
Major Ensemble: Select 8 credits from the following:		8
MUSC 306	Concert Choir (or as approved by adviser)	
Minor Ensemble: Select 4 credits from the following:		4
MUSC 215	University Chamber Singers	
MUSC 317	Madrigal Singers	
MUSC 319	Opera Workshop	
Or as approved by adviser		
Performance Attendance: Must enroll for 5 different semesters		
MUSC 180	Performance Attendance	0
Total Credits		103

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

Degree Notes

- Music majors may not declare a music minor.

Minor Requirements

Minor: Music

Minor Requirements

Required Credits: 20

Code	Title	Credits
Required Courses		
MUSC 103	Introduction to Music History	3

MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
Applied Study Electives		2
Major Ensemble Electives		2
Electives		5
Total Credits		20

Minor Requirements and Notes

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

Music Education

Department Information

- **Department Location:**
  Reineke Fine Arts Center
- **Department Phone:**
  701-231-7932
- **Department Email:**
  ndsu.performing.arts@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/performingarts/music/
- **Degrees Offered:**
  B.Mus.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/music-education/

Major Requirements

Major: Music Education - Instrumental Music Track

Degree Type: B.Mus
Required Degree Credits to Graduate: 143

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

- A GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A grade of 'C' or better is required in all MUSC prefix courses.

Code	Title	Credits
Music Core Requirements for Education Majors		
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
HDFS 230	Life Span Development (May satisfy general education category B)	3
or PSYC 250	Developmental Psychology	
MUSC 103	Introduction to Music History (May satisfy general education category A)	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 189	Skills for Academic Success [1]	1
MUSC 230	Theory and Analysis III	3
MUSC 231	Theory and Analysis IV	3
MUSC 232	Ear Training & Sight Singing III	1
MUSC 233	Ear Training & Sight Singing IV	1
MUSC 250	Basic Conducting	2
MUSC 331	Instrumental Arranging	2
MUSC 340	Music History I	3
MUSC 341	Music History II	3
MUSC 344	Wind Band Literature	2
MUSC 349	Vocal Methods & Pedagogy I	2
MUSC 351	Instrumental Conducting & Literature	2
MUSC 352	Choral Conducting & Literature	2
MUSC 353	Woodwind Methods I	2
MUSC 354	Woodwind Methods II	2
MUSC 355	Brass Methods	2
MUSC 357	Marching Band/Jazz Methods & Techniques	2
MUSC 359	Percussion Methods	2
MUSC 380	Recital	1
or MUSC 480	Recital	
MUSC 385	Music Entrepreneurship	3
MUSC 481	Instrumental Music Methods	2
MUSC 482	Choral Music Methods	2
MUSC 483	Elementary Music Methods	2
Professional Education Requirements		

EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Instrumental Track Requirements		
Major Instrumental Ensemble: Must enroll in MUSC 303 Wind Symphony for 5 semesters and MUSC 111 Marching Band for 2 semesters.		7
MUSC 303	Wind Symphony	
MUSC 304	University Symphony Orchestra (for string majors)	
MUSC 111	Marching Band	
Minor Ensembles: Must enroll in 2 different semesters as approved by adviser. May be selected from the following ensembles:		2
MUSC 112	University Band	
MUSC 311	Jazz Ensemble	
MUSC 314	Brass Chamber Ensemble	
MUSC 315	Woodwind Chamber Ensemble	
MUSC 316	String Chamber Ensemble	
MUSC 318	Mixed Chamber Ensemble	
MUSC 322	Jazz Combo	
Major Choral Ensemble (Must enroll for 2 different semesters as approved by adviser):		2
MUSC 116	Cantemus	
MUSC 117	Statesmen of NDSU	
MUSC 215	University Chamber Singers	
Applied Voice:		
MUSC 163	Voice Class for Instrumentalists	2
Performance Attendance: Must enroll in the following for 5 different semesters:		
MUSC 180	Performance Attendance	0
Applied Major Instrument: All students enrolled in applied instruction must participate in a major ensemble specific to their area. Two semesters each of 100 level, 200 level, and 300 level. One semester of 400 level. Select from the following:		7
MUSC 165	Applied Piano	
MUSC 168	Applied Wind Instruments	
MUSC 169	Applied Percussion Instruments	
MUSC 170	Applied Upper Strings	
MUSC 171	Applied Lower Strings	
MUSC 172	Applied Guitar	
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		116

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

Proficiency Waiver

- Piano proficiency exam must be completed before student teaching.
- Piano credit requirements listed may be waived in whole or in part for successful completion of the piano proficiency.

- Piano majors may fulfill this requirement by accompanying or performance on a secondary medium according to the discretion of the student's applied instructor/adviser.

Degree Requirements and Notes

- Music majors may not declare a music minor.
- See School of Education (https://www.ndsu.edu/education) for admission requirements.

Major Requirements

Major: Music Education - Vocal Music Track

Degree Type: B.Mus
Required Degree Credits to Graduate: 151

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

- GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A grade of 'C' or better is required in all MUSC prefix courses.

Code	Title	Credits
Music Core Requirements for Education Majors		
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3

HDFS 230	Life Span Development (May satisfy general education category B)	3
or PSYC 250	Developmental Psychology	
MUSC 103	Introduction to Music History (May satisfy general education category A)	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 174	Pronunciation for Singers I	1
MUSC 175	Pronunciation for Singers II	1
MUSC 189	Skills for Academic Success [1]	1
MUSC 230	Theory and Analysis III	3
MUSC 231	Theory and Analysis IV	3
MUSC 232	Ear Training & Sight Singing III	1
MUSC 233	Ear Training & Sight Singing IV	1
MUSC 250	Basic Conducting	2
MUSC 332	Survey of Choral Literature	2
MUSC 340	Music History I	3
MUSC 341	Music History II	3
MUSC 349	Vocal Methods & Pedagogy I	2
MUSC 350	Vocal Methods & Pedagogy II	2
MUSC 351	Instrumental Conducting & Literature	2
MUSC 352	Choral Conducting & Literature	2
MUSC 353	Woodwind Methods I	2
MUSC 355	Brass Methods	2
MUSC 359	Percussion Methods	2
MUSC 380	Recital	1
or MUSC 480	Recital	
MUSC 385	Music Entrepreneurship	3
MUSC 481	Instrumental Music Methods	2
MUSC 482	Choral Music Methods	2
MUSC 483	Elementary Music Methods	2
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Vocal Track Requirements		
Major Choral Ensemble: Must be taken in 7 different semesters. Select from the following in consultation with adviser:		7
MUSC 116	Cantemus	
MUSC 117	Statesmen of NDSU	
MUSC 306	Concert Choir	
Minor Choral/Vocal Ensemble: Must be taken in 2 different semesters. Select two credits from the following in consultation with adviser:		2
MUSC 215	University Chamber Singers	
MUSC 317	Madrigal Singers	
MUSC 319	Opera Workshop	
Major Instrumental Ensemble: Must be taken in 2 different semesters. Select two credits from the following in consultation with adviser:		2
MUSC 111	Marching Band	
MUSC 112	University Band	

MUSC 303	Wind Symphony	
MUSC 304	University Symphony Orchestra	
MUSC 311	Jazz Ensemble	
Performance Attendance: Must enroll for 5 different semesters		
MUSC 180	Performance Attendance	0
Applied Voice: Must enroll in the following as indicated:		7
MUSC 167	Applied Voice (for 2 semesters)	
MUSC 267	Applied Voice (for 2 semesters)	
MUSC 367	Applied Voice (for 2 semesters)	
MUSC 467	Applied Voice (for 1 semester)	
Students enrolled in applied instruction must participate in a major ensemble specific to applied area.		
Applied Piano: Private (MUSC 165) or class (MUSC 160; MUSC 161; MUSC 260; MUSC 261)		4
MUSC 160	Piano Class I (Up to 2 semesters of MUSC 165 with permission)	
or MUSC 165	Applied Piano	
MUSC 161	Piano Class II	
MUSC 260	Piano Class III	
MUSC 261	Piano Class IV	
Total Credits		112

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

Proficiency Waiver

- Piano proficiency exam must be completed before student teaching.
- Piano credit requirements listed may be waived in whole or in part for successful completion of the piano proficiency.
- Piano majors may fulfill this requirement by accompanying or performance on a secondary medium according to the discretion of the student's applied instructor/adviser.

Degree Notes

- Music majors may not declare a music minor.
- See School of Education (https://www.ndsu.edu/education) for admission requirements.

Minor Requirements

Minor: Music Education

Required Credits: 19

Code	Title	Credits
Required Courses		
MUSC 103	Introduction to Music History	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
Applied Study Electives		2
Major Ensemble Electives		2
Music Education Practicum: Select one of the following:		2
MUSC 481	Instrumental Music Methods	
MUSC 482	Choral Music Methods	
MUSC 483	Elementary Music Methods	
Music Education Methods: Select one from the following:		2
MUSC 349	Vocal Methods & Pedagogy I	
MUSC 353	Woodwind Methods I	

MUSC 355	Brass Methods
MUSC 359	Percussion Methods
Total Credits	19

Minor Requirements and Notes

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

Minor Requirements

Instrumental Music Education Minor

Required Credits: 19

Code	Title	Credits
MUSC 103	Introduction to Music History	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 351	Instrumental Conducting & Literature	2
Instrumental Enselmble: Select 2 credits from the following:		2
MUSC 111	Marching Band	
MUSC 112	University Band	
MUSC 303	Wind Symphony	
Music Education Methods		
MUSC 353	Woodwind Methods I	2
MUSC 355	Brass Methods	2
MUSC 359	Percussion Methods	2
Music Education Practicum		
MUSC 481	Instrumental Music Methods	2
Total Credits		23

Minor Requirements

Vocal Music Education Minor

Required Credits: 20

Code	Title	Credits
MUSC 103	Introduction to Music History	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 352	Choral Conducting & Literature	2
Choral Ensemble: Select 2 credits from the following:		2
MUSC 116	Cantemus	
MUSC 117	Statesmen of NDSU	
MUSC 215	University Chamber Singers	
MUSC 306	Concert Choir	
Music Education Methods		
MUSC 162	Voice Class	1
MUSC 163	Voice Class for Instrumentalists	2
Music Education Practicum		

MUSC 482	Choral Music Methods	2
Total Credits		20

Natural Resources Management

Department Information

- **Department Location:**
  Morrill Hall
- **Department Phone:**
  701-231-8180
- **Department Web Site:**
  www.ndsu.edu/nrm/
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/natural-resources-management/#planofstudytext

Major Requirements

Major: Natural Resources Management

Degree Type: B.S.
Minimum Degree Credits to Graduate: 128

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Required Core Courses for Natural Resources Management:		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
BIOL 364	General Ecology	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
ECON 201	Principles of Microeconomics (May satisfy general education category B and G)	3
ECON 481	Natural Resource Economics	3
GEOL 105	Physical Geology (May satisfy general education category S and G)	3
HIST 434	Environmental History	3
or HIST 435	World Environmental History	
NRM 150	Natural Resource Management Orientation	1
NRM 225	Natural Resources & Agrosystems (May satisfy general education category S)	3
NRM/SOIL 264	Natural Resource Management Systems	3
NRM 431	National Environmental Policy Act & Environmental Impact Assessment	3
NRM 462	Natural Resource and Rangeland Planning	3
POLS 115	American Government	3
or POLS 215	Problems and Policies In American Government	
RNG 452	Geographic Information Systems in Range Survey	3
or GEOG 455	Introduction to Geographic Information Systems	
SOIL 210	Introduction to Soil Science	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Select one of the following: (May satisfy general education category B)		3
EMGT 101	Emergencies, Disasters, and Catastrophes	
SOC 110	Introduction to Sociology	
Select one of the following:		3
EMGT 261	Disaster Preparedness	
EMGT 262	Disaster Mitigation	
EMGT 263	Disaster Response	
EMGT 264	Disaster Recovery	
POLS 422	State and Local Politics	
POLS 442	Global Policy Issues	
SOC 431	Environmental Sociology	
NRM Emphasis Area: Students must select one of the seven NRM emphasis areas to complete the major. See below.		38
Total Credits		96

Natural Resources Management Emphasis Areas

- Select and complete one emphasis area as part of the Natural Resources Management major.
- Declaring an Emphasis- Students should formally declare an emphasis area with the Office of Registration & Records (https://www.ndsu.edu/registrar) by the beginning of their junior year. The emphasis area is recorded on the academic transcript with the degree.

Biotic Resources Science

Code	Title	Credits
Required. Select two of the following:		6
CHEM 122	General Chemistry II	
CHEM 240	Survey of Organic Chemistry	
RNG 136	Introduction to Range Management	
RNG/NRM 453	Rangeland Resources Watershed Management	

Select a minimum of 32 credits from the approved electives list below for Biotic Resourses:		32
BIOL 414	Plant Systematics	
BIOL 476	Wildlife Ecology and Management	
RNG 456	Range Habitat Management	
SOIL 217	Introduction to Meteorology & Climatology	
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	
RNG/NRM 454	Wetland Resources Management	
MICR 202	Introductory Microbiology	
BIOL 461	Plant Ecology	
BIOL 450	Invertebrate Zoology	
BIOL 454	Herpetology	
BIOL 458	Mammalogy	
PLSC 355	Woody Landscape Plants	
PLSC 380	Principles of Plant Physiology	
RNG/BOT 450	Range Plants	
RNG 458	Grazing Ecology	
MICR 202L	Introductory Microbiology Lab	
NRM 402	River and Stream Resource Management	
NRM 421	Environmental Outreach Methods	
BIOL 462	Physiological Ecology	
BIOL 475	Conservation Biology	
BIOL 477	Wildlife and Fisheries Management Techniques	
ENT 350	General Entomology	
ZOO 452	Ichthyology	
BIOL 463	Animal Behavior	
BIOL 456	Ornithology	
PLSC 323	Principles of Weed Science	
RNG 326	Modeling of Range and Agro-Ecosystems	
Total Credits		38

Sustainability

Code	Title	Credits
Required:		
NRM 401	Urban-Ecosystem Management	3
NRM 420	Sustainable Scenarios in Natural Resources Management	3
Select one:		3
BIOL 475	Conservation Biology	
POLS 442	Global Policy Issues	
POLS 453	Environmental Policy and Politics	
SOC 404	Community Assessment	
SOC 431	Environmental Sociology	
Select one:		3
NRM 402	River and Stream Resource Management	
NRM 454	Wetland Resources Management	
SOIL 410	Soils and Land Use	
Select a minimum of 26 credits from the approved electives:		26
ANTH 462	Anthropology and the Environment	
ANTH 459	Global Cultural Heritage	

ANTH 464	Disaster and Culture
BIOL 271	Wildlife Ecology and Conservation: An undergraduate research course
BIOL 475	Conservation Biology
BIOL 476	Wildlife Ecology and Management
BIOL 480	Ecotoxicology
BIOL 481	Wetland Science
ECON 482	Environmental Economics
EMGT 101	Emergencies, Disasters, and Catastrophes
EMGT 261	Disaster Preparedness
EMGT 262	Disaster Mitigation
EMGT 263	Disaster Response
EMGT 264	Disaster Recovery
ENT 350	General Entomology
GEOL 300	Environmental Geology
HIST 435	World Environmental History
NRM 322	Environmental Law and Policy
NRM 402	River and Stream Resource Management (If not used above)
NRM 421	Environmental Outreach Methods
NRM 453	Rangeland Resource/Watershed Management
PLSC 110	World Food Crops
PLSC 219	Introduction to Prairie & Community Forestry
POLS 442	Global Policy Issues (If not used above)
POLS 453	Environmental Policy and Politics (If not used above)
RNG 451	Ecology of Fire-Dependent Ecosystems
RNG 456	Range Habitat Management
RNG 458	Grazing Ecology
RNG 460	Plant Ecology
SOC 404	Community Assessment (If not used above)
SOC 405	Community Development
SOC 235	Cultural Diversity
SOC 431	Environmental Sociology (If not used above)
SOC 443	International Disasters
SOIL 217	Introduction to Meteorology & Climatology
SOIL 351	Soil Ecology
SOIL 410	Soils and Land Use (If not used above)
Total Credits	38

Physical/earth Resources Science

Code	Title	Credits
Required:		
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
GEOL 300	Environmental Geology	3
or GEOG 412	Geomorphology	
SOIL 322	Soil Fertility and Fertilizers	3
or SOIL 351	Soil Ecology	
SOIL 410	Soils and Land Use	3
or SOIL 444	Soil Genesis and Survey	
Select a minimum of 25 credits from the approved electives list below for Physical/Earth Resources Science:		25
ABEN 464	Resource Conservation and Irrigation Engineering	
ASM 354	Electricity and Electronic Applications	
RNG 136	Introduction to Range Management	

GEOL 105L	Physical Geology Lab
SOIL 444	Soil Genesis and Survey
NRM 401	Urban-Ecosystem Management
RNG/NRM 454	Wetland Resources Management
NRM 420	Sustainable Scenarios in Natural Resources Management
PHYS 211	College Physics I
CE 204	Surveying
MICR 202	Introductory Microbiology
SOIL 465	Soil And Plant Analysis
GEOL/CHEM 428	Geochemistry
ASM 225	Computer Applications in Agricultural Systems Management
PHYS 211L	College Physics I Laboratory
CHEM 240	Survey of Organic Chemistry
GEOL 414	Hydrogeology
MICR 202L	Introductory Microbiology Lab
NRM 402	River and Stream Resource Management
NRM 421	Environmental Outreach Methods
ASM 454	Principles and Application of Precision Agriculture
SOIL 217	Introduction to Meteorology & Climatology
SOIL 433	Soil Physics
SOIL 447	Microclimatology
SOIL 480	Soils and Pollution
Total Credits	38

Environmental Communication

Code	Title	Credits
Required:		
COMM 112	Understanding Media and Social Change	3
COMM 200	Introduction to Media Writing	3
NRM 421	Environmental Outreach Methods	3
COMM 485	Risk and Crisis Communication	3
Select one of the following:		4
COMM/POLS/CJ 325	Applied Research Methods	
SOC 340 & SOC 341	Social Research Methods and Social Research Methods Laboratory	
Select a minimum of 22 credits from the approved electives list below for Environmental Communication:		22
COMM 245	Principles of Broadcast Production	
COMM 260	Introduction to Web Design	
COMM 301	Rhetorical Traditions	
NRM 420	Sustainable Scenarios in Natural Resources Management	
COMM 433	Legal Communication	
COMM 442	Digital Media and Society	
COMM 445	Advanced Broadcast Production	
COMM 472	Public Relations Campaigns	
COMM 402	Contemporary Rhetoric	
COMM 261	Introduction to Web Development	
COMM 310	Advanced Media Writing	
COMM 362	Principles of Design For Media	
COMM 383	Organizational Communication I	
NRM 421	Environmental Outreach Methods	
COMM 436	Issues in Mass Communications	
COMM 443	Mass Media and Public Opinion	

COMM 450	Issues in Communication
COMM 431	Communication Ethics and Law
Total Credits	38

Pollution Control

Code	Title	Credits
Required:		
CE 309	Fluid Mechanics	3
CE 370	Introduction to Environmental Engineering	3
CE 408	Water Resources and Supply	3
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
MATH 165	Calculus I	4
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
Select a minimum of 15 credits from the approved electives list below for Pollution Control:		15
Air/Solids:		
CE 472	Solid Waste Management	
SOIL 217	Introduction to Meteorology & Climatology	
SOIL 447	Microclimatology	
Biotic:		
ABEN 499	Special Topics	
PLSC 380	Principles of Plant Physiology	
RNG 460	Plant Ecology	
MICR 350	General Microbiology	
MICR 350L	General Microbiology Lab	
BIOL 476	Wildlife Ecology and Management	
BIOL 477	Wildlife and Fisheries Management Techniques	
Earth/Soils:		
CHEM 240	Survey of Organic Chemistry	
GEOL 300	Environmental Geology	
SOIL 322	Soil Fertility and Fertilizers	
SOIL 351	Soil Ecology	
SOIL 410	Soils and Land Use	
SOIL 433	Soil Physics	
SOIL 444	Soil Genesis and Survey	
SOIL 447	Microclimatology	
SOIL 465	Soil And Plant Analysis	
SOIL 480	Soils and Pollution	
Water:		
ABEN 464	Resource Conservation and Irrigation Engineering	
CE 410	Water and Wastewater Engineering	
CE 421	Open Channel Flow	
CE 477	Applied Hydrology	
CE 478	Water Quality Management	
GEOL 414	Hydrogeology	
RNG/NRM 453	Rangeland Resources Watershed Management	
GEOL/CHEM 428	Geochemistry	
Total Credits		38

Natural Resources Economics

Code	Title	Credits
Required:		
MATH 144	Mathematics for Business	4
ECON 341	Intermediate Microeconomics	3
STAT 331	Regression Analysis	2
Select a minimum of 29 credits from the approved electives list below for Natural Resources Economics:		29
AGEC 339	Quantitative Methods & Decision Making	
AGEC 375	Applied Agricultural Law	
ECON 202	Principles of Macroeconomics	
ECON 343	Intermediate Macroeconomics	
ECON 456	History of Economic Thought	
ECON 470	Public Economics	
ECON 480	Industrial Organization	
GEOG 262	Geography of North America	
NRM 401	Urban-Ecosystem Management	
NRM 420	Sustainable Scenarios in Natural Resources Management	
POLS 220	International Politics	
POLS 442	Global Policy Issues	
POLS 452	Comparative Political Economy	
SOC 403	Sociology of The Great Plains	
SOC 439	Social Change	
AGEC 347	Principles of Real Estate	
AGEC 484	Agricultural Policy	
COMM 315	Small Group Communication	
ECON 324	Money and Banking	
ECON 410	Econometrics	
ECON 461	Economic Development	
ECON 472	International Trade	
ECON 482	Environmental Economics	
HNES 427	Leisure And Society	
NRM 402	River and Stream Resource Management	
NRM 421	Environmental Outreach Methods	
POLS 360	Principles of Public Administration	
POLS 444	International Law	
POLS 453	Environmental Policy and Politics	
SOC 431	Environmental Sociology	
Total Credits		38

Social Sciences

Code	Title	Credits
Required:		
SOC 340 & SOC 341	Social Research Methods and Social Research Methods Laboratory	4
SOC 405	Community Development	3
SOC 404	Community Assessment	3
Select a minimum of 28 credits from the approved electives list below for Social Science:		28
ANTH 204	Archaeology and Prehistory	
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
ANTH 446	Latin America & Carribean: Afro-Latino/as, Gender, Indigeneity	
CJ 201	Introduction to Criminal Justice	
EMGT 261	Disaster Preparedness	

EMGT 263	Disaster Response
EMGT 414	Spatial Analysis in Emergency Management
EMGT 461	Business Continuity and Crisis Management
EMGT 481	Disaster Analysis
GEOG 262	Geography of North America
NRM 401	Urban-Ecosystem Management
NRM 421	Environmental Outreach Methods
POLS 225	Comparative Politics
POLS 422	State and Local Politics
SOC 403	Sociology of The Great Plains
SOC 422	Development Of Social Theory
or ANTH 480	Development of Anthropological Theory
SOC 418	Social Psychology
SOC 431	Environmental Sociology
SOC 443	International Disasters
ANTH 205	Human Origins
ANTH 433	Apes and Human Evolution
ANTH 462	Anthropology and the Environment
ANTH 481	Qualitative Methods in Cultural Anthropology
EMGT 101	Emergencies, Disasters, and Catastrophes
EMGT 262	Disaster Mitigation
EMGT 264	Disaster Recovery
EMGT 463	Voluntary Agency Disaster Services
ENGL 474	Native American Literature
NRM 420	Sustainable Scenarios in Natural Resources Management
POLS 215	Problems and Policies In American Government
POLS 360	Principles of Public Administration
POLS 453	Environmental Policy and Politics
SOC 439	Social Change
SOC 465	Applied Demographics
Total Credits	38

Degree Notes:

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

Minor Requirements

Natural Resources Management Minor

Minor Requirements

Required Credits: 19

Code	Title	Credits
Core Courses		
NRM 150	Natural Resource Management Orientation	1
NRM 225	Natural Resources & Agrosystems	3
NRM 431	National Environmental Policy Act & Environmental Impact Assessment	3
Interdisciplinary Courses		
Select four of the following:		12
ASM/NRM/SOIL 264	Natural Resource Management Systems	
BIOL 364	General Ecology	
BIOL 461	Plant Ecology	

BIOL 476	Wildlife Ecology and Management
ECON 481	Natural Resource Economics
EMGT 261	Disaster Preparedness
EMGT 262	Disaster Mitigation
ENT 350	General Entomology
GEOL 105	Physical Geology
GEOL 300	Environmental Geology
HIST 434	Environmental History
NRM 421	Environmental Outreach Methods
NRM/RNG 453	Rangeland Resource/Watershed Management
SOIL 210	Introduction to Soil Science
SOIL 217	Introduction to Meteorology & Climatology
SOC 431	Environmental Sociology
POLS 453	Environmental Policy and Politics
RNG 452	Geographic Information Systems in Range Survey (RNG 452 changing to NRM 452 GIS in NRM)
SOIL 410	Soils and Land Use
SOC 405	Community Development

Minor Requirements and Notes:

- Students must earn a 2.00 minimum GPA in the courses used to satisfy the minor requirements.
- A minimum of 8 credits must be taken at NDSU.

Neuroscience

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-8622
- **Department Web Site:**
  www.ndsu.edu/psychology/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/neuroscience/

Minor Requirements

Neuroscience Minor

Minor Requirements

Required Credits: 17

Code	Title	Credits
Required Courses		
PSYC 260	Introduction to Neuroscience	3
Electives: Select 14 credits from the following:		14
BIOL 220	Human Anatomy and Physiology I	
BIOL 220L	Human Anatomy and Physiology I Laboratory	
PSYC 322	Judgment & Decision-Making	
PSYC 450	Computational Methods in Experimental Psychology	
PSYC 460	Sensation & Perception	
PSYC 461	Memory And Knowledge	
PSYC 464	Attention & Thinking	
PSYC 465	Psychobiology	

PSYC 481	Health Psychology
PSYC 486	Neuropsychology
PSYC 493	Undergraduate Research
Total Credits	17

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Psychology Majors: Classes taken for the psychology major cannot be double-counted with the neuroscience minor. The credits must be unique from courses used to fulfill the psychology major.

Nursing

Department Information

- **Department Location:**
  SGC D102
- **Department Phone:**
  701-231-7395
- **Department Web Site:**
  www.ndsu.edu/nursing/
- **Degrees Offered:**
  B.S.N.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/nursing/

Major Requirements

Major: Nursing - Pre-Licensure Track

Degree Type: B.S.N.
Required Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Quantitative Reasoning (R) †		3
Science and Technology (S) †		10
Humanities and Fine Arts (A) †		6
Social and Behavioral Sciences (B) †		6
Wellness (W) †		2

Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

All students must complete all major requirements with a grade of 'C' or better including ENGL 120 and COMM 110.

Code	Title	Credits
Nursing Major Requirements		
BIOC 260	Elements of Biochemistry	4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory (May satisfy a general education category S) *	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory *	4
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab (May satisfy a general education category S) *	4
CHP 190	Critical Thinking and Academic Success [1]	2
CHP 400	Interprofessional Health Care Practice	3
ENGL 325	Writing in the Health Professions (May satisfy a general education category C)	3
HNES 250	Nutrition Science (May satisfy a general education category W)	3
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab (May satisfy a general education category S) *	3
NURS 210	Orientation to Research and Evidence-Based Practice	2
NURS 250	Health Promotion	2
NURS 251	Skills and Concepts for Nursing	2
NURS 252	Gerontologic Nursing	2
NURS 300	Pharmacology for Nursing	3
NURS 341	Foundations of Clinical Nursing	3
NURS 342	Adult Health Nursing I	5
NURS 352	Family Nursing I	4
NURS 360	Health Assessment	4
NURS 362	Family Nursing II	4
NURS 382	Clinical Applications	1
NURS 402	Mental Health Nursing	4
NURS 403	Adult Health Nursing II	5
NURS 404	Adult Health III	4
NURS 406	Community & Public Health Nursing	4
NURS 410	Research and Redesign	2
NURS 450	Nursing Synthesis/Practicum	4
NURS 460	Management, Leadership and Career Development	3
PSYC 111	Introduction to Psychology (May satisfy a general education category B) *	3
PSYC 250	Developmental Psychology	3
or HDFS 230	Life Span Development	
SOC 110	Introduction to Sociology (May satisfy a general education category B) *	3
or ANTH 111	Introduction to Anthropology	
Total Credits		97

* Will be used in the selective GPA calculation for admission to the Professional Nursing program. Grades for three of the five sciences (lecture/lab) will be used for selective GPA.

1 CHP 190 is required for students with fewer than 24 earned transfer credits.

Degree Requirements and Notes

- Students must maintain a semester GPA of 2.0 or above for each semester in the College of Health Professions (CoHP). A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the CoHP.
- Would also accept the following course sequence in place of CHEM 117 Chemical Concepts and Applications/CHEM 117L Chem Concepts and Applications Lab: CHEM 121 General Chemistry I/CHEM 121L General Chemistry I Laboratory, CHEM 122 General Chemistry II/CHEM 122L General Chemistry II Laboratory or CHEM 121 General Chemistry I/CHEM 121L General Chemistry I Laboratory and CHEM 140 Organic Chemical Concepts and Applications.

Major Requirements

Major: Nursing - LPN to BSN Track

Degree Type: B.S.N.
Required Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

All students must complete all major requirements with a grade of 'C' or better including ENGL 120 and COMM 110.

Code	Title	Credits
Nursing Major Requirements		
BIOC 260	Elements of Biochemistry	4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory (May satisfy a general education category S) *	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory *	4
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab (May satisfy a general education category S) *	4
HNES 250	Nutrition Science (May satisfy a general education category W)	3
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab (May satisfy a general education category S) *	3
NURS 251	Skills and Concepts for Nursing	2
NURS 252	Gerontologic Nursing	2
NURS 300	Pharmacology for Nursing	3
NURS 289	Transition from Associate LPN to BSN	2
NURS 341	Foundations of Clinical Nursing	3
NURS 342	Adult Health Nursing I	5
NURS 352	Family Nursing I (validation)	5
NURS 360	Health Assessment	4
NURS 362	Family Nursing II (validation)	4
NURS 372	Expanded Family Nursing I	2
NURS 402	Mental Health Nursing (validation)	4
NURS 403	Adult Health Nursing II (validation)	5
NURS 405	Psychsocial Nursing	2
NURS 406	Community & Public Health Nursing	4
NURS 407	Adult Health: Complex Problems	3
NURS 407L	Expanded Clinical Practice for the LPN-BSN	2
NURS 450	Nursing Synthesis/Practicum	4
NURS 420	Evidence-Based Practice and Research in Nursing	3
NURS 460	Management, Leadership and Career Development	3
CHP 400	Interprofessional Health Care Practice	3
PSYC 111	Introduction to Psychology (May satisfy a general education category B) *	3
PSYC 250	Developmental Psychology *	3
or HDFS 230	Life Span Development	
SOC 110	Introduction to Sociology (May satisfy a general education category B) *	3
or ANTH 111	Introduction to Anthropology	
Select one of the following: (May satisfy general education category C)		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 322	Writing and the Creative Process	
ENGL 323	Creative Writing	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Total Credits		99

* Will be used in the selective GPA calculation for admission to the Professional Nursing program.

Degree Requirements and Notes

- Students must maintain a semester GPA of 2.0 or above for each semester in the College of Health Professions (CoHP). A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the CoHP.

- Would also accept the following course sequence in place of CHEM 117 Chemical Concepts and Applications/CHEM 117L Chem Concepts and Applications Lab: CHEM 121 General Chemistry I/CHEM 121L General Chemistry I Laboratory, CHEM 122 General Chemistry II/CHEM 122L General Chemistry II Laboratory or CHEM 121 General Chemistry I/CHEM 121L General Chemistry I Laboratory and CHEM 140 Organic Chemical Concepts and Applications.

Major Requirements

Major: Nursing - RN to BSN Track

Degree Type: B.S.N.
Required Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Demonstrated Competency Credit		15
Nursing Major Requirements		
NURS 326	Immersion I	1
NURS 336	Transcultural Nursing Care	3
NURS 346	NDSU RN to BSN Immersion II	1
NURS 356	The Essence of Nursing	3
NURS 366	Quality and Safety in Nursing	3

NURS 386	Chronicity Throughout the Lifespan I	3
NURS 388	Chronicity Throughout the Lifespan II	3
NURS 420	Evidence-Based Practice and Research in Nursing	3
NURS 426	NDSU RN to BSN Immersion III	1
NURS 446	Population Focused Nursing Care	3
NURS 446L	Population Focused Nursing Care - Clinical	2
NURS 456	RN to BSN Immersion IV	1
NURS 462	Nurses as Leaders	3
NURS 462L	Nursing Leadership Practicum	1
NURS 478	BSN Capstone	2
Select one of the following: (May satisfy general education category C)		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 322	Writing and the Creative Process	
ENGL 323	Creative Writing	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Total Credits		51

Degree Notes:

- Courses will be offered in 8 week blocks
- 60 credits toward degree must be earned from a four-year degree granting institution
- 36 credits must be earned in residence at NDSU
- 15 demonstrated competency credits will be awarded upon completion of the first semester

Pharmacy

Department Information

- **Department Location:**
  Sudro Hall
- **Department Phone:**
  701-231-7456
- **Department Web Site:**
  www.ndsu.edu/pharmacy/
- **Degrees Offered:**
  B.S.; Pharm.D.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/pharmacy/

Major Requirements

Major: Pharmaceutical Sciences (Includes Pre-Pharmacy) Requirements

Degree Type: B.S.
Required Degree Credits to Graduate: 127-136

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		

Quantitative Reasoning (R) †	3
Science and Technology (S) †	10
Humanities and Fine Arts (A) †	6
Social and Behavioral Sciences (B) †	6
Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Pharmaceutical Sciences Requirements (includes Pre-Pharmacy)

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.
- Selected Core Courses - see information below for grading and GPA information.

Code	Title	Credits
BIOL 150 & 150L	General Biology I and General Biology I Laboratory *	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory *	4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory (May satisfy general education category S) *	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory (May satisfy general education category S)	4
CHEM 121	General Chemistry I (May satisfy general education category S) *	3
CHEM 121L	General Chemistry I Laboratory (May satisfy general education category S)	1
CHEM 122	General Chemistry II (May satisfy general education category S) *	3
CHEM 122L	General Chemistry II Laboratory (May satisfy general education category S)	1
CHP 190	Critical Thinking and Academic Success	2
COMM 110	Fundamentals of Public Speaking *	3
COMM 216	Intercultural Communication (May satisfy general education category B and D) *	3
ECON 201	Principles of Microeconomics (May satisfy general education category B and G) *	3
ENGL 120	College Composition II *1	3
MATH 146	Applied Calculus I (May satisfy general education category R) *	4
MICR 460	Pathogenic Microbiology	3
PHYS 211	College Physics I	3
PSCI 499	Biochemistry and Molecular Biology for Pharmacists (Admission to PharmD program required)	5
STAT 330	Introductory Statistics (May satisfy general education category R) *	3
Biochemistry - select from below 2		5 or 6
BIOC 460 & BIOC 461	Foundations of Biochemistry and Molecular Biology I and Foundations of Biochemistry and Molecular Biology II	
PSCI 499	Biochemistry and Molecular Biology for Pharmacists	
Organic Chemistry - select from below 2		5 or 7
CHEM 341 & 341L & CHEM 342	Organic Chemistry I and Organic Chemistry I Laboratory and Organic Chemistry II *	
PSCI 391	Seminar in Pharmeceutical Organic Chemistry	
Select one of the following: *		3 or 5

MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab *	
MICR 350 & 350L	General Microbiology and General Microbiology Lab *	
Upper Division Writing - select from below [2]		3
ENGL 324	Writing in the Sciences (May satisfy general education category C)	
or ENGL 325	Writing in the Health Professions	
PHRM 324		
Professional Pharmacy P1 & P2 Years		72-76

[1] Students with composite ACT scores of 20 or lower must register for English 110 fall semester and take Engl 120 spring semester. Students who complete English 120 with a "C" or higher will receive credit for English 110 with a passing grade (P).

[2] 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 December 31 deadline to apply to the pharmacy program. Remaining courses, which are required and listed in the pre-pharmacy curriculum, MUST be completed by the end of spring term. The only exception to this is that up to six credits of electives may be completed during the summer term.

Pre-Professional Pharmacy Requirements and Notes

- **All courses listed for pre-pharmacy must be complete in order to apply for the professional program in the last spring semester in which pre-requisite courses are taken.**

Degree Requirements and Notes

- All required courses must be completed with a grade of 'C' or above.
- All students must maintain a semester GPA of 2.0 or above for each semester in the College. A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the College of Health Professions.

Major Requirements

Major: Doctor of Pharmacy

Degree Type: Pharm.D.
Required Degree Credits to Graduate: 146

Professional Pharm.D. Requirements

The following professional Pharm.D. requirements that follow are subject to change per department. Students follow the curricula developed by the department and any changes that occur while in the professional program will be communicated to the student by the department.

In addition to curriculum listed below, 6 credits of Professional Elective MUST be completed PRIOR to P4 year.

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 340	Pathophysiology I	4
PHRM 341	Pathophysiology II	3
PHRM 350	Introduction to Pharmacy Practice	2
PHRM 351L	Pharmacy Practice Laboratory I	2
PHRM 352	Introduction to Health Care Systems	2

PHRM 355	Introductory Pharmacy Practice Experience I: Introduction to Institutional Pharmacy Practice	3
PHRM 480	Drug Literature Evaluation	3
P2 Second Year Professional		
CHP 400	Interprofessional Health Care Practice	3
PSCI 413	Endocrine/Respiratory/GI Pharmacodynamics	3
PSCI 414	Cardiovascular Pharmacodynamics	3
PSCI 415	Neuropsychiatry Pharmacodynamics	3
PSCI 417	Pharmacogenomics	2
PHRM 400	Top Drugs I	1
PHRM 450	Self Care	3
PHRM 452L	Pharmacy Practice Laboratory II	2
PHRM 455	Introductory Pharmacy Practice Experience II: Introduction to Community Pharmacy Practice	4
PHRM 532	Infectious Disease	3
PHRM 534	Rheumatology/Endocrinology/Gastrointestinal	3
PHRM 535	Hematology and Oncology	3
PHRM 538	PTDI: Cardiovascular and Pulmonary Diseases	4
PHRM 565	Pharmacy-Based Immunization Delivery	1
P3 Third Year Professional		
PHRM 475	Pharmacy Practice Management	3
PHRM 500	Top Drugs II	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	
PHRM 551L	Pharmacy Practice Laboratory III	2
PHRM 552L	Pharmacy Practice Laboratory IV	2
PHRM 560	Specialty Care Topics	2
PHRM 570	Pharmacy Practice Improvement and Project Management	2
PHRM 572	Pharmacy Law and Ethics	3
PHRM 580	Pharmacotherapy Capstone	3
P4 Fourth Year Professional		
Student will choose 8 out of 9 rotations for a total of 40 credits. Each rotation is 5 credits.		40
PHRM 581	Advanced Pharmacy Practice Experience - Rotation I	
PHRM 582	Advanced Pharmacy Practice Experience - Rotation II	
PHRM 583	Advanced Pharmacy Practice Experience - Rotation III	
PHRM 584	Advanced Pharmacy Practice Experience - Rotation 4	
PHRM 585	Advanced Pharmacy Practice Experience - Rotation 5	
PHRM 586	Advanced Pharmacy Practice Experience - Rotation 6	
PHRM 587	Advanced Pharmacy Practice Experience - Rotation 7	
PHRM 588	Advanced Pharmacy Practice Experience - Rotation 8	
PHRM 589	Advanced Pharmacy Practice Experience - Rotation 9	
Total Credits		146

- To apply to the professional entry-level pharmacy program at NDSU, an application must be submitted on-line to the Dean's Office, Sudro 123, by December 31. A cumulative grade point average of 3.0 or above is required before an applicant will be evaluated. Online application should be available the first week of November.
- The deadline to apply to the pharmacy program is December 31, 2018.
- PCAT: We do require the PCAT (http://www.pearsonassessments.com/haiweb/Cultures/en-US/site/Community/PostSecondary/Products/pcat/pcathome.htm) (Pharmacy College Admission Test). The College requires that students take either the PCAT in July, September, October or November 2018 for students applying for 2019. We will accept PCAT scores from exams taken back three years (July 2015 to November 2018). If you are interested in taking a practice test, Test Prep Review is a free service of a nonprofit group of educators. Their website was created to

provide free practice test questions for students in a variety of career situations. Their PCAT practice test, is located at PCAT Practice (http://www.testprepreview.com/pcat_practice.htm)

- Students not previously enrolled at NDSU must apply both to NDSU and to the School of Pharmacy within College of Health Professions. For an NDSU application, contact the Office of Admissions at 701-231-8643. For International students, contact the Office of International Programs at 701-231-7895.

Philosophy-Humanities

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-8654
- **Department Web Site:**
  ndsuhprs.org/ (http://ndsuhprs.org)
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/philosophy-humanities/#planofstudytext

Major Requirements

Major: Philosophy/Humanities

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major Requirements

Code	Title	Credits
Philosophy/Humanities Major Requirements		
PHIL 101	Introduction to Philosophy (May satisfy general education category A)	3
PHIL 210	Ethics	3
or PHIL 215	Contemporary Moral Issues	
PHIL 257	Traditional Logic (May satisfy general education category R)	3
PHIL 321	Ancient Philosophy	3
or PHIL 322	Medieval Philosophy	
PHIL 323	Modern Philosophy	3
or PHIL 324	Contemporary Philosophy	
PHIL 451	Epistemology	3
Capstone Experience: Select one of the following:		3
PHIL 450	Metaphysics (May satisfy general education category C)	
PHIL 486	Philosophy & Literature	
PHIL 494	Individual Study	
Philosophy Major Electives		11
Total Credits		32

Minor Requirements

Philosophy-Humanities Minor

Minor Requirements

Required Credits: 21

Code	Title	Credits
Required Minor Courses		
PHIL 101	Introduction to Philosophy	3
PHIL 210	Ethics	3
or PHIL 215	Contemporary Moral Issues	
PHIL 257	Traditional Logic	3
PHIL 450	Metaphysics	3
or PHIL 451	Epistemology	
PHIL 486	Philosophy & Literature	3
or PHIL 494	Individual Study	
Philosophy Electives		6
Total Credits		21

* May take as an elective if not taken as a required course.

Minor Requirements and Notes

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

Physical Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/physical-education/#planofstudypemajortext

Major Requirements

Major: Physical Education

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Physical Education Requirements		
ENGL 358	Writing in the Humanities and Social Sciences (May satisfy general education category C)	3
HNES 217	Personal and Community Health (May satisfy general education category w) *	3
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
SOC 110	Introduction to Sociology (May satisfy general education category B)	3
Teaching Speciality Requirements		
HDFS 230	Life Span Development	3
or PSYC 250	Developmental Psychology	
HNES 110	Introduction to Health and Physical Education *	3
HNES 254	Curriculum, Standards and Assessment in Physical Education *	3
HNES 255	Professional Preparation in Middle School Physical Education *	3
HNES 256	Professional Preparation in High School Physical Education *	3
HNES 257	Professional Preparation in Elementary School Activities	3
HNES 301	Motor Learning and Performance *	3
HNES 336	Methods Of Coaching *	3
HNES 350	Fitness Education Activities and Materials *	3
HNES 353	Adapted Physical Education *	3
HNES 367	Principles of Conditioning *	3
HNES 461	Administrative and Social Aspects of Physical Education and Athletics *	3
College Requirement		
HD&E 320	Professional Issues	1
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: (PE)	3
EDUC 485	Student Teaching Seminar	1

EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		80

* Students must earn a grade of 'B' or better.

Degree Requirements and Notes

- A GPA of 2.75 or better in the teaching specialty is required to stay in full standing in the program, for placement in student teaching, and to exit from the program.
- A GPA of 2.75 or better in the professional education requirements, as well as passing the Exit Portfolio, are required to exit the program.
- Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.
- See School of Education (https://www.ndsu.edu/education) for admission requirements.

Bachelor of Arts (BA) Degree – An additional 6 credits of Humanities and Social Sciences and proficiency at the second year in a modern foreign language are required. See School of Education for admission requirements.

Physics

Department Information

- **Department Location:**
  South Engineering
- **Department Phone:**
  701-231-8974
- **Department Web Site:**
  www/ndsu.edu/physics/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/physics/#planofstudytext

Major Requirements

Major: Physics - Standard

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements - Standard

A grade of 'C' or better is required for all PHYS and AST prefix courses.

Code	Title	Credits
Physics Major Requirements (Standard)		
PHYS 171	Introductory Projects in Physics	1
PHYS 251 & 251L	University Physics I and University Physics I Laboratory (May satisfy general education category S)	5
PHYS 251R	University Physics I Recitation	1
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
PHYS 252R	University Physics II Recitation	1
PHYS 350	Modern Physics	3
PHYS 355	Classical Mechanics	3
PHYS 360	Modern Physics II	3
PHYS 361	Electromagnetic Theory (or PHY 370: Electromagnetic Theory from MSUM)	3
PHYS 370	Introduction to Computational Physics	3
PHYS 411 & 411L	Optics for Scientists & Engineers and Optics for Scientists and Engineers Lab	4
PHYS 462	Thermal and Statistical Physics	3
PHYS 485	Quantum Mechanics I	3
PHYS 486	Quantum Mechanics II	3
PHYS 488	Senior Project I	1
PHYS 489	Senior Project II	2
Physics Electives: Select two from the following:		6
PHYS 215	Research For Undergraduates	
PHYS 413	Lasers for Scientists and Engineers	

PHYS 415	Elements of Photonics	
PHYS 463	Statistical Mechanics	
PHYS 481	Condensed Matter Physics	
MSUM AST	Astronomy courses (300/400 level) with departmental approval	
Related Required Courses		
CSCI 160	Computer Science I	4
or ECE 173	Introduction to Computing	
CSCI 161	Computer Science II	4
MATH 129	Basic Linear Algebra	3
or MATH 329	Intermediate Linear Algebra	
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH Electives - Select 6 credits from the following:		6
MATH 270	Introduction to Abstract Mathematics	
MATH 400 Level (MATH 488 & MATH 489 are recommended)		
Select one of the following chemistry sequences (150/160 is recommended):		4
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
Select one of the following chemistry sequences (151/161 recommended):		4
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Total Credits		90

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Major Requirements

Major: Physics with Optical Science and Engineering Option

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

MAJOR REQUIREMENTS - Optical Science and Engineering OPTION

A grade of 'C' or better is required for all PHYS prefix courses.

Code	Title	Credits
Physics Major Requirements (Optical Science & Engineering Option)		
PHYS 171	Introductory Projects in Physics	1
PHYS 251 & 251L	University Physics I and University Physics I Laboratory (May satisfy general education category S)	5
PHYS 251R	University Physics I Recitation	1
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
PHYS 252R	University Physics II Recitation	1
PHYS 350	Modern Physics	3
PHYS 355	Classical Mechanics (or PHY 330: Intermediate Mechanics from MSUM)	3
PHYS 360	Modern Physics II	3
PHYS 361	Electromagnetic Theory (or PHY 370:Electromagnetic Theory from MSUM)	3
PHYS 370	Introduction to Computational Physics	3
PHYS 411 & 411L	Optics for Scientists & Engineers and Optics for Scientists and Engineers Lab	4
PHYS 413	Lasers for Scientists and Engineers	3
PHYS 415	Elements of Photonics	3
PHYS 462	Thermal and Statistical Physics	3
PHYS 485	Quantum Mechanics I	3
PHYS 486	Quantum Mechanics II	3
PHYS 488	Senior Project I	1
PHYS 489	Senior Project II	2

CSCI 160	Computer Science I	4
or ECE 173	Introduction to Computing	
EE 206	Circuit Analysis I	4
Related Required Courses		
MATH 129	Basic Linear Algebra	3
or MATH 329	Intermediate Linear Algebra	
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH Electives: Select 6 credits from the following:		6
MATH 270	Introduction to Abstract Mathematics	
MATH 400 Level (MATH 452, MATH 481, and/or MATH 488 are recommended)		
Select one of the following (150/160 is recommended):		4
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
Select one of the following (151/161 is recommended):		4
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Total Credits		90

PROGRAM NOTES

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Recommended Electives for the Optical and Engineering Option

Code	Title	Credits
ECE 311	Circuit Analysis II	4
ECE 321	Electronics for Electrical Engineers	2
ECE 417	Optical Signal Transmission	3
ECE 483	Instrumentation for Engineers	3

Minor Requirements

Physics Minor

Minor Requirements

Required Credits: 19

Code	Title	Credits
Required Courses		
PHYS 251	University Physics I	4
PHYS 252	University Physics II	4
PHYS 252L	University Physics II Laboratory	1
PHYS 350	Modern Physics	3
Electives: Select 7 credits from the following:		7
PHYS 171	Introductory Projects in Physics	
PHYS 251L	University Physics I Laboratory	
PHYS 251R	University Physics I Recitation	
PHYS 252R	University Physics II Recitation	
PHYS 215	Research For Undergraduates	
Any 300-400 level Physics course		

ME 221 and ME 222 may be substituted for PHYS 251 and PHYS 251L	
Total Credits	19

Minor Requirements and Notes

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

Physics Education

Department Information

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

Major Requirements

Major: Physics Education

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 148

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Physics Education Requirements		
BIOL 124 & 124L	Environmental Science and Environmental Science Laboratory (May satisfy general education category S)	4
ENGL 324	Writing in the Sciences (May satisfy general education category C)	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Teaching Specialty Requirements		
Select One Course Pair:		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 Course Pair:		4
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
CHEM Elective	300/400-Level Elective Course & Lab	4
CSCI 114	Microcomputer Packages	3-4
or CSCI 116	Business Use of Computers	
or CSCI 160	Computer Science I	
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
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
PHYS 110	Introductory Astronomy	3
PHYS 171	Introductory Projects in Physics	1
PHYS 215	Research For Undergraduates	1
PHYS 251 & 251L	University Physics I and University Physics I Laboratory	5
PHYS 251R	University Physics I Recitation	1
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5
PHYS 252R	University Physics II Recitation	1
PHYS Elective	300/400-Level Elective Course	3
PHYS 350	Modern Physics	3
PHYS 355	Classical Mechanics	3-4
or PHYS 330: Intermediate Mechar		
PHYS 360	Modern Physics II	3
PHYS 361	Electromagnetic Theory	3-4
or PHYS 370: Electromagnetic The		

PHYS 411 & 411L	Optics for Scientists & Engineers and Optics for Scientists and Engineers Lab	4
PHYS 462	Thermal and Statistical Physics	3
PHYS 485	Quantum Mechanics I	3
PHYS 491	Seminar	1
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Science)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		125-128

* MATH 429 Topics in Linear Algebra may substitute for MATH 129 Basic Linear Algebra.

Degree Requirements and Notes

- A GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A GPA of 2.75 or better in the professional education requirements as well as passing the appropriate Praxis II exam are required to exit the program. A grade of 'C' or better is required in all Professional Education Requirement courses.
- Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.
- See School of Education (https://www.ndsu.edu/education) for admission requirements.

Bachelor of Arts (BA) Degree – An additional 6 credits of Humanities and Social Sciences and proficiency at the second year in a modern foreign language are required.

Political Science

Department Information

- **Department Location:**
  Putnam Hall
- **Department Phone:**
  701-231-8567
- **Department Web Site:**
  www.ndsu.edu/cjps/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/political-science/#planofstudystandardtext

Major Requirements

Major: Political Science - Standard

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major Requirements

Code	Title	Credits
Core Requirements		
POLS 110	Introduction to Political Science (May satisfy general education category B)	3
or POLS 115	American Government	
POLS 220	International Politics	3
or POLS 225	Comparative Politics	
POLS 240	Political Ideologies	3
POLS 325	Applied Research Methods	4
or CJ 325	Applied Research Methods	
POLS 489	Senior Seminar	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Select a minimum of one course from each of the four areas listed below:		12
Area 1:		
POLS 420	Political Behavior-Executive-Legislative Process	
POLS 421	Political Behavior-Political Parties	
POLS 422	State and Local Politics	
POLS 423	Public Policy Analysis	
Area 2:		
POLS 430	Constitutional Law-Civil Liberties	
POLS 431	Constitutional Law-Criminal Justice	
Area 3:		
POLS 442	Global Policy Issues	
POLS 444	International Law	
POLS 445	Ethnic Conflicts	
POLS 453	Environmental Policy and Politics	
POLS 446	Current Topics in International Law	
Area 4:		
POLS 442	Global Policy Issues	
POLS 450	Politics of the Developing Countries	
POLS 451	Politics of the Industrialized Countries	
POLS 452	Comparative Political Economy	
POLS 453	Environmental Policy and Politics	
Political Science Electives: At least 9 credits must be from permanently numbered courses.		9
Courses which are eligible to fulfill this requirement may come from any of the following courses, or from Special Topic classes offered by the Political Science department (requires a substitution form to be submitted to the Office of Registration and Records signed by dept. chairperson), or from classes not selected to meet area requirements.		
POLS 120	Terrorism	
POLS 210	Current Politics	
POLS 215	Problems and Policies In American Government	
POLS 216	Campaigns and Elections	
POLS 230	Judicial Process	
POLS 350	Gender Issues and the Law	
POLS 351	Women and Politics	
POLS 360	Principles of Public Administration	
Total Credits		40

Degree Requirements and Notes

- Minimum cumulative GPA of 3.00 required in courses with the POLS prefix.

Major Requirements

Major: Political Science - Pre-Law Option

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major Requirements

Code	Title	Credits
Core Requirements		
POLS 110	Introduction to Political Science (May satisfy general education category B)	3
or POLS 115	American Government	
POLS 220	International Politics	3
or POLS 225	Comparative Politics	
POLS 240	Political Ideologies	3
POLS 325	Applied Research Methods	4
or CJ 325	Applied Research Methods	
POLS 489	Senior Seminar	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Pre-Law Emphasis Requirements:		
A single International Law course satisfies either a core requirement or an Area 2 requirement, but not both.		
POLS	100 or 200 level	3
POLS 230	Judicial Process	3
POLS 430	Constitutional Law-Civil Liberties	3
POLS 431	Constitutional Law-Criminal Justice	3
POLS 444	International Law	3
or POLS 446	Current Topics in International Law	
Additional Program Requirements: Complete requirements as indicated from each of the three professional areas listed below for the Pre-Law Option (I, II, & III)		
Professional Area I: One course from each of the following three areas.		9
Area One:		
POLS 420	Political Behavior-Executive-Legislative Process	
POLS 421	Political Behavior-Political Parties	
POLS 422	State and Local Politics	
POLS 423	Public Policy Analysis	
Area Two:		
POLS 442	Global Policy Issues	
POLS 445	Ethnic Conflicts	
POLS 453	Environmental Policy and Politics	
POLS 444	International Law	
or POLS 446	Current Topics in International Law	
Area Three:		
POLS 442	Global Policy Issues	
POLS 450	Politics of the Developing Countries	
POLS 451	Politics of the Industrialized Countries	
POLS 452	Comparative Political Economy	
POLS 453	Environmental Policy and Politics	

Professional Area II: Communciation Component - Select 2 courses from the following:		6
COMM 214	Persuasive Speaking	
or COMM 308	Business and Professional Speaking	
COMM 216	Intercultural Communication	
COMM 318	Argumentation and Advocacy	
or COMM 383	Organizational Communication I	
ENGL 358	Writing in the Humanities and Social Sciences	
Professional Area III: Law Related Courses - Select 2 courses from the following:		5-6
ACCT 410	Fraud Examination	
BUSN 430	Legal and Social Environment of Business	
BUSN 431	Business Law I-Contracts, Property and Torts	
BUSN 432	Business Law II-Business Organization and Commercial Transactions	
CJ 201	Introduction to Criminal Justice	
CJ 230	Criminology	
CJ 330	Criminal Law and Procedure	
COMM 433	Legal Communication	
COMM 434	Communication Law	
Total Credits		54-55

Degree Requirements and Notes

- Minimum cumulative GPA of 3.00 required in courses with the POLS prefix.

Major Requirements

Major: Political Science - Public Service Option

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major Requirements

Code	Title	Credits
Core Requirements		
POLS 110	Introduction to Political Science (May satisfy general education category B)	3
or POLS 115	American Government	
POLS 220	International Politics	3
or POLS 225	Comparative Politics	
POLS 240	Political Ideologies	3
POLS Elective	100 or 200 level	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Political Science - Public Service Emphasis:		
POLS 215	Problems and Policies In American Government	3
POLS 325	Applied Research Methods	4
or CJ 325	Applied Research Methods	
POLS 420	Political Behavior-Executive-Legislative Process	3
POLS 422	State and Local Politics	3
POLS 423	Public Policy Analysis	3
POLS 430	Constitutional Law-Civil Liberties	3
or POLS 431	Constitutional Law-Criminal Justice	
POLS 442	Global Policy Issues	3
or POLS 444	International Law	

or POLS 446	Current Topics in International Law	
POLS 450	Politics of the Developing Countries	3
or POLS 451	Politics of the Industrialized Countries	
or POLS 452	Comparative Political Economy	
POLS 489	Senior Seminar	3
POLS 496	Field Experience	9
Supplemental Requirements: Pre-requisites apply to all courses. Select 5 courses from the following:		15
ACCT 200	Elements of Accounting I	
ACCT 201	Elements of Accounting II	
MGMT 320	Foundations of Management	
COMM 383	Organizational Communication I	
ECON 202	Principles of Macroeconomics	
EMGT 101	Emergencies, Disasters, and Catastrophes	
ENGL 320	Business and Professional Writing	
SOC 115	Social Problems	
HDFS 353	Children, Families and Public Policy	
Total Credits		67

Degree Requirements and Notes

- Minimum cumulative GPA of 3.00 required in courses with the POLS prefix.

Minor Requirements

Minor: Political Science

Required Credits: 21

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

Minor Requirements and Notes

- Minimum cumulative GPA of 3.00 required in courses with the POLS prefix.

Precision Agriculture

Department Information

- **Department Phone:**
  701-231-7261
- **Department Email:**
  ndsu.aben@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/aben/
- **Degrees Offered:**
  B.S.

Major Requirements

Major: Precision Agriculture

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

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Code	Title	Credits
Major 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 378	Machinery Principles and Management	3
ASM 454	Principles and Application of Precision Agriculture	3
ASM 491	Seminar	1
CHEM 121	General Chemistry I	3
CHEM 121L	General Chemistry I Laboratory	1
GEOG 105	Fundamentals of Geographic Information Systems	3
GEOG 470	Remote Sensing	3
MATH 103	College Algebra	3

MATH 105	Trigonometry	3
PAG 115	Introduction to Precision A	3
PAG 215	Mapping of Precision Ag Data	3
PAG 315	Electronic Systems in Preci	3
PAG 455	Big Data Management in Precision Agriculture	3
PAG 475	Precision Ag Systems Capst	2
PAG 496	Precision Ag Tech Expo	1
PAG 496	Internship	1
PLSC 110	World Food Crops	3
PLSC 225	Principles of Crop Production	3
PPTH 324	Introductory Plant Pathology	3
SOIL 210	Introduction to Soil Science	3
SOIL 322	Soil Fertility and Fertilizers	3
STAT 330	Introductory Statistics	3
Precision Ag Major requires an additional 18 credits of elective credits. Choose from those listed below, or consult your advisor for additional options.		18
AGEC 342	Farm and Agribusiness Management II	
AGEC 350	Agrisales	
ASM 264	Natural Resource Management Systems	
ASM 373	Tractors & Power Units	
ASM 374	Power Units Laboratory	
ASM 429	Hydraulic Power Principles and Applications	
CSCI 479	Introduction to Data Mining	
GEOG 455	Introduction to Geographic Information Systems	
GEOG 456	Advanced Geographic Information Systems	
GEOG 480	Geographic Information Systems Pattern Analysis and Modeling	
ME 311	Introduction To Aviation	
ME 312	Introduction to Flight	
ME 313	Commercial Instrument Ground School	
NRM 420	Sustainable Scenarios in Natural Resources Management	
PLSC 215	Weed Identification	
PLSC 323	Principles of Weed Science	
PPTH 455	Plant Disease Management	
SOIL 217	Introduction to Meteorology & Climatology	
SOIL 410	Soils and Land Use	
SOIL 447	Microclimatology	
Total Credits		84

Minor Requirements

Precision Agriculture

Minor Requirements

Required Credits: 18

Code	Title	Credits
Precision Ag Minor Courses - Select 3 courses from the following:		9
ASM 454	Principles and Application of Precision Agriculture	
PAG 215	Mapping of Precision Ag Data	
PAG 315	Electronic Systems in Pre	
PAG 455	Big Data Management in Precision Agriculture	
Precision Ag Minor Required Course		1
PAG 496	Internship (or similar department course)	
Precision Ag Minor Elective Courses - Select 3 courses from the following:		8

AGEC 342	Farm and Agribusiness Management II
ASM 264	Natural Resource Management Systems
ASM 354	Electricity and Electronic Applications
ASM 378	Machinery Principles and Management
CSCI 479	Introduction to Data Mining
GEOG 455	Introduction to Geographic Information Systems
GEOG 456	Advanced Geographic Information Systems
GEOG 470	Remote Sensing
ME 313	Commercial Instrument Ground School
PAG 475 Precision Ag Systems Ca	
PLSC 225	Principles of Crop Production
NRM 453	Rangeland Resource/Watershed Management
SOIL 322	Soil Fertility and Fertilizers
Total Credits	18

Professional Selling

Department Information

- **Department Location:**
  Richard H. Barry Hall
- **Department Phone:**
  701-231-8651
- **Department Web Site:**
  www.ndsu.edu/business/departments/mm/
- **Degrees Offered:**
  Certificate
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/professional-selling/

Certificate Requirements

Certificate: Professional Selling

Required Credits: 16

Code	Title	Credits
Requirements		
MRKT 320	Foundations of Marketing	3
MRKT 430	Sales and Personal Selling *	3
MRKT 434	Sales Management	3
MRKT 436	Advanced Professional Selling	1
BUSN 413	Business Internship **	3
Electives		
Select one of the following:		3
AGEC 350	Agrisales	
MGMT 451	Negotiation and Alternative Dispute Resolution	
MGMT 461	Supply Chain Management	
MGMT 499	Modeling the Supply Chain	
MRKT 438	Customer Relationship Management (CRM) and Sales Technology	
MRKT 470	Services Marketing	
Total Credits		16

* Optional co-requisite with MRKT 320

** Requires approval by College of Business Center for Professional Selling and Sales Technology

Requirements for a certificate in Professional Selling

- Certificates must be declared within the College of Business. Be sure to officially declare your certificate by completing the Certificate in Professional Selling form online at www.ndsu.edu/mgmt_mrkt. Please do so *before or when* taking MRKT 430 Sales and Personal Selling.
- To be accepted into the certificate program, students must have a 2.50 institutional cumulative GPA and at least junior standing (60 credits).
- To complete a certificate, students must earn a 'C' or better in all courses used to satisfy certificate requirements and a minimum 2.50 grade point average that is based on the courses used to satisfy the certificate requirements.
- If the certificate or institutional GPA falls below the 2.50 GPA after acceptance into the program, the student will not be allowed to register for the CoB courses until the cumulative GPA returns to 2.50 or above.
- Certificate students must satisfy all course prerequisites.
- Approval for a certificate does not guarantee enrollment in specific courses.

Psychology

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-8622
- **Department Web Site:**
  www.ndsu.edu/psychology/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/psychology/#planofstudytext

Major Requirements

Major: Psychology

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Quantitative Reasoning (R) †		3
Science and Technology (S) †		10
Humanities and Fine Arts (A) †		6
Social and Behavioral Sciences (B) †		6

Wellness (W) †	2
Cultural Diversity (D) *†	
Global Perspectives (G) *†	
Total Credits	39

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

Code	Title	Credits
Psychology Major Requirements		
PSYC 111	Introduction to Psychology (Cannot be used to satisfy general education category B)	3
PSYC 189	Skills for Academic Success [1]	1
PSYC 350	Research Methods I	3
PSYC 351	Research Methods II	3
PSYC	Electives	6
Psychology 400 Level Electives:		9
Select one course from 3 of the following 4 groups (A-D)		
Group A: Social/Personality:		
PSYC 453	Organizational Psychology	
PSYC 468	Personality	
PSYC 470	Experimental Social Psychology	
Group B: Perception/Cognition:		
PSYC 460	Sensation & Perception	
PSYC 461	Memory And Knowledge	
PSYC 464	Attention & Thinking	
Group C: Biological Bases of Behavior:		
PSYC 465	Psychobiology	
PSYC 481	Health Psychology	
PSYC 486	Neuropsychology	
Group D: Individual Differences:		
PSYC 463	Experimental Developmental Psychology	
PSYC 471	The Psychology Of Aging	
PSYC 472	Advanced Psychopathology	
PSYC 473	Child Psychopathology and Therapy	
Capstone Experience: Select one of the following:		3
PSYC 480	History & Systems	
PSYC 489	Honors Thesis	
PSYC 400 Level	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 level)	3
Additional Degree Requirements		3-14
Students earning a Bachelor of Science degree must select one of the three tracks listed below in consultation with an adviser (14 credit minimum).		
Students earning a Bachelor of Arts degree must complete the Modern Foreign Language proficiency (3-14 credits).		
Total Credits		40-51

Code	Title	Credits
Natural Science Track		
14 additional credits in math/science. Prefixes accepted include: BIOL, BIOC, BOT, CHEM, ENT, GEOL, MATH, MICR, PHYS, PLSC, STAT, OR ZOO. Courses selected for this track cannot count for general education.		

Code	Title	Credits
Social Science Track		
14 additional credits in social sciences (excluding PSYC prefix courses). Prefixes accepted include: ANTH, CJ, ECON, POLS, SOC or HDFS general education courses or courses that include an HDFS general education prerequisite. Courses selected for this track cannot count for general education.		
Other courses accepted include:		
COMM 114	Human Communication	
COMM 212	Interpersonal Communication	
COMM 216	Intercultural Communication	
COMM 260	Introduction to Web Design	
COMM 271	Listening and Nonverbal Communication	
COMM 301	Rhetorical Traditions	
COMM 402	Contemporary Rhetoric	
COMM 435	Critical Approaches to Popular Culture	
COMM 436	Issues in Mass Communications	
COMM 450	Issues in Communication	
COMM 480	Health Communication II	
BUSN 487	Managerial Economics	
MGMT 320	Foundations of Management	
MGMT 330	Foundations of Organizational Behavior	
GEOG 151	Human Geography	
GEOG 161	World Regional Geography	
GEOG 262	Geography of North America	

Code	Title	Credits
Minor Program of Study Track		
A minor in an approved area of study.		

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

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Minor Requirements

Psychology Minor

Minor Requirements

Required Credits: 18

Code	Title	Credits
Required Courses		
PSYC 111	Introduction to Psychology	3
PSYC Electives	At least one course must be a 300-400 level course	15
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Courses cannot be taken P/F.

Public History

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-8654
- **Department Web Site:**
  ndsuhprs.org/ (http://ndsuhprs.org)
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/public-history/#planofstudytext

Major Requirements

Major: Public History

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 120

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major Requirements

Note: Thirty-three (33) credits of the major must be taken in residence at NDSU.

Code	Title	Credits
Public History Major Requirements		
Select one history survey course from the following:		3
HIST 101	Western Civilization I	
HIST 102	Western Civilization II	
HIST 103	U.S. to 1877	
HIST 104	U.S. Since 1877	
HIST 251	Introduction To Public History	3
HIST 252	Introduction to Museum Work	3
HIST 352	Museum Collections Management	3
HIST 390	Historical Research and Writing	3
HIST 401	Archival Theory and Practice	3
HIST 403	Archival Preservation	3
HIST 404	Digital History	3
HIST 415	Public Memory and Memorialization in America	3
HIST 489	Senior Seminar (Capstone)	3
HIST 496	Field Experience (Approved Internship)	9
Distribution Requirement: Minimum credit required for each distribution area.		
U.S. History: Select 6 credits from the following:		6
RELS 340	New Religious Movements	
RELS 345	Religion and Politics	

HIST 382	Canada	
HIST 415	Public Memory and Memorialization 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 428	War and Society in Early America	
HIST 431	The North American Plains	
HIST 434	Environmental History	
HIST 436	American Frontier to 1850	
HIST 437	American West Since 1850	
Non U.S. History: Select 6 credits from the following:		6
HIST 320	History of Christianity (May satisfy general education category A and G)	
HIST 355	History of Global Islam	
HIST 381	Australia & New Zealand	
HIST 440	The Ottoman Empire	
HIST 450	Ancient History	
HIST 451	Medieval History	
HIST 454	Renaissance And Reformation	
HIST 455	The Eighteenth Century	
HIST 456	Europe 1815-1914	
HIST 457	Europe Since 1914	
HIST 464	Imperial Spain	
HIST 465	Germany since 1750	
HIST 467	History Of Russia II	
HIST 470	Modern Latin America I	
HIST 471	Modern Latin America II	
HIST 473	Colonial Mexico	
HIST 474	Modern Mexico	
HIST 477	Slavery in the Atlantic World	
HIST 480	History of Modern China from 1600	
HIST 481	History of Japan	
HIST 482	Vietnam: 125 Years of Conflict	
HIST 484	Cultures and Civilizations of the Pre-modern World	
HIST 485	Cultural Exchange and the Making of the Modern World	
Total Credits		51

Radiologic Sciences

Department Information

- **Department Location:**
  Sudro Hall
- **Department Phone:**
  701-231-8713
- **Department Web Site:**
  www.ndsu.edu/alliedsciences/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/radiologic-sciences/#planofstudytext

Major Requirements

Radiologic Sciences Major

Degree Type: B.S.
Required Degree Credits to Graduate: 126

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Radiologic Science Major Requirements		
CHP 190	Critical Thinking and Academic Success	2
RS 200	Introduction to Radiologic Sciences	1
RS 496	Field Experience	60
Professional education (internship) within an accredited affiliated school of radiologic technology includes the capstone experience.		
Related Courses Required:		
BIOC 260	Elements of Biochemistry	4
or BIOC 460	Foundations of Biochemistry and Molecular Biology I	
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory (May satisfy a general education category S)	4

BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab (May satisfy a general education category S)	4
CSCI 114	Microcomputer Packages (May satisfy a general education category S)	3
or CSCI 116	Business Use of Computers	
MATH 105	Trigonometry (or higher level)	3
Select one microbiology course and lab from the following:		3-5
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	
CHP 125	Medical Terminology for Health Professionals	1
PHRM 170	Common Medicines & Diseases	2
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4
PSYC 111	Introduction to Psychology (May satisfy a general education category B)	3
STAT 330	Introductory Statistics (May satisfy a general education category R)	3
Special Major Electives (department approved)		
Sociology: Select one of the following:		3
SOC 426	Sociology of Medicine	
SOC 440	Sociology of Aging	
SOC 441	Death and Dying	
Communication: Select one of the following:		3
COMM 308	Business and Professional Speaking	
COMM 315	Small Group Communication	
COMM 380	Health Communication I	
COMM 381	Patient-Provider Communication	
COMM 383	Organizational Communication I	
CHP 400	Interprofessional Health Care Practice	
Total Credits		111-113

Degree Requirements and Notes

- All required courses must be completed with a grade of 'C' or above. All students must maintain a semester GPA of 2.0 or above for each semester in the College. A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the College.
- Completion of the prerequisites does not guarantee a student internship. Selection of interns is competitive. Please consult your Radiologic Sciences advisor for more information.

Range Science

Department Information

- **Department Location:**
  Morrill Hall
- **Department Phone:**
  701-231-7582
- **Department Web Site:**
  www.ndsu.edu/range/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  https://bulletin.ndsu.edu/programs-study/undergraduate/range-science/#planofstudytext

Major Requirements

Major: Range Science

Degree Type: B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Required Courses for Range Science		
AGRI 189	Skills for Academic Success (or similar department course)	1
ANSC 114	Introduction to Animal Sciences	3
RNG 136	Introduction to Range Management	3
RNG 213	Rangeland Sampling Techniques	3
RNG 450	Range Plants	3
RNG 451	Ecology of Fire-Dependent Ecosystems	3
RNG 452	Geographic Information Systems in Range Survey	3
RNG 453	Rangeland Resources Watershed Management	3
or RNG 454	Wetland Resources Management	

RNG 456	Range Habitat Management	3
RNG 458	Grazing Ecology	3
RNG 460	Plant Ecology	3
RNG 462	Natural Resource and Rangeland Planning	3
Other Required Courses		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151	General Biology II	3
BIOL 364	General Ecology	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122	General Chemistry II (May satisfy general education category S)	3
ECON 201	Principles of Microeconomics (May satisfy general education category B and G)	3
PLSC 380	Principles of Plant Physiology	
Select one of the following: (May satisfy general education category C)		3
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
MATH 103	College Algebra (or higher level)	3
PLSC 315 & 315L	Genetics and Genetics Laboratory (May satisfy general education category S)	4
SOIL 210	Introduction to Soil Science	3
SOIL 217	Introduction to Meteorology & Climatology (May satisfy general education category S)	3
SOIL 351	Soil Ecology	3
or SOIL 410	Soils and Land Use	
SOIL 444	Soil Genesis and Survey	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
BIOL 475	Conservation Biology	3
or BIOL 476	Wildlife Ecology and Management	
Total Credits		82

Minor Requirements

Range Science Minor

Minor Requirements

Required Credits: 16

Code	Title	Credits
Required Courses		
RNG 136	Introduction to Range Management	3
RNG 225	Natural Resource & Agro-Ecosystems	3
RNG 450	Range Plants	3
Select one of the following:		3
RNG 452	Geographic Information Systems in Range Survey	
RNG 453	Rangeland Resources Watershed Management	
RNG 460	Plant Ecology	
RNG 456	Range Habitat Management	3
or RNG 458	Grazing Ecology	
Elective Course: Seminar may be used to fulfill this elective.		1
Total Credits		16

Minor Requirements and Notes:

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

Reliability Engineering

Department Information

- **Department Phone:**
  701-231-7494
- **Department Web Site:**
  www.ndsu.edu/coe/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  https://bulletin.ndsu.edu/programs-study/undergraduate/reliability-engineering/

Minor: Reliability Engineering

Required Credits: 18

Code	Title	Credits
IME 460	Evaluation of Engineering Data	3
IME 463	Reliability Engineering	3
IME 464	Reliability Analysis	3
Elective Credits: Select 9 credits from the following:		9
IME 450	Systems Engineering and Management	
IME 461	Quality Assurance and Control	
ME 332	Engineering Materials II	
ME 442	Machine Design I	
ME 472	Fatigue and Fracture of Metals	
ECE 341	Random Processes	
ECE 427	Packaging for Electronics	
or IME 427	Packaging for Electronics	
ECE 443	Communications I	
ECE 444	Applied Digital Signal Processing	
STAT 330	Introductory Statistics	
STAT 461	Applied Regression Models	
STAT 462	Introduction to Experimental Design	
Total Credits		18

MINOR NOTE:

- This minor is only available to students pursuing an engineering major.
- 12 of the 18 credits for this minor must be unique and cannot count toward requirements in the student's engineering major.

Religion

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-8654
- **Department Web Site:**
  ndsuhprs.org/ (http://ndsuhprs.org)
- **Degrees Offered:**
  Minor

- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/religious-studies/

Minor Requirements

Religion Minor

Minor Requirements

Required Credits: 18

Code	Title	Credits
Required Minor Courses		
RELS 100	World Religions	3
RELS 460	Theory and Methods of Religious Studies	3
RELS	300-400 level electives	6
RELS	Additional electives	6
Total Credits		18

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU.
- For advice on the distribution of electives consult with religious studies faculty members.

Respiratory Care

Department Information

- **Department Location:**
  Sudro Hall
- **Department Phone:**
  701-231-8713
- **Department Web Site:**
  www.ndsu.edu/alliedsciences/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/respiratory-care/#planofstudytext

Major Requirements

Respiratory Care Major

Degree Type: B.S.
Required Degree Credits to Graduate: 126

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Respiratory Care Major Requirements		
CHP 190	Critical Thinking and Academic Success	2
RC 200	Introduction to Respiratory Care	1
RC 496	Field Experience	51
RC 494	Individual Study	4
Advanced clinicals including the capstone experience.		
Related Courses Required:		
BIOC 260	Elements of Biochemistry	3 or 4
or BIOC 460	Foundations of Biochemistry and Molecular Biology I	
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory (May satisfy a general education category S)	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
CHEM 240	Survey of Organic Chemistry	3
CHP 125	Medical Terminology for Health Professionals	1
CSCI 114	Microcomputer Packages (May satisfy a general education category S)	3
or CSCI 116	Business Use of Computers	
MATH 103	College Algebra (or higher level; excluding MATH 104)	3
PHYS 120	Fundamentals of Physics (May satisfy a general education category S)	3
PSYC 111	Introduction to Psychology (May satisfy a general education category B)	3
STAT 330	Introductory Statistics (May satisfy a general education category R)	3
Select one microbiology course & lab from the following:		3-5
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	

MICR 350 & 350L	General Microbiology and General Microbiology Lab	
Special Major Electives (department approved)		
Sociology: Select one of the following:		3
SOC 426	Sociology of Medicine	
SOC 440	Sociology of Aging	
SOC 441	Death and Dying	
Communication: Select one of the following:		3
COMM 308	Business and Professional Speaking	
COMM 315	Small Group Communication	
COMM 380	Health Communication I	
COMM 381	Patient-Provider Communication	
COMM 383	Organizational Communication I	
CHP 400	Interprofessional Health Care Practice	
Total Credits		105-108

Degree Requirements and Notes

- All required courses must be completed with a grade of 'C' or above. All students must maintain a semester GPA of 2.0 or above for each semester in the College. A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the College.
- Completion of the prerequisites does not guarantee a student internship. Selection of interns is competitive. Please consult your Respiratory Care advisor for more information.
- Core courses have a maximum of two attempts allowed. These include:

Code	Title	Credits
BIOC 260	Elements of Biochemistry	3 or 4
or BIOC 460	Foundations of Biochemistry and Molecular Biology I	
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	4
PHYS 120	Fundamentals of Physics	3
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
CHEM 240	Survey of Organic Chemistry	3
MATH 103	College Algebra	3
CHP 125	Medical Terminology for Health Professionals	1
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	

Social Science Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**

B.S.; B.A.

- **Plan Of Study Sample:**
  https://bulletin.ndsu.edu/programs-study/undergraduate/social-science-education/#planofstudytext

Major Requirements

Major: Social Science Education

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Teaching Specialty Requirements		
HIST 101	Western Civilization I (May satisfy general education category A)	3
HIST 102	Western Civilization II (May satisfy general education category A)	3
HIST 103	U.S. to 1877	3
HIST 104	U.S. Since 1877	3
HIST 390	Historical Research and Writing (May satisfy general education category C)	3
HIST	Non-US History (300-400 level)	6

HIST	US History (300-400 level)	6
HIST	History Elective	3
Select one of the following areas (A-C):		6
A. Anthropology (6 cr):		
ANTH 111	Introduction to Anthropology	
ANTH	300-400 Level	
B. Sociology (6 cr):		
SOC 110	Introduction to Sociology	
SOC	300-400 Level	
C. Psychology (6 cr):		
PSYC 111	Introduction to Psychology	
PSYC 250	Developmental Psychology	
Select two of the following areas (D-F):		24
D. Political Science (12 cr):		
POLS 115	American Government	
Select 3 from the following:		
POLS 215	Problems and Policies In American Government	
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	
E. Geography (12 cr):		
GEOG 262	Geography of North America	
GEOL 106	The Earth Through Time	
GEOG	Geography Electives (6 cr)	
F. Economics (12 cr):		
ECON 201	Principles of Microeconomics	
ECON 202	Principles of Macroeconomics	
ECON	Electives (6 cr)	
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Soc Sci)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		91

Degree Requirements and Notes

- A GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A grade of 'C' or better is required in all Professional Education Requirement courses.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- Course taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.
- See School of Education (https://www.ndsu.edu/education) for admission requirements.

Social Work & Human Development and Family Science Dual Degree Program with Minot State Universtiy

Department Information

- **Department Location:**
  E. Morrow Lebedeff Hall
- **Department Phone:**
  701-231-9792
- **Department Web Site:**
  www.ndsu.edu/hdfs/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/social-work-human-development-family-science/#planofstudytext

Major Requirements

Major at NDSU: Human Development & Family Science
Major at Minot State University: Social Work

Degree Type: B.A. or B.S.
Required Degree Credit to Graduate: 127

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

A grade of 'C' or better is better is required in all HDFS prefix courses.

Code	Title	Credits
Human Development & Family Science Core Requirements		
Select one of the following: (May satisfy general education category S) [1]		4
BIOL 111 & 111L	Concepts of Biology and Concepts of Biology Lab	
BIOL 126 & 126L	Human Biology and Human Biology Laboratory	
Select one of the following: (May satisfy general education category B and G) [1]		3
ECON 105	Elements of Economics	
ECON 201	Principles of Microeconomics	
ECON 202	Principles of Macroeconomics	
Select one of the following: (May satisfy general education category C)		3
ENGL 320	Business and Professional Writing	
ENGL 325	Writing in the Health Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
CSCI 114	Microcomputer Packages (May satisfy general education category S)	3
or MIS 116	Business Use of Computers	
HD&E 189	Skills for Academic Success [3]	1
HDFS 135	Family Science (May satisfy general education category B)	3
HDFS 230	Life Span Development (May satisfy general education category B)	3
HDFS 250	Introduction to Research Methods in Human Development and Family Sciences [2]	3
HDFS 353	Children, Families and Public Policy [2]	3
HDFS 475	Children and Families Across Cultures (May satisfy general education category B and D) [2]	3
HD&E 320	Professional Issues	1
HDFS	Elective (HDFS 196, HDFS 242 & HDFS 496 may not be used)	3
HDFS 300/400	300/400 Level Elective (HDFS 496 may not be used)	3
PHIL 101	Introduction to Philosophy (May satisfy general education category A)	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 (May satisfy general education category B) [1]	3
PSYC 212	Psychological Aspects of Drug Use and Abuse (May satisfy general education category B) [2]	3
PSYC 270	Abnormal Psychology (May satisfy general education category B) [2]	3
SOC 110	Introduction to Sociology (May satisfy general education category B) [1]	3
STAT 330	Introductory Statistics (May satisfy general education category R) [2]	3
Cultural Diversity	Elective-Select one additional cultural diversity course from the NDSU general education cultural diversity list	3
SWK 250	Interpersonal Skills	3
SWK 256	Development of Social Work	3
SWK 330	Behavior and Pluralistic Society	3
SWK 331	Systems Theory and Family Dynamics	3
SWK 335	Social Work Methods I	3
SWK 426	Social Work Methods II	3

SWK 427	Social Work Methods III	3
SWK 490 & 491	Field Education & Senior Semiar (to be taken in the same semester)	15
SWK 430	Diversity, Oppression, and Social Change	3
SWK Elective	Elective	3
Select either the Family Science or Adult Development & Aging option listed below		9
Total Credits		111

Family Science Option

Code	Title	Credits
HDFS 242	Couples, Marriages and Families	3
HDFS 357	Personal and Family Finance	3
HDFS 462	Methods of Family Life Education	3

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

1 Prerequisite for admission to the Social Work program; includes ENGL 110 and ENGL 120.

2 No substitutions allowed.

3 HD&E 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 HD&E 189.

Degree Requirements and Notes

- A 2.50 cumulative GPA is required in major courses for graduation.
- Course taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.

Sociology

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-8657
- **Department Email:**
  ndsu.soc.anth@ndsu.edu
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/sociology/#planofstudytext

Major Requirements

Major: Sociology

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specific by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major Requirements

Code	Title	Credits
Sociology Core Requirements		
ANTH 111	Introduction to Anthropology (May satisfy general education category B and D)	3
SOC 110	Introduction to Sociology (May satisfy general education category B)	3
SOC 340	Social Research Methods	3
SOC 341	Social Research Methods Laboratory	1
SOC 422	Development Of Social Theory	3
SOC 489	Senior Capstone In Sociology	1
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Core Perspecitve Courses	**See areas listed below**	21
Students are REQUIRED to complete the anchor course from each area plus an additional 9 credits from any of the four areas.		
Total Credits		38

Core Perspective Courses

Completion of the anchor course from each area plus an additional 9 credits from any of the four areas is required to complete the core perspectives requirement.

Area One: Social Structure

Code	Title	Credits
SOC 233	Sociology of Organizations and Work (ANCHOR)	3
SOC 401	Sociology of Religion	3
SOC 404	Community Assessment	3
SOC 417	Sociology of the Family	3
SOC 426	Sociology of Medicine	3
SOC 427	Public Health Law and Policy for Non-urban, Rural and Frontier Areas	3
SOC 443	International Disasters	3
SOC 465	Applied Demographics	3

Area Two: Social Inequality

Code	Title	Credits
SOC 235	Cultural Diversity (ANCHOR)	3
SOC 410	Social Inequality	3
SOC 412	Sociology of Gender	3
SOC 424	Feminist Theory and Discourse	3
SOC 445	Special Populations in Disasters	3

Area Three: Social Change

Code	Title	Credits
SOC 115	Social Problems (ANCHOR) [Either course serves as the anchor]	3
or SOC 116	Global Social Problems	
SOC 403	Sociology of The Great Plains	3
SOC 405	Community Development	3
SOC 407	Deviant Behavior	3
SOC 431	Environmental Sociology	3
SOC 439	Social Change	3
SOC 440	Sociology of Aging	3

Area Four: Social Interaction

Code	Title	Credits
SOC 214	Social Interaction (ANCHOR)	3
SOC 416	Sociology Through Literature	3
SOC 418	Social Psychology	3

SOC 441	Death and Dying	3
Total Credits		12

Minor Requirements

Sociology Minor

Minor Requirements

Required Credits: 18

Code	Title	Credits
Core Courses		
ANTH 111	Introduction to Anthropology	3
SOC 110	Introduction to Sociology	3
Required Courses: Select two of the following:		6
SOC 115	Social Problems	
or SOC 116	Global Social Problems	
SOC 214	Social Interaction	
SOC 233	Sociology of Organizations and Work	
SOC 235	Cultural Diversity	
Major Electives: Select any two sociology courses at the 300-400 level		6
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Emergency Management majors who wish to complete this minor must complete 9 unique Sociology credits (i.e. courses that were not completed for the major of EM).

Soil Science

Department Information

- **Department Location:**
  Walster Hall
- **Department Phone:**
  701-231-8901
- **Department Web Site:**
  www.ndsu.edu/soils/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/soil-science/#planofstudytext

Major Requirements

Major: Soil Science

Degree Type: B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

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

7. At least 36 credits must be NDSU resident credits. Residence credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Required Courses for Soil Science		
AGRI 189	Skills for Academic Success (or equivalent department course) [1]	1
GEOG 455	Introduction to Geographic Information Systems	4
or RNG 452	Geographic Information Systems in Range Survey	
PLSC 110	World Food Crops (May satisfy general education category S and G)	3
PLSC 225	Principles of Crop Production	3
or RNG 136	Introduction to Range Management	
SOIL 210	Introduction to Soil Science	3
SOIL 217	Introduction to Meteorology & Climatology	3
SOIL 264	Natural Resource Management Systems	3
SOIL 322	Soil Fertility and Fertilizers	3
SOIL 351	Soil Ecology	3
SOIL 410	Soils and Land Use	3
SOIL 444	Soil Genesis and Survey	3
SOIL 454	Wetland Resources Management	3
SOIL 462	Natural Resource and Rangeland Planning	3
Supporting 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
or PHYS 212 & 212L	College Physics II and College Physics II Laboratory	

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
GEOL 105 & 105L	Physical Geology and Physical Geology Lab (May satisfy general education category S)	4
MATH 103	College Algebra	3
MATH 105	Trigonometry	3
PLSC 380	Principles of Plant Physiology	
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
Select one from the following: (May satisfy general education category C)		3
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:		3-4
BIOC 260	Elements of Biochemistry	
CHEM 240	Survey of Organic Chemistry	
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	
Agriculture Electives: Select 9 credits of agriculture electives		9
Total Credits		86

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

Minor Requirements

Soil Science Minor

Minor Requirements

Required Credits: 18

Code	Title	Credits
Required Courses		
SOIL 210	Introduction to Soil Science	3
SOIL 322	Soil Fertility and Fertilizers	3
SOIL 444	Soil Genesis and Survey	3
Elective Courses		
Select three of the following:		9
SOIL 264	Natural Resource Management Systems	
SOIL 351	Soil Ecology	
SOIL 410	Soils and Land Use	
SOIL 433	Soil Physics	
SOIL 447	Microclimatology	
SOIL/NRM/RNG 454	Wetland Resources Management	
SOIL 465	Soil And Plant Analysis	
Total Credits		18

Minor Requirements and Notes:

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

Spanish

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7887
- **Department Email:**
  ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/modernlanguages/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/spanish/#planofstudytext

Major Requirements

Major: Spanish

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major Requirements

A minimum grade of 'B' is required for all SPAN prefix courses counted for the Spanish major.

Code	Title	Credits
Spanish Major Core Requirements		
SPAN 311	Spanish Conversation and Composition I	3
SPAN 312	Spanish Conversation and Composition II	3
Advanced Language:		
SPAN 401	Advanced Spanish Grammar and Writing (May satisfy a general education category C)	3
or SPAN 402	Advanced Spanish Conversation	
Civilization:		
SPAN 330	Introduction to Spanish Civilization	3
or SPAN 331	Introduction to Spanish American Civilization	
Spanish American Literature:		
Select one of the following:		3
SPAN 440	Traditions in Spanish American Literature	
SPAN 441	Contemporary Spanish American Literature	
SPAN 442	Introduction to Chicano Literature	
SPAN 443	Spanish American Women Writers	
Peninsular Literature:		
Select one of the following:		3
SPAN 450	Traditions in Spanish Literature	
SPAN 451	Contemporary Spanish Literature	
SPAN 452	Cervantes	
SPAN 453	Spanish Women Writers	
Foreign Language:		
A minimum of one year of a second foreign language is required, with grades of 'C' or better in both semesters..		8
Additional Courses:		9
Select from the following and any course not used above:		
SPAN 332	Introduction to Hispanic Cinema	

SPAN 430	Approaches to Literature	
Study Abroad and Capstone Experience:		
SPAN 492	Study Abroad (Requires a minimum of one semester-14 weeks at the 300+ level in a program pre-approved by the Modern Languages Dept.)	1-15
SPAN 489	Senior Thesis (Consult dept/adviser semester before enrolling)	1
Total Credits		37-51

Degree Notes:

- Of the 28 credits required for the Spanish major, 15 must be NDSU resident credits in addition to the capstone (i.e. cannot be taken Tri-College or study abroad). Note: Other University-wide residency requirements will apply.

Minor Requirements

Spanish Minor

Minor Requirements

Required Credits:18

A minimum grade of 'B' is required for all courses used for the Spanish minor.

Code	Title	Credits
Minor Core Requirements		
SPAN 311	Spanish Conversation and Composition I	3
SPAN 312	Spanish Conversation and Composition II	3
SPAN 330	Introduction to Spanish Civilization	3
or SPAN 331	Introduction to Spanish American Civilization	
SPAN 401	Advanced Spanish Grammar and Writing	3
or SPAN 402	Advanced Spanish Conversation	
Select one course form the following:		3
SPAN 332	Introduction to Hispanic Cinema	
SPAN 430	Approaches to Literature	
SPAN 440	Traditions in Spanish American Literature	
SPAN 441	Contemporary Spanish American Literature	
SPAN 442	Introduction to Chicano Literature	
SPAN 443	Spanish American Women Writers	
SPAN 450	Traditions in Spanish Literature	
SPAN 451	Contemporary Spanish Literature	
SPAN 452	Cervantes	
SPAN 453	Spanish Women Writers	
Additional Electives - Select from any course listed on this guide not previously taken.		3
Total Credits		18

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU; cannot be taken through Tri-College or study abroad.

Spanish Education

Department Information

- **Department Location:**
  Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
  701-231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Degrees Offered:**
  B.S.; B.A.

- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/spanish-education/#planofstudytext

Major Requirements

Major: Spanish Education

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

- GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A minimum grade of 'B' is required in the SPAN teaching specialty courses.

Code	Title	Credits
Teaching Specialty Requirements		
SPAN 311	Spanish Conversation and Composition I	3
SPAN 312	Spanish Conversation and Composition II	3
Civilization:		
SPAN 330	Introduction to Spanish Civilization	3
or SPAN 331	Introduction to Spanish American Civilization	

Advanced Language:		
SPAN 401	Advanced Spanish Grammar and Writing (May satisfy general education category C)	3
or SPAN 402	Advanced Spanish Conversation	
Spanish American Literature: Select one of the following:		3
SPAN 440	Traditions in Spanish American Literature	
SPAN 441	Contemporary Spanish American Literature	
SPAN 442	Introduction to Chicano Literature	
SPAN 443	Spanish American Women Writers	
Peninsular Literature: Select one of the following:		3
SPAN 450	Traditions in Spanish Literature	
SPAN 451	Contemporary Spanish Literature	
SPAN 452	Cervantes	
SPAN 453	Spanish Women Writers	
Electives : Choose from the following or any other courses not used above:		9
SPAN 332	Introduction to Hispanic Cinema	
SPAN 430	Approaches to Literature	
Study Abroad & Capstone Experience:		
SPAN 492	Study Abroad (minimum 1 semester=14 weeks-at 300+ level in a program pre-approved by Modern Languages Dept.)	1-15
SPAN 489	Senior Thesis (Consult dept./advisor semester before enrolling)	1
Foreign Language:		
A minimum of one year of a second foreign language is required, with grades of 'C' or better in both courses.		8
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Lang)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		68-82

Degree Requirements and Notes

- A grade of 'C' or better is required in all Professional Education Requirement courses.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- Of the 28 required credits of Spanish, a minimum of 15, in addition to the capstone, must be resident credit (i.e. taken at NDSU, cannot be Tri-College nor study abroad).
- Courses taken *Pass/Fail* will not be used to satisfy any requirement other than total credits for graduation.
- See School of Education (https://www.ndsu.edu/education) for admission requirements.

Spanish Studies

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7887
- **Department Email:**
  ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/modernlanguages/

- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/spanish-studies/

Minor Requirements

Spanish Studies Minor

Minor Requirements

Required Credits: 18

Code	Title	Credits
Spanish Studies Core Requirements		
SPAN 311	Spanish Conversation and Composition I	3
SPAN 312	Spanish Conversation and Composition II	3
SPAN 330	Introduction to Spanish Civilization	3
or SPAN 331	Introduction to Spanish American Civilization	
SPAN 330 or SPAN 331 may be completed through study abroad.		
History Electives		
Must be a sequence. Or a history sequence appropriate to student's area of study.		
HIST 101	Western Civilization I	3
HIST 102	Western Civilization II	3
Additional Electives: Select one of the following:		3
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
GEOG 151	Human Geography	
GEOG 161	World Regional Geography	
POLS 220	International Politics	
SPAN 492	Study Abroad	
Total Credits		18

Minor Requirements and Notes

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

Sport Management

Department Information

- **Department Location:**
  Bentson/Bunker Field House
- **Department Phone:**
  701-231-7474
- **Department Web Site:**
  www.ndsu.edu/hnes/undergraduate_programs/sport_management/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/sport-management/#planofstudytext

Major Requirements

Major: Sport Management

Degree Type: B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

- A cumulative GPA of 2.75 or higher is required for admission to the Sport Management program.
- An NDSU GPA of 2.75 or higher must be maintained and the student must earn a grade of "C" or better in the HNES major requirements courses to retain status in the professional program.

Code	Title	Credits
Sport Management Core Requirements		
COMM 112	Understanding Media and Social Change (May satisfy general education category B)	3
COMM 200	Introduction to Media Writing	3
CSCI 114	Microcomputer Packages (May satisfy general education category S)	3
or MIS 116	Business Use of Computers	
COMM 375	Principles of Strategic Communication	3
ENGL 320	Business and Professional Writing (May satisfy general education category C)	3
HNES 100	Concepts of Fitness & Wellness (May satisfy general education category W)	2
HNES 190	Introduction to Sport Management *	3
HNES 224	Sport and Event Management *	3
HNES 226	Socio-Cultural Dimension in Sport	3
HNES 304	Sport Promotion and Public Relations	3
HNES 426	Sport Administration	3

HNES 431	Governance, Policy, Legal Liability and Ethics in Sport	3
HNES 436	Managing Sport Facilities	3
HNES 485	Sport Management Internship (students need to have completed HNES 190, 224 and 226 to be eligible for HNES 485)	15
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
SOC 110	Introduction to Sociology (May satisfy general education category B)	3
Required Minor - Business Administration		24
Minor application form is required to be completed with the College of Business. The business minor requires a 2.50 GPA in minor courses which cannot be taken pass/fail.		
Select one of the following options		9
Option 1 - Management Group (Student must choose 9 credits) - MGMT 330, MGMT 430, MGMT 450, MGMT 451, MGMT 453, MGMT 454, MGMT 470, or BUSN 340		
Option 2 - Marketing Group (Student must choose 9 credits) - MRKT 362, MRKT 410, MRKT 420, MRKT 460, MRKT 470, or BUSN 340		
Option 3 - Electives - student may take 9 credits of elective courses		
Total Credits		92

* Requires a grade of 'B' or better.

Degree Requirements and Notes

- Course taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.
- Students who have specific career goals in mind may elect to complete additional minor(s) by choosing focused electives. Examples of other minors that compliment Sport Management include: Accounting, Community Development, Hospitality & Tourism Management, Human Development and Family Science, Journalism, Public Relations & Advertising, Management Communication, and Web Design.

Statistics

Department Information

- **Department Location:**
  Morrill Hall
- **Department Phone:**
  701-231-7532
- **Department Email:**
  ndsu.stats@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/academics/programs/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/statistics/

Major Requirements

Major: Statistics

Degree Type: B.A. or B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

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

7. At least 36 credits must be NDSU resident credits. Residence credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

A grade of 'C' or better is required in ALL courses used toward the major.

Code	Title	Credits
Statistics Major Requirements		
CSCI 160	Computer Science I	4
CSCI 222	Discrete Mathematics	3
or MATH 270	Introduction to Abstract Mathematics	
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
STAT 367	Probability	3
STAT 368	Statistics	3
STAT 461	Applied Regression Models	3
STAT 462	Introduction to Experimental Design (Capstone)	3

Electives: Select 15 credits from the following (can choose only one CSCI course):		15
CSCI 161	Computer Science II	
CSCI 418	Simulation Models	
MATH 429	Topics in Linear Algebra	
STAT 460	Applied Survey Sampling	
STAT 463	Nonparametric Statistics	
STAT 464	Discrete Data Analysis	
STAT 467	Probability and Mathematical Statistics I	
STAT 468	Probability and Mathematical Statistics II	
STAT 469	Introduction to Biostatistics	
STAT 470	Statistical SAS Programming	
STAT 471	Introduction to the R Language	
STAT 472	Time Series	
Minor Requirement		16
A minor is required in one of the following disciplines: Social Science, Physical Science, Biological Science, Business, Mathematics, or Computer Science.		
Total Credits		65

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Minor Requirements

Minor: Statistics

Standard Track

Required Credits: 22

Code	Title	Credits
Required Courses		
MATH 165	Calculus I	4
MATH 166	Calculus II	4
STAT 331	Regression Analysis	2
or STAT 461	Applied Regression Models	
STAT 367	Probability	3
STAT 368	Statistics	3
STAT 462	Introduction to Experimental Design	3
STAT Elective	400 Level	3
Total Credits		22

Applied Statistics Track

Required Credits: 17

Code	Title	Credits
Required Courses		
STAT 330	Introductory Statistics	3
STAT 331	Regression Analysis	2
STAT Electives	Select 4 department approved 400-level, 3 credit statistics courses.	12
Total Credits		17

Minor Requirements and Notes

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

Strategic Communication

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7705
- **Department Web Site:**
  www.ndsu.edu/communication/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/strategic-communication/

Major Requirements

Major: Strategic Communication

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major Requirements

Code	Title	Credits
Pre-Communication Requirements:		
Students must complete the following 19 credits of coursework with a minimum GPA of 3.0 to be admitted to the professional major.		
ENGL 120	College Composition II	3
COMM 110	Fundamentals of Public Speaking	3
COMM 112	Understanding Media and Social Change	3
COMM 114	Human Communication	3
COMM 189	Skills for Academic Success	1
COMM 212	Interpersonal Communication	3
COMM 220	Persuasion	3
Professional Strategic Communication Major		
COMM 200	Introduction to Media Writing	3
COMM 320	Communication Research Methods	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 472	Public Relations Campaigns	3
or COMM 476	Advertising Campaign Practicum	
or COMM 480	Health Communication II	
COMM 496	Field Experience	3
Select one of the following for upper division writing requirement:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 323	Creative Writing	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 357	Visual Culture and Language	
ENGL 358	Writing in the Humanities and Social Sciences	

ENGL 459	Researching and Writing Grants and Proposal	
Electives:		18
Six COMM courses selected in consultation with one's advisor. Students can specialize in Advertising or Public Relations. Only 3 credits of COMM 496 can be counted toward this requirement.		
Total Credits		64

Program Note: Student enrollment is limited to one degree program offered by the Department of Communication.

Minor Requirements

Strategic Communication Minor

Minor Requirements

Required Credits: 21

Code	Title	Credits
COMM 112	Understanding Media and Social Change	3
COMM 200	Introduction to Media Writing	3
COMM 375	Principles of Strategic Communication	3
Professional Specialization Electives:		12
COMM 308	Business and Professional Speaking	
COMM 330	Photography for the Media	
COMM 362	Principles of Design For Media	
COMM 376	Advertising Creative Strategies	
COMM 377	Media Planning	
COMM 425	Specialty Writing	
COMM 435	Critical Approaches to Popular Culture	
COMM 442	Digital Media and Society	
COMM 465	Convergence Media	
COMM 472	Public Relations Campaigns	
COMM 476	Advertising Campaign Practicum	
COMM 485	Risk and Crisis Communication	
Total Credits		21

Minor Requirements and Notes

- Student enrollment is limited to one degree program offered by the Department of Communication.
- A minimum of 9 credits must be taken at NDSU.

Theatre Arts

Department Information

- **Department Location:**
  Reineke Fine Arts Center
- **Department Phone:**
  701-231-7932
- **Department Email:**
  ndsu.performing.arts@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/performingarts/theatre/
- **Degrees Offered:**
  B.A.; B.S.; B.F.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/theatre-arts/

Major Requirements

Major: Theatre Arts

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 122

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major Requirements

Students must earn a grade of 'C' or better in all THEA prefix courses.

Code	Title	Credits
Professional Major Requirements		
ART 111	Introduction to Art History (May satisfy general education category A and G)	3
ENGL 380	Shakespeare	3
MUSC 100	Music Appreciation (May satisfy general education category A)	3
or MUSC 103	Introduction to Music History	
THEA 150	Theatre Foundations I	1
THEA 161	Acting I	3
THEA 180	Dramatic Literature and Style I	3
THEA 181	Dramatic Literature & Style II	3
THEA 261	Advanced Acting	3
THEA 270 & THEA 220	Stagecraft and Stagecraft Lab	3
THEA 271 & THEA 221	Costume Craft and Costume craft Lab	3
THEA 275	Theatrical Makeup Design	3
or THEA 279	Scenic Painting	
THEA 280	World Theatre (May satisfy a general education category D)	3
THEA 365	Directing I	3
THEA 450	Capstone Experience	3
THEA 480	History and Literature of Theatre I	3
THEA 481	History and Literature of the Theatre II	3
Select one of the following:		3
THEA 276 & THEA 224	Lighting and Sound Design for the Theatre and Lighting and Sound Design Lab	
THEA 277 & THEA 223	Costume Design for the Theatre and Costume Design Lab	
THEA 278 & THEA 222	Introduction to Design: Scenic Design and Scenic Design Lab	
Practicum - 12 credits from the following:		12
THEA 210	Theatre Practicum (Repeatable, 1-2 credits)	
THEA 211	Stage Management Practicum and Seminar (2 credits)	
Electives: Select nine credits from the following:		9
THEA 160	Storytelling	
THEA 260	Theatre for Young Audiences Ensemble	
THEA 262	Introduction to Dance	
THEA 266	Voice and Movement for the Actor	
THEA 275	Theatrical Makeup Design	

THEA 276	Lighting and Sound Design for the Theatre	
THEA 277	Costume Design for the Theatre	
THEA 278	Introduction to Design: Scenic Design	
THEA 279	Scenic Painting	
THEA 465	Directing II	
Total Credits		70

Link to view program description and 4-year Plan of Study (http://bulletin.ndsu.edu/undergraduate/program-overview/theatre-arts)

Major Requirements

Major: Theatre Arts - Design & Tech Theatre Track

Degree Type: B.F.A.
Required Degree Credits to Graduate: 133

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Code	Title	Credits
Professional Major Requirements		
Students must earn a minimum grade of a 'C' in all THEA prefix courses.		
ART 111	Introduction to Art History (May satisfy general education category A and G)	3

MUSC 100	Music Appreciation (May satisfy general education category A)	3
or MUSC 103	Introduction to Music History	
THEA 161	Acting I	3
THEA 150	Theatre Foundations I	1
THEA 180	Dramatic Literature and Style I	3
THEA 181	Dramatic Literature & Style II	3
THEA 270 & THEA 220	Stagecraft and Stagecraft Lab *	3
THEA 271 & THEA 221	Costume Craft and Costume craft Lab *	3
THEA 272	Drawing for the Theatre *	3
THEA 275	Theatrical Makeup Design *	3
THEA 276 & THEA 224	Lighting and Sound Design for the Theatre and Lighting and Sound Design Lab *	3
THEA 277 & THEA 223	Costume Design for the Theatre and Costume Design Lab *	3
THEA 278 & THEA 222	Introduction to Design: Scenic Design and Scenic Design Lab *	3
THEA 279	Scenic Painting *	3
THEA 280	World Theatre (May satisfy a general education category D)	3
THEA 365	Directing I	3
THEA 370	Technical Theatre Production (take 2 times) *	6
THEA 376	Theatrical Design Studio I: Theatrical Drawing and Rendering *	3
THEA 377	Theatrical Design Studio II: Collaboration of the Designer *	3
THEA 450	Capstone Experience	3
THEA 480	History and Literature of Theatre I	3
THEA 481	History and Literature of the Theatre II	3
THEA 486	History of Dress and Decor I; the Foundations of Western Style *	3
THEA 487	History of Dress and Decor II; Western Style since 1800 *	3
Practicum- 12 credits from the following:		12
THEA 210	Theatre Practicum (Repeatable, 1-2 credits) *	
THEA 211	Stage Management Practicum and Seminar (2 credits) *	
Related Area:		
ART 131	Foundations Drawing	3
ENGL 380	Shakespeare	3
Total Credits		91

* Students must earn a minimum grade of a 'B' in these Design and Technology courses.

1 Seminar course for third year Theatre majors.

Major Requirements

Major: Theatre Arts - Musical Theatre Track

Degree Type: B.F.A.
Required Degree Credits to Graduate: 155

University Degree Requirements

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

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

7. At least 36 credits must be NDSU resident credits. Residence credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Students must earn a minimum grade of a 'C' in all THEA or MUSC prefix courses.

Code	Title	Credits
Professional Major Requirements		
ART 111	Introduction to Art History (May satisfy general education category A and G)	3
MUSC 100	Music Appreciation (May satisfy general education category A)	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 150	Theatre Foundations I	1
THEA 161	Acting I [1]	3
THEA 180	Dramatic Literature and Style I	3
THEA 228	Development of Musical Theatre [1]	3
THEA 261	Advanced Acting	3
THEA 263	Dance Studio (take one each of Jazz, Lyrical Ballet, Tap) [1]	3
THEA 266	Voice and Movement for the Actor [1]	3
THEA 270 & THEA 220	Stagecraft and Stagecraft Lab (Taken with THEA 270 Stagecraft)	3
THEA 271 & THEA 221	Costume Craft and Costume craft Lab (Taken with THEA 271 Costume Craft)	3

THEA 275	Theatrical Makeup Design	3
THEA 280	World Theatre (May satisfy a general education category D)	3
THEA 362	Dance Styles for Theatre (Take 2 times) [1]	4
THEA 365	Directing I	3
THEA 368	Business of Acting	3
THEA 450	Capstone Experience	3
THEA 466	Advanced Voice for the Actor [1]	3
THEA 467	Advanced Movement for the Actor [1]	3
THEA 468	Acting the Song II	3
THEA 480	History and Literature of Theatre I	3
THEA 481	History and Literature of the Theatre II	3
ENGL 380	Shakespeare	3
Select one of the following:		3
THEA 276 & THEA 224	Lighting and Sound Design for the Theatre and Lighting and Sound Design Lab [2]	
THEA 277 & THEA 223	Costume Design for the Theatre and Costume Design Lab [2]	
THEA 278 & THEA 222	Introduction to Design: Scenic Design and Scenic Design Lab [2]	
Theatre Practice - 12 credits from the following:		12
THEA 210	Theatre Practicum (Repeatable 1-2 credits) [2]	
THEA 211	Stage Management Practicum and Seminar (Repeatable - 2 credits)	
Total Credits		95

[1] Students must earn a minimum grade of 'B' in these music, dance and performance courses.

[2] First year students taking THEA 220 or THEA 221 will not take Practicum 210. When students take THEA 222, 223 or 224 they will take Practicum 210 for 1 cr.

Major Requirements

Major: Theatre Arts - Performance Track

Degree Type: B.F.A.
Required Degree Credits to Graduate: 135

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

Students must earn a minimum grade of a 'C' in all THEA prefix courses.

Code	Title	Credits
Professional Major Requirements		
ART 111	Introduction to Art History (May satisfy general education category A and G)	3
ENGL 380	Shakespeare	3
MUSC 100	Music Appreciation (May satisfy general education category A)	3
or MUSC 103	Introduction to Music History	
MUSC 162	Voice Class	1
THEA 150	Theatre Foundations I	1
THEA 161	Acting I *	3
THEA 180	Dramatic Literature and Style I	3
THEA 181	Dramatic Literature & Style II	3
THEA 261	Advanced Acting	3
THEA 262	Introduction to Dance [1]	2
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	3
THEA 271 & THEA 221	Costume Craft and Costume craft Lab	3
THEA 275	Theatrical Makeup Design	3
Select one of the following:		3
THEA 228	Development of Musical Theatre [1]	
THEA 267	Acting for the Camera	
Select one of the following:		3
THEA 276 & THEA 224	Lighting and Sound Design for the Theatre and Lighting and Sound Design Lab	
THEA 277 & THEA 223	Costume Design for the Theatre and Costume Design Lab	
THEA 278 & THEA 222	Introduction to Design: Scenic Design and Scenic Design Lab	
THEA 280	World Theatre (May satisfy a general education category D)	3
THEA 361	Acting III: Advanced Realism [1]	3
THEA 365	Directing I	3
THEA 368	Business of Acting [1]	3
THEA 450	Capstone Experience	3
THEA 461	Acting Shakespeare [1]	3
THEA 462	Acting Styles [1]	3

THEA 466	Advanced Voice for the Actor [1]	3
THEA 467	Advanced Movement for the Actor [1]	3
THEA 480	History and Literature of Theatre I	3
THEA 481	History and Literature of the Theatre II	3
Theatre Practice - Repeatable for 12 credits:		12
THEA 210	Theatre Practicum (1-2 credits)	
THEA 211	Stage Management Practicum and Seminar (2 credits)	
Total Credits		90

[1] Students must earn a minimum grade of 'B' in these dance and performance courses.

Minor Requirements

Theatre Arts Minor

Standard Option

Required Credits: 23

Code	Title	Credits
Theatre Appreciation: Select 2 of the following:		6
THEA 110	Introduction to Theatre Arts	
THEA 180	Dramatic Literature and Style I	
THEA 181	Dramatic Literature & Style II	
THEA 280	World Theatre	
Theatre Practicum or Labs: 2 credits from the following		2
THEA 210	Theatre Practicum	
THEA 220	Stagecraft Lab	
THEA 221	Costume craft Lab	
THEA 222	Scenic Design Lab	
THEA 223	Costume Design Lab	
THEA 224	Lighting and Sound Design Lab	
Electives: Select 15 credits from the following:		15
THEA 161	Acting I	
THEA 228	Development of Musical Theatre	
THEA 261	Advanced Acting	
THEA 262	Introduction to Dance	
THEA 263	Dance Studio (repeatable up to 6 cr)	
THEA 266	Voice and Movement for the Actor	
THEA 270	Stagecraft	
THEA 271	Costume Craft	
THEA 275	Theatrical Makeup Design	
THEA 276	Lighting and Sound Design for the Theatre	
THEA 277	Costume Design for the Theatre	
THEA 278	Introduction to Design: Scenic Design	
THEA 279	Scenic Painting	
THEA 362	Dance Styles for Theatre (repeatable up to 3 cr)	
THEA 365	Directing I	
THEA 399	Special Topics: Clown (repeatable up to 3 cr)	
Total Credits		23

Minor Requirements and Notes

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

Minor Requirements

Theatre Arts Minor

With Dance Option

Required Credits: 23

Code	Title	Credits
Theatre Appreciation: Select 2 of the following:		6
THEA 110	Introduction to Theatre Arts	
THEA 180	Dramatic Literature and Style I	
THEA 181	Dramatic Literature & Style II	
THEA 280	World Theatre	
Theatre Practicum or Labs		2
THEA 210 & THEA 211	Theatre Practicum and Stage Management Practicum and Seminar	
THEA 220	Stagecraft Lab	
THEA 221	Costume craft Lab	
THEA 222	Scenic Design Lab	
THEA 223	Costume Design Lab	
THEA 224	Lighting and Sound Design Lab	
Electives: Select 15 credits from the following:		15
THEA 161	Acting I	
THEA 262	Introduction to Dance (1 credit)	
THEA 263	Dance Studio (1 credit; can take up to 6 times)	
THEA 362	Dance Styles for Theatre (2 credits; can take up to 3 times)	
Total Credits		23

Minor Requirements and Notes

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

Tribal and Indigenous Peoples Studies

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-8657
- **Department Web Site:**
  www.ndsu.edu/socanth/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/tribal-indigenous-peoples-studies/

Minor: Tribal and Indigenous Peoples Studies

Minimum Credits: 18

Code	Title	Credits
SOC/ANTH 291	Seminar (Introduction to Tribal and Indigenous Peoples Studies)	3
SOC/ANTH 391	Seminar (Introduction to Regional Tribal and Indigenous Peoples Studies)	3
SOC/ANTH 491	Seminar (History and Evolution of Tribal and Indigenous Peoples Sovereignty)	3
Elective Courses - Select 9 credits from the following:		9
ANTH 441	Death and Dying	
ANTH 444	Peoples of the Pacific Islands	

ANTH 446	Latin America & Carribean: Afro-Latino/as, Gender, Indigeneity
ANTH 462	Anthropology and the Environment
ANTH 491	Seminar
ENGL 435	Young Adult Literature in a Multicultural World
ENGL 474	Native American Literature
HIST 220	North Dakota History
HIST 431	The North American Plains
HIST 434	Environmental History
HIST 474	Modern Mexico
POLS 442	Global Policy Issues
POLS 444	International Law
POLS 450	Politics of the Developing Countries
SOC 403	Sociology of The Great Plains
SOC 410	Social Inequality
SOC 431	Environmental Sociology
Total Credits	18

University Studies

Department Information

- **Department Location:**
  Morrill Hall
- **Department Phone:**
  701-231-7014
- **Department Email:**
  ndsu.arc@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/advising_resource_center/
- **Degrees Offered:**
  B.U.S.

The Bachelor of University Studies (B.U.S.) degree is a baccalaureate degree program offered through the College of Arts, Humanities and Social Sciences, and is advised through the Advising Resource Center. The B.U.S. degree is a flexible degree option for students who are seeking a non-traditional, interdisciplinary education and wishing to tailor their own degree. Each degree plan is designed by the student with assistance from an academic advisor and is later approved by a committee composed of campus-wide representation.

Degree Plan Proposal

Students seeking the B.U.S. degree usually begin by visiting the Advising Resource Center and talking with an adviser about their educational, personal, and professional goals. The adviser will work with the student in preparing what is called a Bachelor of University Studies proposal, which includes a statement of goals, a summary of previous education and experience, and a proposed plan of study (i.e., remaining coursework) for the degree. After both have signed the proposal, it is forwarded to the Bachelor of University Studies Program Review Committee for approval. If the proposal is approved by the committee, it becomes the student's requirements for graduation. Each plan of study must meet the general education requirements (https://www.ndsu.edu/registrar/academics/gened) (including the Capstone Experience, Cultural Diversity and Global Perspectives categories) and the graduation requirements (https://bulletin.ndsu.edu/academic-policies/undergraduate-policies/degree-and-graduation) of the university. The B.U.S. degree does not allow a designated major, instead a student will create an area or areas of emphasis that will help him or her attain post-graduation goals. Each area of emphasis must include a minimum of 12 credits of study with at least 6 of those credits being upper division credits. In addition to the emphasis area a student may choose to declare an academic minor that they feel will strengthen their plan of study. No fewer than 15 credits must be proposed (remain to be taken after approval) and included in the proposal.

The degree plan proposal must be submitted to the B.U.S Program Review Committee by guideline due dates (October 1 for spring or summer graduation; February 1 for fall graduation).

The General Education requirements (https://www.ndsu.edu/registrar/academics/gened) will have as a minimum the following:

Code	Title	Credits
Requirements		Credits
Communications (C)		12

Quantitative Reasoning (R)	3
Science & Technology (S) (A laboratory course is included in this requirement.)	10
Humanities & Fine Arts (A)	6
Social & Behavioral Sciences (B)	6
Wellness (W)	2
Capstone	3
Total Credits	42

Approval of a student's proposal means that the committee believes that the approved plan is the best educational program available to that student and that it is a baccalaureate-level program.

It is the policy of the College of Arts, Humanities and Social Sciences that students seeking a B.U.S. degree will, following approval of the B.U.S Proposal, be expected to make continual progress toward completion of their degree. Discontinuing enrollment for a period of two continuous academic years or more indicates lack of progress. The approved proposals of students who lack progress will no longer be considered valid for graduation with a B.U.S. degree. If these students choose to continue to seek a B.U.S. degree, it will be necessary to submit a new proposal for consideration by the committee.

In addition to the Bachelor of University Studies' continual progress policy, NDSU requires that any student who discontinues enrollment for more than one year is subject to completing the General Education requirements in effect at the time of re-entry. B.U.S. proposals are subject to the NDSU baccalaureate degree requirements.

For further information, contact:

Advising Resource Center
112 Morrill Hall
NDSU Dept. 2800, P.O. Box 6050
North Dakota State University
Fargo, ND 58108-6050
Telephone: 701-231-7014
ndsu.arc@ndsu.edu

Veterinary Technology

Department Information

- **Department Location:**
  Robinson Hall
- **Department Web Site:**
  www.ag.ndsu.edu/vettech/
- **Degrees Offered:**
  B.S.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/veterinary-technology/

Major Requirements

Major: Veterinary Technology

Degree Type: B.S.
Minimum Degree Credits to Graduate: 120

University Degree Requirements

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

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

7. At least 36 credits must be NDSU resident credits. Residence credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Major Requirements

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

Code	Title	Credits
Required Core Courses for Pre-Vet Tech		
VETS 115	Medical Terminology for the Paraprofessional	1
VETS 125	Animal Restraint	2
VETS 135	Anatomy and Physiology of Domestic Animals	3
VETS 136	Anatomy and Physiology Laboratory	1
VETS 150	Introduction to the Veterinary Profession	1
Required Core Courses for Professional Vet Tech: Must be admitted to the professional program to take the following courses.		
VETS 249	Veterinary Hospital Information and Procedures	2
VETS 255	Veterinary Diagnostic Imaging	2
VETS 255L	Veterinary Diagnostic Imaging Laboratory	1
VETS 265	Veterinary Nursing I	2
VETS 385	Veterinary Parasitology	2
VETS 386	Veterinary Hematology	2
VETS 387	Veterinary Clinical Pathology	3
VETS 457	Veterinary Pharmacology	2
VETS 461	Veterinary Surgical Nursing Techniques	2
VETS 461L	Veterinary Surgical Techniques Laboratory	1
VETS 481	Ward Care/Clinic Care (1 credit each X4) [1]	4
VETS 482	Large Animal Techniques	2
VETS 483	Clinical Veterinary Practicum (1 credit each X4) [1]	4
VETS 485	Veterinary Technology Externship 6-12 (Capstone Course)	6
Related Core Courses Required for Professional Program		

ANSC 114	Introduction to Animal Sciences	3
ANSC 223	Introduction to Animal Nutrition	2
ANSC 370	Fundamentals/Animal Disease	3
ANSC 371	Fundamentals of Animal Disease II	3
BIOL 111	Concepts of Biology (May satisfy general education category S)	3
CHEM 117	Chemical Concepts and Applications (May satisfy general education category S)	3
or CHEM 121	General Chemistry I	
CSCI 114	Microcomputer Packages (May satisfy general education category S)	3
or MIS 116	Business Use of Computers	
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab (May satisfy general education category S)	3
Total Credits		66

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

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

Degree Requirements and Notes:

- Transfer grades must be 'C' or better to count towards major requirements.
- The following minor programs of study are suggested to supplement this major program of study: Agribusiness, Animal Science, Business Administration, Equine Studies, Large Animal Veterinary Technology, Microbiology, Psychology, or Range Science

Web Design

Department Information

- **Department Location:**
  Minard Hall
- **Department Phone:**
  701-231-7705
- **Department Web Site:**
  www.ndsu.edu/communication/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/web-design/

Minor Requirements

Minor: Web Design

Minor Requirements

Required Credits: 21

Code	Title	Credits
Required Courses		
COMM 260	Introduction to Web Design	3
COMM 261	Introduction to Web Development	3
COMM 363	Advanced Web Design	3
Professional Specialization		12
ART 185	Graphic Design I	
COMM 200	Introduction to Media Writing	
COMM 313	Editorial Processes	
COMM 330	Photography for the Media	
COMM 362	Principles of Design For Media	

COMM 465	Convergence Media
CSCI 122	Introduction to Programming Concepts
CSCI 159	Computer Science Problem Solving
CSCI 160	Computer Science I
CSCI 227	Computing Fundamentals I
CSCI 277	Introduction to UNIX
CSCI 366	Database Systems
CSCI 371	Web Scripting Languages
CSCI 488	Human-Computer Interaction
Total Credits	21

Minor Requirements and Notes

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

Wellness

Department Information

- **Department Location:**
  E. Morrow Lebedeff Hall
- **Department Phone:**
  701-231-8211
- **Department Web Site:**
  www.ndsu.edu/hde/undergraduate_studies/minors/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  https://bulletin.ndsu.edu/programs-study/undergraduate/wellness/

Minor Requirements

Minor: Wellness

Required Credits: 18

Code	Title	Credits
Required Courses		
HNES 111	Wellness	3
HDFS 186	Consumer and Society	3
HDFS 242	Couples, Marriages and Families	3
ADHM 410	Dress in World Cultures	3
or ADHM 411	Food and World Cultures	
Elective Courses: Select 2 of the following. Courses cannot be from the major area of study.		6
ADHM 486	Dress and Human Behavior	
COMM 212	Interpersonal Communication	
HNES 200	Principles of Nutrition	
HNES 217	Personal and Community Health	
RELS 100	World Religions	
SOC 115	Social Problems	
SOC 214	Social Interaction	
Total Credits		18

Minor Requirements and Notes:

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

Women and Gender Studies

Department Information

- **Department Location:**
  Morrill Hall
- **Department Phone:**
  701-231-7290
- **Department Web Site:**
  www.ndsu.edu/wgs/
- **Degrees Offered:**
  B.S.; B.A.
- **Plan Of Study Sample:**
  bulletin.ndsu.edu/programs-study/undergraduate/women-gender-studies/

Major Requirements

Major: Women & Gender Studies

Degree Type: B.A. or B.S.
Required Degree Credits to Graduate: 120

University Degree Requirements

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

For complete information, please refer to the Degree and Graduation Requirements (p. 854) section of this Bulletin.

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study, a second major, or a second degree is required.

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

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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

Major Requirements

Code	Title	Credits
Women & Gender Studies Major		
SOC 424	Feminist Theory and Discourse	3
WGS 110	Introduction to Women's Studies (May satisfy general education category A and D)	3
WGS 112	Introduction to Masculinities (May satisfy general education category A and D)	3
WGS 340	Perspectives in LGBTQ Studies	3
WGS 350	Perspectives in Women's Studies	3
WGS 370	Transnational/Global Women	3
WGS 489	Internship/Capstone	3
Electives: Select 15 credits from the following:		15
CJ 310	Women and Policing	
CJ 465	Women and Minorities in Criminal Justice	
COMM 216	Intercultural Communication (May satisfy general education category B and D)	
COMM 380	Health Communication I	
COMM 383	Organizational Communication I	
COMM 412	Gender and Communication	
ENGL 330	British and American Women Writers (May satisfy general education category A and D)	
ENGL 331	Contemporary Women Writers	
ENGL 335	Multicultural Writers (May satisfy general education category A and D)	
ENGL 454	Language Bias	
ENGL 459	Researching and Writing Grants and Proposal	
FREN 345	Women in French Literature	
HDFS 230	Life Span Development (May satisfy general education category B)	
HDFS 242	Couples, Marriages and Families (May satisfy general education category W)	
HDFS 353	Children, Families and Public Policy	
HDFS 448	Issues In Sexuality	
HDFS 468	Families and Work	

HDFS 475	Children and Families Across Cultures (May satisfy general education category B and D)
HIST 259	Women in European History 1400-1800
HIST 260	Women In America
HIST 426	Women in American History
POLS 350	Gender Issues and the Law
POLS 351	Women and Politics
PSYC 210	Human Sexuality (May satisfy general education category B)
PSYC 250	Developmental Psychology (May satisfy general education category B)
SOC 235	Cultural Diversity (May satisfy general education category B and D)
SOC 410	Social Inequality
SOC 412	Sociology of Gender (May satisfy general education category B and D)
SOC 417	Sociology of the Family
SOC 439	Social Change
WGS 496	Field Experience
Total Credits	36

Minor Requirements

Women & Gender Studies Minor

Required Credits: 18

Code	Title	Credits
Required Courses		
WGS 110	Introduction to Women's Studies	3
WGS 350	Perspectives in Women's Studies	3
Core Courses: Select 12 credits of the following		12
CJ 310	Women and Policing	
CJ 465	Women and Minorities in Criminal Justice	
COMM 216	Intercultural Communication	
COMM 380	Health Communication I	
COMM 383	Organizational Communication I	
COMM 412	Gender and Communication	
ENGL 330	British and American Women Writers	
ENGL 331	Contemporary Women Writers	
ENGL 335	Multicultural Writers	
ENGL 454	Language Bias	
ENGL 459	Researching and Writing Grants and Proposal	
FREN 345	Women in French Literature	
HDFS 230	Life Span Development	
HDFS 242	Couples, Marriages and Families	
HDFS 353	Children, Families and Public Policy	
HDFS 448	Issues In Sexuality	
HDFS 468	Families and Work	
HDFS 475	Children and Families Across Cultures	
HIST 259	Women in European History 1400-1800	
HIST 260	Women In America	
POLS 350	Gender Issues and the Law	
POLS 351	Women and Politics	
PSYC 210	Human Sexuality	
PSYC 250	Developmental Psychology	
SOC 235	Cultural Diversity	
SOC 417	Sociology of the Family	
SOC 424	Feminist Theory and Discourse	

SOC 439	Social Change
WGS 112	Introduction to Masculinities
WGS 340	Perspectives in LGBTQ Studies
WGS 370	Transnational/Global Women
Total Credits	18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU

Zoology

Department Information

- **Department Location:**
  Stevens Hall
- **Department Phone:**
  701-231-7087
- **Department Web Site:**
  www.ndsu.edu/biology/
- **Degrees Offered:**
  Minor
- **Program Overview:**
  bulletin.ndsu.edu/programs-study/undergraduate/zoology/

Minor Requirements

Zoology Minor

Minor Requirements

Required Credits: 18

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 315 & 315L	Genetics and Genetics Laboratory	4
Electives: At least 3 credits in department approved 300-400 level courses		6
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Zoology majors may not minor in Zoology or Biology.

General Education

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

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

General Education Category Descriptions

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

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

General Education Program Assessment

General education assessment has three basic purposes:

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

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

General Education Transfer

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

Using NDSU Study Abroad and Study Tour Experiences for General Education Cultural Diversity or Global Perspectives

UNIV 492: Study Abroad – A student who studies abroad for one or more semesters and who successfully completes a minimum of three credits may qualify for either Cultural Diversity or Global Perspectives. 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. In addition, a student must complete a Student Appeal for Exception to General Education Requirements (https://www.ndsu.edu/fileadmin/registrar/forms/genedappeal.pdf) for consideration.

(Prefix) 379: Study Tour – Study Tour experiences do not automatically qualify for NDSU general education. An NDSU study tour instructor must apply for general education course approval in the appropriate category that pertains to the course content (including cultural diversity and global perspectives). Approval requires the instructor to submit a course syllabus and a one-page rationale addressing how the tour experience will meet the outcome being sought. Syllabus and rationale are to be submitted to the University Curriculum Committee well in advance of the tour departure.

Core Undergraduate Learning Outcomes

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

Communication (C)

1. Communication Learning Outcome - students will use a variety of modes, particularly written, oral, artistic, and visual to
   a. effectively communicate analysis, knowledge, understanding, expression and/or conclusions
   b. skillfully use high-quality, credible, relevant sources
   c. demonstrate appropriate conventions in a variety of communication situations
   d. demonstrate the ability to communicate effectively with diverse audiences in a variety of contexts

Quantitative Reasoning (R)

1. Critical Thinking, Creative Thinking, and Problem Solving Learning Outcome - students will
   a. explain the nature of evidence used for analysis
   b. apply quantitative and qualitative methods to collect and analyze data
   c. apply creativity and divergent thinking
   d. evaluate the assumptions, evidence, and logic of competing views and explanations
   e. identify methods of inquiry, approaches to knowledge, and their assumptions and limitations in multiple disciplines
   f. evaluate, synthesize, and apply evidence to understand and address complex, real world problems
   g. generate creative, reasoned, approaches or solutions to unscripted, real world problems

Science & Technology (S)

1. Technology Learning Outcome- students will
   a. apply technology to demonstrate creativity and solve problems
   b. use technology to enhance understanding
   c. identify the social, aesthetic, and ethical implications of technological decisions
   d. analyze how technology shapes, limits, and augments our experiences and understandings
2. Natural and Physical Sciences Learning Outcome - students will
   a. analyze components and dynamics of natural and physical worlds
   b. develop models to explain phenomena within the natural and physical worlds
   c. identify the role of scientific methods in the study of natural and physical worlds

Humanities & Fine Arts (A) and Social & Behavioral Sciences (B)

1. Human Societies Learning Outcomes - students will
   a. identify the nature and impact of aesthetic and creative activities in human experience
   b. analyze the interplay of self and society, particularly how social structures shape human experiences and how humans shape social structures
   c. analyze the components and dynamics of human societies in their artistic, cultural, and historical contexts
   d. apply theories or research methods to understand human events, identities, artifacts, or social structures
   e. engage in a creative, aesthetic, or artistic activity

Social & Behavioral Sciences - Wellness (W)

1. Person & Social Responsibility Learning Outcomes - students will
   a. examine their own values, biases, and conclusions
   b. analyze the ethical basis for and implications of personal, professional, and civic decisions
   c. comprehend and demonstrate appropriate standard of professional behavior

d. identify stewardship of the land and its people as integral to a land-grant university
e. analyze human impacts on the world and the importance of sustaining its resources for future generations

Cultural Diversity (D)

1. Diversity Learning Outcomes - students will
   a. identify how values and contributions of diverse societies provide contexts for individual experiences, values, ideas, artistic expressions, and identities
   b. identify the role diversity plays in the ability of biological organisms to adapt to a changing environment
   c. evaluate how diverse systems (both natural and human-made), technologies, or innovations emerge from, interact with, and affect various communities
   d. collaborate with others in diverse interpersonal, intercultural, or international settings

Global Perspectives (G)

1. Global Perspectives Learning Outcomes - students will
   a. apply theories or research methods to develop strategies and solutions that address global challenges
   b. identify potential benefits and explore the opportunities of being a global citizen
   c. analyze how communities are impacted by and/or contribute to globalization from various perspectives
   d. analyze the process and/or develop models of global trends
   e. evaluate global phenomena using perspectives, attitudes and beliefs of communities with cultural backgrounds different from their own

General Education Administrative Policies

1. General education courses may be used to satisfy requirements for both general education requirements and the major, minor, and program emphases, where applicable.
2. Departments or colleges may preclude their students from double counting general education courses with major courses.
3. Except for courses that meet the cultural diversity or global perspectives requirements, no course can fulfill the requirements for more than one general education category.
4. General education requirements can be met through credit by exam, departmental examinations, or equivalents.
5. General education requirements can be met by successful completion of a course for which an approved general education course in the same department is a prerequisite or by successful completion of an advanced course in the same department with comparable course content.
6. Except for courses offered only on a pass/fail basis, no courses taken to meet the general education requirements may be taken for pass/fail grades.
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/gened/syllabi))
13. Students who have completed basic military training (which is the commitment for enlistment) will receive a waiver for the Wellness category. Military record documentation is required for the waiver; documentation is to be submitted to the Office of Registration and Records with a completed Appeal for Exception to General Education Requirements form. The waiver for the training will not lead to course credit, and all other minimum graduation requirements apply.

General Education Courses

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

Category C: Communications - 12 credits

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

Code	Title	Credits
ENGL 110	College Composition I	4
or ENGL 112	ESL College Composition I	
ENGL 120	College Composition II	3-4
or ENGL 121	Honors Composition II	
or ENGL 122	ESL College Composition II	
COMM 110	Fundamentals of Public Speaking	3
ENGL 320	Business and Professional Writing	3
ENGL 321	Writing in the Technical Professions	3
ENGL 322	Writing and the Creative Process	3
ENGL 324	Writing in the Sciences	3
ENGL 325	Writing in the Health Professions	3
ENGL 326	Writing in the Design Professions	3
ENGL 357	Visual Culture and Language	3
ENGL 358	Writing in the Humanities and Social Sciences	3
ENGL 459	Researching and Writing Grants and Proposal	3
FREN 360	Studies in Language and Style	3
HIST 390	Historical Research and Writing	3
MICR 354	Scientific Writing	3
PHIL 450	Metaphysics	3
PHIL 451	Epistemology	3
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 146	Applied Calculus I	4
MATH 165	Calculus I	4
PHIL 257	Traditional Logic	3
STAT 330	Introductory Statistics	3

CATEGORY S: Science & Technology - 10 Credits

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

Natural Science (Sn):

Code	Title	Credits
AGRI 115	Wonders of Weather	3
BIOL 111	Concepts of Biology	3
BIOL 111L	Concepts of Biology Lab	1
BIOL 124	Environmental Science	3

BIOL 124L	Environmental Science Laboratory	1
BIOL 126	Human Biology	3
BIOL 126L	Human Biology Laboratory	1
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	
ENT 210	Insects, Humans and the Environment	3
GEOL 201	The Geology of Climate Change and Energy	3
HON 342	Colloquium in the Sciences	3
MICR 202	Introductory Microbiology	2
MICR 202L	Introductory Microbiology Lab	1
NRM/RNG 225	Natural Resources & Agrosystems	3
PLSC 110	World Food Crops	3
PLSC 111	Genetics and You	2
PLSC 210	Horticulture Science	3
PLSC 211	Horticulture Science Lab	1
SOIL 217	Introduction to Meteorology & Climatology	3

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	Eastern North Dakota Field Course May be taken as a co-requisite lab if taken with GEOL 105 or GEOL 106.	1
HNES 250	Nutrition Science May be used for Category 5b: Wellness if taken in addition to the 10 credits required in Science & Technology. It may not be counted in more than one category.	3
PHYS 110	Introductory Astronomy	3
PHYS 110L	Introductory Astronomy Lab	1
PHYS 120	Fundamentals of Physics	3
PHYS 120L	Fundamentals of Physics Laboratory	1
PHYS 211	College Physics I	3
PHYS 211L	College Physics I Laboratory	1
PHYS 212	College Physics II	3
PHYS 212L	College Physics II Laboratory	1
PHYS 220	Physics for Designers	3
UNIV 150	Foundations of Science	3
UNIV 151	Science and Society	3

Technology (St):

Code	Title	Credits
CSCI 114	Microcomputer Packages	3
or MIS 116	Business Use of Computers	

CATEGORY A: Humanities & Fine Arts - 6 Credits

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

Code	Title	Credits
ADHM 310	History of Fashion	3
ADHM 315	History of Interiors I	3
ADHM 316	History of Interiors II	3
ADHM 410	Dress in World Cultures	3
ADHM 411	Food and World Cultures	3
ARB 101	First-Year Arabic I	4
ARB 102	First-Year Arabic II	4
ARB 201	Second-Year Arabic I	3
ARCH 321	History and Theory of Architecture I	3
ARCH 322	History of Architecture II	3
ART 110	Introduction to the Visual Arts	3
ART 111	Introduction to Art History	3
ART 153	Design Thinking and Creative Strategy	3
ART 210	Art History I	3
ART 211	Art History II	3
CLAS 101	First-Year Latin I	4
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 330	British and American Women Writers	3
ENGL 331	Contemporary Women Writers	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	20th Century American Fiction	3
ENGL 345	Themes in American Culture	3
ENGL 375	The Bible as Literature	3
ENGL 380	Shakespeare	3
ENGR 311	History of Technology in America	3
ENVD 101	Introduction to Environmental Design	3
FREN 101	First-Year French I	4
FREN 102	First-Year French II	4
FREN 201	Second-Year French I	3
FREN 345	Women in French Literature	3
GERM 101	First-Year German I	4
GERM 102	First-Year German II	4
GERM 201	Second-Year German I	3
GERM 220	German Culture & Society	3
HIST 101	Western Civilization I	3
HIST 102	Western Civilization II	3
HIST 103	U.S. to 1877	3
HIST 104	U.S. Since 1877	3
HIST 135	Race in U.S. History	3
HIST 261	American Indian History	3
HIST 270	American Religious History	3
HIST 271	Introduction to Latin American History	3

HIST 355	History of Global Islam	3
HIST 381	Australia & New Zealand	3
HIST 431	The North American Plains	3
HON 340	Colloquium in the Humanities	3
HON 386	World Literature: Imaginary Homelands	3
LA 321		4
MUSC 100	Music Appreciation	3
MUSC 103	Introduction to Music History	3
MUSC 108	Roots of American Popular Music	3
PHIL 101	Introduction to Philosophy	3
PHIL 111	Professional Responsibility and Ethics	3
PHIL 215	Contemporary Moral Issues	3
PHIL 216	Business Ethics	3
RELS 100	World Religions	3
RELS 220	Old Testament	3
RELS 270	American Religious History	3
RELS 340	New Religious Movements	3
RELS 345	Religion and Politics	3
RELS 355	History of Global Islam	3
SPAN 101	First-Year Spanish I	4
SPAN 102	First-Year Spanish II	4
SPAN 201	Second-Year Spanish I	3
THEA 110	Introduction to Theatre Arts	3
THEA 115	World Film	3
THEA 160	Storytelling	3
THEA 280	World Theatre	3
WGS 110	Introduction to Women's Studies	3
WGS 112	Introduction to Masculinities	3

Fine Arts Performance:

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

Code	Title	Credits
ART 130	Drawing I	3
THEA 161	Acting I	3

CATEGORY B: Social & Behavioral Sciences - 6 Credits

Code	Title	Credits
ADHM 486	Dress and Human Behavior	3
ANTH 111	Introduction to Anthropology	3
COMM 112	Understanding Media and Social Change	3
COMM 114	Human Communication	3
COMM 212	Interpersonal Communication	3
COMM 216	Intercultural Communication	3
ECON 105	Elements of Economics	3
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
EMGT 101	Emergencies, Disasters, and Catastrophes	3
ENGR 312	Impact of Technology on Society	3
GEOG 151	Human Geography	3
GEOG 161	World Regional Geography	3
HDFS 135	Family Science	3
HDFS 186	Consumer and Society	3

HDFS 230	Life Span Development	3
HDFS 475	Children and Families Across Cultures	3
HON 341	Colloquium in the Social Sciences	3
INTL 110	Introduction to International Studies	3
POLS 110	Introduction to Political Science	3
POLS 115	American Government	3
POLS 120	Terrorism	3
POLS 220	International Politics	3
PSYC 111	Introduction to Psychology	3
PSYC 210	Human Sexuality	3
PSYC 211	Introduction To Behavior Modification	3
PSYC 212	Psychological Aspects of Drug Use and Abuse	3
PSYC/SOC 214	Social Interaction	3
PSYC 221	Psychology Applied to Work	3
PSYC 250	Developmental Psychology	3
PSYC 270	Abnormal Psychology	3
SOC 110	Introduction to Sociology	3
SOC 116	Global Social Problems	3
SOC 235	Cultural Diversity	3
SOC 412	Sociology of Gender	3

CATEGORY W: Wellness - 2 Credits

- At least two credits must be taken from the following list
- Required is a social/behavioral science course that integrates at least two areas of lifelong wellness: emotional well-being, nutrition, physical activity, and psychological development.

Code	Title	Credits
HDFS 242	Couples, Marriages and Families	3
HNES 100	Concepts of Fitness & Wellness	2
HNES 111	Wellness	3
HNES 200	Principles of Nutrition	3
HNES 217	Personal and Community Health	3
HNES 250	Nutrition Science	3
PH 101	Introduction to Public Health	3

CATEGORY D: Cultural Diversity

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

Code	Title	Credits
ADHM 410	Dress in World Cultures	3
ADHM 411	Food and World Cultures	3
ANTH 111	Introduction to Anthropology	3
ARB 201	Second-Year Arabic I	3
ART 110	Introduction to the Visual Arts	3
COMM 216	Intercultural Communication	3
ENGL 150	Being Human	3
ENGL 330	British and American Women Writers	3
ENGL 335	Multicultural Writers	3
ENGL 340	19th Century American Fiction	3
ENGL 341	20th Century American Fiction	3
ENGL 345	Themes in American Culture	3
FREN 201	Second-Year French I	3
FREN 345	Women in French Literature	3

GERM 201	Second-Year German I	3
HDFS 475	Children and Families Across Cultures	3
HIST 135	Race in U.S. History	3
HIST 261	American Indian History	3
HIST 271	Introduction to Latin American History	3
HIST 431	The North American Plains	3
HON 386	World Literature: Imaginary Homelands	3
MUSC 108	Roots of American Popular Music	3
PH 101	Introduction to Public Health	3
PHIL 215	Contemporary Moral Issues	3
SOC 235	Cultural Diversity	3
SOC 412	Sociology of Gender	3
SPAN 201	Second-Year Spanish I	3
THEA 115	World Film	3
THEA 280	World Theatre	3
WGS 110	Introduction to Women's Studies	3
WGS 112	Introduction to Masculinities	3

CATEGORY G: Global Perspectives

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

Code	Title	Credits
ARB 101	First-Year Arabic I	4
ARB 102	First-Year Arabic II	4
ARCH 321	History and Theory of Architecture I	3
ART 111	Introduction to Art History	3
BIOL 124	Environmental Science	3
BIOL 124L	Environmental Science Laboratory	1
ECON 105	Elements of Economics	3
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
ENGL 336	Literature and The Environment	3
ENGL 375	The Bible as Literature	3
ENGR 312	Impact of Technology on Society	3
FREN 101	First-Year French I	4
FREN 102	First-Year French II	4
GEOG 151	Human Geography	3
GEOG 161	World Regional Geography	3
GEOL 105L	Physical Geology Lab	1
GEOL 105	Physical Geology	3
GEOL 106	The Earth Through Time	3
GEOL 106L	The Earth Through Time Lab	1
GEOL 201	The Geology of Climate Change and Energy	3
GERM 101	First-Year German I	4
GERM 102	First-Year German II	4
GERM 220	German Culture & Society	3
HIST 355	History of Global Islam	3
HIST 381	Australia & New Zealand	3
INTL 110	Introduction to International Studies	3
NRM/RNG 225	Natural Resources & Agrosystems	3
PLSC 110	World Food Crops	3
POLS 120	Terrorism	3

POLS 220	International Politics	3
RELS 220	Old Testament	3
RELS 340	New Religious Movements	3
RELS 345	Religion and Politics	3
RELS 355	History of Global Islam	3
SOC 116	Global Social Problems	3
SPAN 101	First-Year Spanish I	4
SPAN 102	First-Year Spanish II	4
UNIV 151	Science and Society	3

North Dakota University System General Education Requirements Transfer Agreement

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

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

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

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

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

Student Financial Information

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

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

Tri-College University

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

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

Tuition and Fees

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

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

Course Limits

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

Credits and Grades

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

Course Substitutions

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

Course Repeats

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

Policies and Deadlines

Students must observe all registration and academic policies and deadlines of their home campus, including arrangements for withdrawals, drops/adds, pass/fail options, audits, and incomplete grades.

Registration

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

Tri-College Minors

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

Majors

Majors may be earned only at the school from which a student earns a degree. Most students enroll initially at the school from which they intend to graduate. However, the TCU course exchange agreement between MSUM and NDSU allows a student to begin their studies at one of the schools prior to transferring to the other school to complete their degree. Tri-college students typically are restricted to pre-professional coursework at a campus

that offers a professional program of study. Students should work with the chair of the department in which they intend to major to make sure their program includes all requirements for the major and for graduation.

Library Services

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

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

Bus and Parking Services

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

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

- **Concordia:** TCU students, faculty, and staff can park in Parking Lot C (https://www.concordiacollege.edu/admission-aid/visit-campus/campus-map).
- **MSUM:** TCU students can park in Lots P and K (https://www.mnstate.edu/parking). TCU faculty and staff may park in Lots P, K, and F (https://www.mnstate.edu/parking).
- **NDSU:** Parking Lots R, TA and Fargo Dome lots B, C and D (https://www.ndsu.edu/fileadmin/parking/docs/NDSU_Parking_lots_map.pdf). Faculty/staff permits are honored in the T1 lot. Individuals with state-issued mobility-impaired permits may park in any mobility-impaired space on campus provided the Tri-College institution permit and the state-issued mobility-impaired permit are clearly displayed in conjunction with one another.
- **MState:** Apply for free parking at the Moorhead campus.
- **NDSCS:** contact Campus Police in the Student Center (https://www.ndscs.edu/campus-map) for parking permit information.

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

Undergraduate Policies

Academic Planning

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

Academic Advising

The academic advising program at NDSU is designed to facilitate the student's intellectual and personal growth, to assist students in using university resources, and to guide students in making informed choices regarding academic and career plans. Following admission to NDSU, each student is assigned an adviser from the college or department in which the student is majoring. If a major has not been declared, an assignment is made with an adviser in the Advising Resource Center (https://www.ndsu.edu/advising_resource_center). Advisers assist students in selecting courses to ensure a balanced education and they help interpret university and college policies and requirements. However, students are responsible for their academic decisions including the selection of courses, meeting course requisites (co-requisites/prerequisites), and adhering to policies, procedures,

and deadlines. Students are encouraged to see their adviser prior to registration. Students with adviser holds are required to meet with their advisers before the hold is lifted. Adviser assignments and holds can be viewed on Campus Connection.

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

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

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

Credit By Examination

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

Advanced Placement Examination (AP)

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

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

Examination	Score	Equivalent NDSU Course	Credit Hours	Gen Ed Category
Art-History	3	ART 210 & ART 211	6	A & A
Biology	3	BIOL 111 & BIOL 111L	4	S/L & S/L
Biology	4-5	BIOL 150, BIOL 150L, BIOL 151, & BIOL 151L	8	S/L, S/L, S/L, & S/L
Calculus AB	3	MATH 165	4	R
Calculus BC	3	MATH 165 & MATH 166	8	R & R
Chemistry	3	Free Elective (CHEM 1XX)*	4	S/L
Chemistry	4-5	CHEM 121, CHEM 121L, CHEM 122, & CHEM 122L	8	S/L, S/L, S/L, & S/L
Chinese Language & Culture	3	Free Elective (TRNSFR 1XX)*	3	A/G
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	4-5	CSCI 159	3	R
English Language & Composition	3	ENGL 110 (or ENGL 112)	4	C
English Literature & Composition	3	ENGL 220	3	A
English Literature & Composition	4-5	ENGL 110 & ENGL 220	7	C & A
Environmental Science	3	BIOL 124 & BIOL 124L	4	S/G & S/L
European History	3	HIST 101 & HIST 102	6	A & A
French Language & Culture	3	FREN 101 & FREN 102	8	A/G & A/G
German Language	3	GERM 101 & GERM 102	8	A/G & A/G
Human Geography	3	GEOG 151	3	B/G

Italian Language & Culture	3	Free Elective (TRNSFR 1XX)*	3	A/G
Japanese Language & Culture	3	Free Elective (TRNSFR 1XX)*	3	A/G
Latin	3	Free Elective (TRNSFR 1XX)*	3	A
Latin Literature	3	CLAS 101 & CLAS 102	8	A & A
Macroeconomics	3	ECON 202	3	B/G
Microeconomics	3	ECON 201	3	B/G
Music Theory	3	Free Elective (MUSC 1XX)*	6	A
Physics I: Algebra-Based	3	Free Elective (PHYS 1XX)*	4	S/L
Physics I: Algebra-Based	4	PHYS 211 & PHYS 211L	4	S/L & S/L
Physics II: Algebra-Based	4	PHYS 212 & PHYS 212L	4	S/L & S/L
Physics C - Electricity & Magnetism	3	PHYS 212 & PHYS 212L	4	S/L & S/L
Physics C - Electricity & Magnetism	4	PHYS 252 & PHYS 252L	4	S/L & S/L
Physics C - Mechanics	3	PHYS 211 & PHYS 211L	4	S/L & S/L
Physics C - Mechanics	4	PHYS 251 & PHYS 251L	4	S/L & S/L
Psychology	3	PSYC 111	3	B
Spanish Language	3	SPAN 101 & SPAN 102	8	A/G & A/G
Spanish Literature & Culture	3	Free Elective (SPAN 1XX)*	3	A
Statistics	3	Free Elective (STAT 1XX)*	3	R
Studio Art-2D Design Portfolio	3	ART 122	3	A
Studio Art-3D Design Portfolio	3	ART 124	3	A
Studio Art-Drawing Portfolio	3	ART 130 & ART 230	6	A & A
U.S. Government & Politics	3	POLS 115	3	B
U.S. History	3	HIST 103 & HIST 104	6	A & A
World History	3	Free Elective (HIST 1XX)*	6	A

* Credit received applies toward degree elective credit

General Education Categories:

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

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

For general information or to order AP score reports contact:

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

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

College Level Examination Program (CLEP)

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

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

The following CLEP policies apply at NDSU

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

CLEP Examinations

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

Examination	Score	Equivalent NDSU Course	Credit Hours	Gen Ed Category
American Government	50	POLS 115	3	B
American Literature	50	ENGL 317 & ENGL 318	6	A & A
Analyzing & Interpreting Literature	50	ENGL 271 & Free Elective (ENGL 1XX)*	6	
Biology	50	BIOL 150 & BIOL 150L	4	S/L & S/L
Calculus	50	MATH 146	4	R
Chemistry	50	CHEM 121 & CHEM 121L	4	S/L & S/L
College Algebra	50	MATH 103	3	R
College Composition	50	ENGL 110	4	C
College Composition Modular	50	ENGL 110	4	C
College Mathematics	50	Free Elective (MATH 1XX)*	3	
English Literature	50	ENGL 315 & ENGL 316	6	A & A
Financial Accounting	50	ACCT 200	3	
French Language Level I	50	FREN 101	4	A/G
French Language Level II	59	FREN 101 & FREN 102	8	A/G & A/G
German Language Level I	50	GERM 101	4	A/G
German Language Level II	60	GERM 101 & GERM 102	8	A/G & A/G
History of the United States I	50	HIST 103	3	A
History of the United States II	50	HIST 104	3	A
Human Growth & Development	50	PSYC 250	3	B
Humanities	50	Free Elective (HUM 1XX)*	3	
Information Systems	50	Free Elective (CSCI 1XX)*	2	S
Introduction to Educational Psychology	50	Free Elective (TRNSFR 1XX)*	3	B
Introduction to Business Law	50	Free Elective (TRNSFR 1XX)*	3	
Introduction to Psychology	50	PSYC 111	3	B
Introduction to Sociology	50	SOC 110	3	B
Natural Sciences	50	Free Elective (TRNSFR 1XX)*	3	
Pre-Calculus	50	MATH 107	3	R
Principles of Macroeconomics	50	ECON 202	3	B/G
Principles of Management	50	Free Elective (TRNSFR 1XX)*	3	
Principles of Marketing	50	Free Elective (TRNSFR 1XX)*	3	

Principles of Microeconomics	50	ECON 201	3	B/G
Social Sciences & History	50	Free Elective (TRNSFR 1XX)*	3	
Spanish Language Level I	50	SPAN 101	4	A/G
Spanish Language Level II	63	SPAN 101 & SPAN 102	8	A/G & A/G
Western Civilization I: Ancient Near East to 1648	50	HIST 101	3	A
Western Civilization II: 1648 to the Present	50	HIST 102	3	A

* Credit received applies toward degree elective credit

General Education Categories:

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

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

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

Phone: (800) 257-9558
Email: clep@collegeboard.org
Web site: www.collegeboard.org (https://www.collegeboard.org)

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

DSST Examinations

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

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

Examination	Score	Equivalent NDSU Course	Credit Hours	Gen Ed Category
A History of the Vietnam War	44	Free Elective (HIST 1XX)*	3.00	
Art of the Western World	48	ART 111	3	A
Astronomy	48	PHYS 110	3	S
Business Law	44	Free Elective (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	
Ethics in America	400	PHIL 210	3	

Foundations of Education	46	Free Elective (TRNSFR 1XX)*	3	
Fundamentals of College Algebra	400	MATH 103	3	
Fundamentals of Counseling	45	Free Elective (TRNSFR 1XX)*	3	
General Anthropology	47	ANTH 111	3	B/D
Here's to Your Health	400	HNES 217	3	W
Human Resource Mangement	46	Free Elective (TRNSFR 1XX)*	3	
Human/Cultural Geography	47	GEOG 151	3	B/G
Intro to the Modern Middle East	47	Free Elective (TRNSFR 1XX)*	3	
Intro to Business	400	Free Elective (TRNSFR 1XX)*	3	
Intro to Computing	400	Free Elective (TRNSFR 1XX)*	3	
Intro to Law Enforcement	45	Free Elective (TRNSFR 1XX)*	3	
Lifespan Development Psychology	46	PSYC 250	3	B
Management Information Systems	400	Free Elective (TRNSFR 1XX)*	3	
Money & Banking	48	Free Elective (TRNSFR 1XX)*	3	
Organizational Behavior	48	Free Elective (TRNSFR 1XX)*	3	
Personal Finance	400	Free Elective (TRNSFR 1XX)*	3	
Physical Geology	46	Free Elective (GEOL 1XX)*	3	S/G
Principles of Finance	400	Free Elective (TRNSFR 1XX)*	3	
Principles of Financial Accounting	49	ACCT 200	3	
Principles of Statistics	48/400	Free Elective (STAT 1XX)*	3	
Principles of Supervison	400	Free Elective (TRNSFR 1XX)*	3	
Rise and Fall of Soviet Union	45	Free Elective (HIST 1XX)*	3	
Substance Abuse	400	PSYC 212	3	B

* Credit received applies toward degree elective credit

General Education Categories:

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

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

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

International Baccalaureate (IB)

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

In accordance with North Dakota University System policy, students must receive a predetermined minimum score on higher-level (HL) examinations to qualify for possible awarding of credit and advanced placement, which is determined by the appropriate academic department on campus. Credit

earned through IB may not be used to satisfy residence-credit requirements for graduation. Scores received in IB examinations not included in the table below may be considered for credits. Contact the Office of Registration and Records (https://www.ndsu.edu/registrar/contact) for information.

Examination	Score	Equivalent NDSU Course	Credit Hours	Gen Ed Category
HL Biology	4	BIOL 150, BIOL 150L, BIOL 151, BIOL 151L	8	S/L, S/L, S/L, S/L
HL Chemistry	4	CHEM 121, CHEM 121L, CHEM 122, CHEM 122L	8	S/L, S/L, S/L, S/L
HL English	4	ENGL 220	3	A
HL French B	5	FREN 101, FREN 102, FREN 201	11	A/G, A/G, A/D
HL Geography	4	GEOG 161	3	G
HL German B	5	GERM 101, GERM 102, GERM 201	11	A/G, A/G, A/D
HL History (Africa)	4	Free Elective (HIST 1XX)*	3	
HL History (Americas)	4	HIST 103, HIST 104	6	A, A
HL History (Asia)	4	Free Elective (HIST 1XX)*	3	
HL History (Europe)	4	HIST 102	3	A
HL History (Islamic)	4	Free Elective (HIST 1XX)*	3	
HL History (Middle East)	4	Free Elective (HIST 1XX)*	3	
HL Literature & Performance	4	COMM 312	3	
HL Mathematics	4	MATH 103, MATH 105	6	
HL Physics	5	Free Elective (PHYS 1XX)*	4	
HL Psychology	4	PSYC 111	3	B
HL Spanish B	5	SPAN 101, SPAN 102, SPAN 201	11	A/G, A/G, A/D

* Credit received applies toward degree elective credit

General Education Categories:

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

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

To order official transcripts, please contact:

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

Course Challenge

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

Procedures for pursuing a course challenge include the following

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

Project Lead the Way (PLTW) Eligibility:

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

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

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

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

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

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

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

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

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

English and Mathematics Placement

In accordance with North Dakota University System Policy and Procedure 402.1.2 (http://www.ndus.nodak.edu/makers/procedures/sbhe/default.asp?PID=217&SID=5) students are placed into Math and English courses based on qualifying exam scores. The intent is to appropriately place students into courses that are both challenging and for which they are adequately prepared.

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

- All students are required to successfully earn credit for ENGL 110 and 120 or equivalent as part of the NDSU general education requirements.
- For students who have multiple placement exam scores, the highest placement may be used.
- Eligible students with disabilities may seek reasonable accommodations to take the placement test. Please submit disability documentation to NDSU Disability Services at least two weeks prior to the time in which the accommodations are needed. Documentation will be reviewed and students will be notified if additional documentation is needed to make an eligibility decision. Please submit the request and documentation to: **NDSU Disability Services** (https://www.ndsu.edu/disabilityservices)**;** Dept. 2860; P.O. Box 6050; Fargo, ND 58108-6050; (701) 231-8463.

- Students who have not taken the ACT or SAT are required to enroll in a developmental English course, ASC 087, prior to enrolling in ENGL 110. ASC 087 will be delivered by North Dakota State College of Science (http://www.ndscs.edu) (NDSCS) on the NDSU campus. Students must register through the collaborative student registration (p. 1401) process. Course textbooks for ASC 087 may be purchased through the NDSU bookstore (http://www.ndsubookstore.com).
- Students who are required to begin in ASC 087 must successfully complete the course with a grade of 'S' (satisfactory) before they may enroll in ENGL 110 or equivalent.
- Upon completion of ENGL 120 with a 'C' grade or higher, students will be awarded placement credit (4) for ENGL 110.
- Students who transfer ENGL 120 to NDSU will be awarded placement credit (4) for ENGL 110 after successfully completing their upper division writing course with a grade of 'C' or higher.
- Students with a MELAB score should contact the IELP coordinator (http://www.ndsu.edu/modernlanguages/department_directory) for information on English placement.

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

English ACT Subtest Score	SAT Writing	ACT Aspire	Smarter Balanced 11/12 Grade(ELA)	Accuplacer WritePlacer Test Score	MyFoundationsLab Pearson (CREAM CLEM & Others)	NDSU Course Placement
13 or lower	Evidence Based Reading & Writing: 400 or lower	425 or lower	2 or lower	3-4	69.9% or less	ASC 087: College Writing Prep II (NDSCS Collaborative)
-	350 or lower (Prior to March 5, 2016)	-	-	-	-	ASC 087: College Writing Prep II (NDSCS Collaborative)
14-17	Evidence-Based Reading & Writing: 410-470	426 or higher	3 or higher	5	70% or higher	ENGL 110: College Composition I
-	360-420 (Prior to March 5, 2016)	-	-	-	-	ENGL 110: College Composition I
18 or higher	Evidence-Based Writing & Reading: 480	-	-	6-8	-	ENGL 120: College Composition II
-	430 (Prior to March 5, 2016)	-	-	-	-	ENGL 120: College Composition II

English Placement for International Students

- All students are required to successfully earn credit for ENGL 112 and 122 (or 110 and 120 for native English speakers) or equivalent as part of the NDSU general education requirements.
- Students who are required to begin in LANG 109 must successfully complete the course with a 'C' grade or higher before they may enroll in ENGL 112 or equivalent.
- For students who have multiple exam scores, the highest placement may be used.
- Students with qualifying exam scores, who are advised to enroll in ENGL 122, will be awarded placement credit (4) for ENGL 112 upon completion of ENGL 122 with a 'C' grade or higher.

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

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

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

Exam Type	LANG 109: Language Use in Writing ESL II	ENGL 112: ESL College Composition I
IELTS (Overall)	5.5 or lower	6.0 or higher
TOEFL (Composite)	70 or lower	71 or higher

Pearson (Overall)	49 or lower	50 or higher
ELS Center	ELS 109 or lower	ELS 112 Certificate/Completion

NDSU Math Placement Procedures

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

- For students who have scores from multiple exams, the highest placement will be used.
- Eligible students with disabilities may seek reasonable accommodations to take the placement test. Please submit disability documentation to NDSU Disability Services at least two weeks prior to the time in which the accommodations are needed. Documentation will be reviewed and students will be notified if additional documentation is needed to make an eligibility decision. Please submit the request and documentation to: **NDSU Disability Services** (https://www.ndsu.edu/disabilityservices)**;** Dept. 5160; P.O. Box 6050; Fargo, ND 58108-6050; (701) 231-8463.
- Current, incoming or returning NDSU students who do not have prior college-level mathematics *OR* have not taken an approved placement examination must take the NDSU Pearson Placement exam to determine course placement.
- Students who meet the minimum score requirement of any approved placement examination may elect to take the NDSU Pearson Placement exam to attempt to place into a course above MATH 103 or MATH 104.
- Students that do not meet the minimum score requirement on any approved placement examination will place into Math 98, however, students may elect to take the NDSU Pearson Placement exam offered through NDSU to attempt to place into a course above MATH 98.
- Students who begin in Math 98 must successfully complete the course with a 'C' grade or higher before they may continue to Math 103 or 104.
- Students have the option to retake the NDSU Pearson Placement exam one time and must be completed before the last day to add classes in Campus Connection.
- Questions about the NDSU Pearson Placement exam can be directed to NDSU One Stop (https://www.ndsu.edu/onestop).

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

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

Test	Test Component	Minimum Score
ACT	Math Subtest	21
SAT	MATH	530
SAT (prior to 2/05/2016)	Math + Reading	990
Accuplacer	Elementary Algebra	76
Accuplacer	College Level Math	50
ACT Aspire	Math Subtest	431
ALEKS	Mathematics PPL	46
MyFoundationsLab Pearson (CREAM, CLEM & Others)	Math	70%
EdReady (NROC)	Math Placement	75
MAA Maplesoft	Algebra	12
Smarter Balanced	Grade 11-12 Math	3

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

Pearson	Course Placement
Intermediate Algebra < 70%	Math 098
Intermediate Algebra ≥ 70%	Math 103 or Math 104
Algebra < 60%	Math 103 or Math 104
Algebra 45%-59.9% AND Trigonometry ≥ 30%	Math 107
Algebra ≥ 60% AND Trigonometry < 50%	Math 105 or Math 144* or Math 146
Algebra ≥ 65% AND Trigonometry 40%-64.9%	Math 165 with Math 105
Algebra ≥ 65% AND Trigonometry ≥ 65%	Math 165

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

Students with College Transfer Coursework or Credit by Examination Placement

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

Sequence of NDSU math courses as a reference or guide:

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

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

MATH 98 > MATH 104

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

General Education

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

University General Education Requirements

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

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

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

- A list of university approved general education courses and administrative policies are available here (p. 823).

General Education Category Descriptions

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

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

- **Wellness (W)** is a dynamic and integrative process of becoming aware of healthy lifestyles, of learning to make informed choices, and of developing a balanced approach to living.

General Education Program Assessment

General education assessment has three basic purposes:

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

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

General Education Transfer

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

Using NDSU Study Abroad and Study Tour Experiences for General Education Cultural Diversity or Global Perspectives

UNIV 492: Study Abroad – A student who studies abroad for one or more semesters and who successfully completes a minimum of three credits may qualify for either Cultural Diversity or Global Perspectives. 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. In addition, a student must complete a Student Appeal for Exception to General Education Requirements (https://www.ndsu.edu/fileadmin/registrar/forms/genedappeal.pdf) for consideration.

(Prefix) 379: Study Tour – Study Tour experiences do not automatically qualify for NDSU general education. An NDSU study tour instructor must apply for general education course approval in the appropriate category that pertains to the course content (including cultural diversity and global perspectives). Approval requires the instructor to submit a course syllabus and a one-page rationale addressing how the tour experience will meet the outcome being sought. Syllabus and rationale are to be submitted to the University Curriculum Committee well in advance of the tour departure.

Core Undergraduate Learning Outcomes

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

Communication (C)

1. Communication Learning Outcome - students will use a variety of modes, particularly written, oral, artistic, and visual to
   a. effectively communicate analysis, knowledge, understanding, expression and/or conclusions
   b. skillfully use high-quality, credible, relevant sources
   c. demonstrate appropriate conventions in a variety of communication situations
   d. demonstrate the ability to communicate effectively with diverse audiences in a variety of contexts

Quantitative Reasoning (R)

1. Critical Thinking, Creative Thinking, and Problem Solving Learning Outcome - students will
   a. explain the nature of evidence used for analysis
   b. apply quantitative and qualitative methods to collect and analyze data
   c. apply creativity and divergent thinking
   d. evaluate the assumptions, evidence, and logic of competing views and explanations
   e. identify methods of inquiry, approaches to knowledge, and their assumptions and limitations in multiple disciplines
   f. evaluate, synthesize, and apply evidence to understand and address complex, real world problems
   g. generate creative, reasoned, approaches or solutions to unscripted, real world problems

Science & Technology (S)

1. Technology Learning Outcome- students will
   a. apply technology to demonstrate creativity and solve problems
   b. use technology to enhance understanding

   c. identify the social, aesthetic, and ethical implications of technological decisions
   d. analyze how technology shapes, limits, and augments our experiences and understandings
2. Natural and Physical Sciences Learning Outcome - students will
   a. analyze components and dynamics of natural and physical worlds
   b. develop models to explain phenomena within the natural and physical worlds
   c. identify the role of scientific methods in the study of natural and physical worlds

Humanities & Fine Arts (A) and Social & Behavioral Sciences (B)

1. Human Societies Learning Outcomes - students will
   a. identify the nature and impact of aesthetic and creative activities in human experience
   b. analyze the interplay of self and society, particularly how social structures shape human experiences and how humans shape social structures
   c. analyze the components and dynamics of human societies in their artistic, cultural, and historical contexts
   d. apply theories or research methods to understand human events, identities, artifacts, or social structures
   e. engage in a creative, aesthetic, or artistic activity

Social & Behavioral Sciences - Wellness (W)

1. Person & Social Responsibility Learning Outcomes - students will
   a. examine their own values, biases, and conclusions
   b. analyze the ethical basis for and implications of personal, professional, and civic decisions
   c. comprehend and demonstrate appropriate standard of professional behavior
   d. identify stewardship of the land and its people as integral to a land-grant university
   e. analyze human impacts on the world and the importance of sustaining its resources for future generations

Cultural Diversity (D)

1. Diversity Learning Outcomes - students will
   a. identify how values and contributions of diverse societies provide contexts for individual experiences, values, ideas, artistic expressions, and identities
   b. identify the role diversity plays in the ability of biological organisms to adapt to a changing environment
   c. evaluate how diverse systems (both natural and human-made), technologies, or innovations emerge from, interact with, and affect various communities
   d. collaborate with others in diverse interpersonal, intercultural, or international settings

Global Perspectives (G)

1. Global Perspectives Learning Outcomes - students will
   a. apply theories or research methods to develop strategies and solutions that address global challenges
   b. identify potential benefits and explore the opportunities of being a global citizen
   c. analyze how communities are impacted by and/or contribute to globalization from various perspectives
   d. analyze the process and/or develop models of global trends
   e. evaluate global phenomena using perspectives, attitudes and beliefs of communities with cultural backgrounds different from their own

General Education Administrative Policies

1. General education courses may be used to satisfy requirements for both general education requirements and the major, minor, and program emphases, where applicable.
2. Departments or colleges may preclude their students from double counting general education courses with major courses.
3. Except for courses that meet the cultural diversity or global perspectives requirements, no course can fulfill the requirements for more than one general education category.
4. General education requirements can be met through credit by exam, departmental examinations, or equivalents.
5. General education requirements can be met by successful completion of a course for which an approved general education course in the same department is a prerequisite or by successful completion of an advanced course in the same department with comparable course content.
6. Except for courses offered only on a pass/fail basis, no courses taken to meet the general education requirements may be taken for pass/fail grades.
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/gened/syllabi))
13. Students who have completed basic military training (which is the commitment for enlistment) will receive a waiver for the Wellness category. Military record documentation is required for the waiver; documentation is to be submitted to the Office of Registration and Records with a completed Appeal for Exception to General Education Requirements form. The waiver for the training will not lead to course credit, and all other minimum graduation requirements apply.

General Education Courses

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

Category C: Communications - 12 credits

Nine Credits must be in Writing, three at the Upper-Level*:

Code	Title	Credits
ENGL 110	College Composition I	4
or ENGL 112	ESL College Composition I	
ENGL 120	College Composition II	3-4
or ENGL 121	Honors Composition II	
or ENGL 122	ESL College Composition II	
COMM 110	Fundamentals of Public Speaking	3
ENGL 320	Business and Professional Writing	3
ENGL 321	Writing in the Technical Professions	3
ENGL 322	Writing and the Creative Process	3
ENGL 324	Writing in the Sciences	3
ENGL 325	Writing in the Health Professions	3
ENGL 326	Writing in the Design Professions	3
ENGL 357	Visual Culture and Language	3
ENGL 358	Writing in the Humanities and Social Sciences	3
ENGL 459	Researching and Writing Grants and Proposal	3
FREN 360	Studies in Language and Style	3
HIST 390	Historical Research and Writing	3
MICR 354	Scientific Writing	3
PHIL 450	Metaphysics	3
PHIL 451	Epistemology	3
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 146	Applied Calculus I	4
MATH 165	Calculus I	4
PHIL 257	Traditional Logic	3
STAT 330	Introductory Statistics	3

CATEGORY S: Science & Technology - 10 Credits

- At least four credits must be in natural or physical sciences.
- A one-credit lab must be taken as a co-requisite with a general education science/technology course unless the course includes an embedded lab experience equivalent to a one-credit course.

Natural Science (Sn):

Code	Title	Credits
AGRI 115	Wonders of Weather	3
BIOL 111	Concepts of Biology	3
BIOL 111L	Concepts of Biology Lab	1
BIOL 124	Environmental Science	3
BIOL 124L	Environmental Science Laboratory	1
BIOL 126	Human Biology	3
BIOL 126L	Human Biology Laboratory	1
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	
ENT 210	Insects, Humans and the Environment	3
GEOL 201	The Geology of Climate Change and Energy	3
HON 342	Colloquium in the Sciences	3
MICR 202	Introductory Microbiology	2
MICR 202L	Introductory Microbiology Lab	1
NRM/RNG 225	Natural Resources & Agrosystems	3
PLSC 110	World Food Crops	3
PLSC 111	Genetics and You	2
PLSC 210	Horticulture Science	3
PLSC 211	Horticulture Science Lab	1
SOIL 217	Introduction to Meteorology & Climatology	3

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	Eastern North Dakota Field Course May be taken as a co-requisite lab if taken with GEOL 105 or GEOL 106.	1

HNES 250	Nutrition Science May be used for Category 5b: Wellness if taken in addition to the 10 credits required in Science & Technology. It may not be counted in more than one category.	3
PHYS 110	Introductory Astronomy	3
PHYS 110L	Introductory Astronomy Lab	1
PHYS 120	Fundamentals of Physics	3
PHYS 120L	Fundamentals of Physics Laboratory	1
PHYS 211	College Physics I	3
PHYS 211L	College Physics I Laboratory	1
PHYS 212	College Physics II	3
PHYS 212L	College Physics II Laboratory	1
PHYS 220	Physics for Designers	3
UNIV 150	Foundations of Science	3
UNIV 151	Science and Society	3

Technology (St):

Code	Title	Credits
CSCI 114	Microcomputer Packages	3
or MIS 116	Business Use of Computers	

CATEGORY A: Humanities & Fine Arts - 6 Credits

- No more than 3 of the 6 credits may be in fine arts performance.

Code	Title	Credits
ADHM 310	History of Fashion	3
ADHM 315	History of Interiors I	3
ADHM 316	History of Interiors II	3
ADHM 410	Dress in World Cultures	3
ADHM 411	Food and World Cultures	3
ARB 101	First-Year Arabic I	4
ARB 102	First-Year Arabic II	4
ARB 201	Second-Year Arabic I	3
ARCH 321	History and Theory of Architecture I	3
ARCH 322	History of Architecture II	3
ART 110	Introduction to the Visual Arts	3
ART 111	Introduction to Art History	3
ART 153	Design Thinking and Creative Strategy	3
ART 210	Art History I	3
ART 211	Art History II	3
CLAS 101	First-Year Latin I	4
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 330	British and American Women Writers	3
ENGL 331	Contemporary Women Writers	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	20th Century American Fiction	3
ENGL 345	Themes in American Culture	3
ENGL 375	The Bible as Literature	3
ENGL 380	Shakespeare	3

ENGR 311	History of Technology in America	3
ENVD 101	Introduction to Environmental Design	3
FREN 101	First-Year French I	4
FREN 102	First-Year French II	4
FREN 201	Second-Year French I	3
FREN 345	Women in French Literature	3
GERM 101	First-Year German I	4
GERM 102	First-Year German II	4
GERM 201	Second-Year German I	3
GERM 220	German Culture & Society	3
HIST 101	Western Civilization I	3
HIST 102	Western Civilization II	3
HIST 103	U.S. to 1877	3
HIST 104	U.S. Since 1877	3
HIST 135	Race in U.S. History	3
HIST 261	American Indian History	3
HIST 270	American Religious History	3
HIST 271	Introduction to Latin American History	3
HIST 355	History of Global Islam	3
HIST 381	Australia & New Zealand	3
HIST 431	The North American Plains	3
HON 340	Colloquium in the Humanities	3
HON 386	World Literature: Imaginary Homelands	3
LA 321		4
MUSC 100	Music Appreciation	3
MUSC 103	Introduction to Music History	3
MUSC 108	Roots of American Popular Music	3
PHIL 101	Introduction to Philosophy	3
PHIL 111	Professional Responsibility and Ethics	3
PHIL 215	Contemporary Moral Issues	3
PHIL 216	Business Ethics	3
RELS 100	World Religions	3
RELS 220	Old Testament	3
RELS 270	American Religious History	3
RELS 340	New Religious Movements	3
RELS 345	Religion and Politics	3
RELS 355	History of Global Islam	3
SPAN 101	First-Year Spanish I	4
SPAN 102	First-Year Spanish II	4
SPAN 201	Second-Year Spanish I	3
THEA 110	Introduction to Theatre Arts	3
THEA 115	World Film	3
THEA 160	Storytelling	3
THEA 280	World Theatre	3
WGS 110	Introduction to Women's Studies	3
WGS 112	Introduction to Masculinities	3

Fine Arts Performance:

- Any performance courses must be in addition to those required for the student's major.

Code	Title	Credits
ART 130	Drawing I	3
THEA 161	Acting I	3

CATEGORY B: Social & Behavioral Sciences - 6 Credits

Code	Title	Credits
ADHM 486	Dress and Human Behavior	3
ANTH 111	Introduction to Anthropology	3
COMM 112	Understanding Media and Social Change	3
COMM 114	Human Communication	3
COMM 212	Interpersonal Communication	3
COMM 216	Intercultural Communication	3
ECON 105	Elements of Economics	3
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
EMGT 101	Emergencies, Disasters, and Catastrophes	3
ENGR 312	Impact of Technology on Society	3
GEOG 151	Human Geography	3
GEOG 161	World Regional Geography	3
HDFS 135	Family Science	3
HDFS 186	Consumer and Society	3
HDFS 230	Life Span Development	3
HDFS 475	Children and Families Across Cultures	3
HON 341	Colloquium in the Social Sciences	3
INTL 110	Introduction to International Studies	3
POLS 110	Introduction to Political Science	3
POLS 115	American Government	3
POLS 120	Terrorism	3
POLS 220	International Politics	3
PSYC 111	Introduction to Psychology	3
PSYC 210	Human Sexuality	3
PSYC 211	Introduction To Behavior Modification	3
PSYC 212	Psychological Aspects of Drug Use and Abuse	3
PSYC/SOC 214	Social Interaction	3
PSYC 221	Psychology Applied to Work	3
PSYC 250	Developmental Psychology	3
PSYC 270	Abnormal Psychology	3
SOC 110	Introduction to Sociology	3
SOC 116	Global Social Problems	3
SOC 235	Cultural Diversity	3
SOC 412	Sociology of Gender	3

CATEGORY W: Wellness - 2 Credits

- At least two credits must be taken from the following list
- Required is a social/behavioral science course that integrates at least two areas of lifelong wellness: emotional well-being, nutrition, physical activity, and psychological development.

Code	Title	Credits
HDFS 242	Couples, Marriages and Families	3
HNES 100	Concepts of Fitness & Wellness	2
HNES 111	Wellness	3
HNES 200	Principles of Nutrition	3
HNES 217	Personal and Community Health	3

HNES 250	Nutrition Science	3
PH 101	Introduction to Public Health	3

CATEGORY D: Cultural Diversity

- This requirement may be met by 3 credits taken in any department as part of the 40 credits required for general education in a course approved for cultural diversity.

Code	Title	Credits
ADHM 410	Dress in World Cultures	3
ADHM 411	Food and World Cultures	3
ANTH 111	Introduction to Anthropology	3
ARB 201	Second-Year Arabic I	3
ART 110	Introduction to the Visual Arts	3
COMM 216	Intercultural Communication	3
ENGL 150	Being Human	3
ENGL 330	British and American Women Writers	3
ENGL 335	Multicultural Writers	3
ENGL 340	19th Century American Fiction	3
ENGL 341	20th Century American Fiction	3
ENGL 345	Themes in American Culture	3
FREN 201	Second-Year French I	3
FREN 345	Women in French Literature	3
GERM 201	Second-Year German I	3
HDFS 475	Children and Families Across Cultures	3
HIST 135	Race in U.S. History	3
HIST 261	American Indian History	3
HIST 271	Introduction to Latin American History	3
HIST 431	The North American Plains	3
HON 386	World Literature: Imaginary Homelands	3
MUSC 108	Roots of American Popular Music	3
PH 101	Introduction to Public Health	3
PHIL 215	Contemporary Moral Issues	3
SOC 235	Cultural Diversity	3
SOC 412	Sociology of Gender	3
SPAN 201	Second-Year Spanish I	3
THEA 115	World Film	3
THEA 280	World Theatre	3
WGS 110	Introduction to Women's Studies	3
WGS 112	Introduction to Masculinities	3

CATEGORY G: Global Perspectives

- This requirement may be met by 3 credits taken in any department as part of the 40 credits required for general education in a course approved for global perspectives.

Code	Title	Credits
ARB 101	First-Year Arabic I	4
ARB 102	First-Year Arabic II	4
ARCH 321	History and Theory of Architecture I	3
ART 111	Introduction to Art History	3
BIOL 124	Environmental Science	3
BIOL 124L	Environmental Science Laboratory	1
ECON 105	Elements of Economics	3
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3

ENGL 336	Literature and The Environment	3
ENGL 375	The Bible as Literature	3
ENGR 312	Impact of Technology on Society	3
FREN 101	First-Year French I	4
FREN 102	First-Year French II	4
GEOG 151	Human Geography	3
GEOG 161	World Regional Geography	3
GEOL 105L	Physical Geology Lab	1
GEOL 105	Physical Geology	3
GEOL 106	The Earth Through Time	3
GEOL 106L	The Earth Through Time Lab	1
GEOL 201	The Geology of Climate Change and Energy	3
GERM 101	First-Year German I	4
GERM 102	First-Year German II	4
GERM 220	German Culture & Society	3
HIST 355	History of Global Islam	3
HIST 381	Australia & New Zealand	3
INTL 110	Introduction to International Studies	3
NRM/RNG 225	Natural Resources & Agrosystems	3
PLSC 110	World Food Crops	3
POLS 120	Terrorism	3
POLS 220	International Politics	3
RELS 220	Old Testament	3
RELS 340	New Religious Movements	3
RELS 345	Religion and Politics	3
RELS 355	History of Global Islam	3
SOC 116	Global Social Problems	3
SPAN 101	First-Year Spanish I	4
SPAN 102	First-Year Spanish II	4
UNIV 151	Science and Society	3

North Dakota University System General Education Requirements Transfer Agreement

The North Dakota University System (NDUS) General Education Requirements Transfer Agreement (GERTA (https://www.ndus.edu/employees/articulation-transfer/gerta-guides-request-form)) was established by the State Board of Higher Education to ease student transfers within the system. Although subject to revision by the board, the policies at the time of this printing were as follows:

- If students have completed the lower-division general education course requirements (36 credits or more) at one NDUS institution and transfer to another NDUS institution, then the lower-division general education requirements will have been met.

If the lower-division general education requirements have not been completed before transferring, the general education courses from the indicated areas are applicable to an appropriate general education requirement of the institution to which they are transferred. In these cases, the number of credits required to complete the general education requirement in each area is determined by the policies of the institution to which the courses are transferred.

Students transferring lower-division general education credits within the North Dakota University System need to consult with advisers in their academic programs at NDSU for two reasons. First, degree requirements of individual programs and colleges at NDSU may exceed the university-wide general education requirements. Second, meeting the university-wide lower-division general education requirements by transfer credits may not necessarily prepare students for advanced, upper-division study in an academic major at NDSU.

Students transferring from non-ND University System institutions will have their general education requirements evaluated on a course-by-course basis when they enter NDSU.

Undergraduate Classification

Undergraduate degree-seeking students are classified according to the total number of credits earned. Classification or standing in a declared plan of study may vary from the classification used by the university in determining academic standing, financial aid award levels, etc.

Classification	Completed Credits
Freshman	0 - 26
Sophomore	27 - 59
Junior	60 - 89
Senior	90 or more

Credit limitations may be placed on students who have not been fully admitted to a degree program at NDSU.

Undergraduate non-degree student: One who is not seeking a degree or who has not completed the formal application process for admission. A maximum of 15 undergraduate credits may be completed in a non-degree student status. Non-degree students are not eligible for financial aid.

Undergraduate Degree and Graduation Information

Baccalaureate Degrees

To receive a baccalaureate degree from NDSU, students must complete all of the requirements listed in this section as well as those specified for the particular degree program by a college within the university. Students should consult the curriculum guide (https://www.ndsu.edu/registrar/academics/curricula) or contact the academic department for further information on degree requirements. Degree candidates must satisfactorily complete one of the degree curricula offered at NDSU in accordance with the requirements listed below.

Degree and Graduation Requirements

Students must satisfactorily complete two sets of requirements: a) university-wide requirements including general education and b) college- or department-level requirements, which include requirements for completing majors and minors. Official college- and department-level requirements for majors and minors are available in the curriculum section (p. 463) of this bulletin and in curriculum guides (https://www.ndsu.edu/registrar/academics/curricula) available online. Minimum degree/graduation requirements are as follows:

1. **Academic major requirements:** Satisfactory completion of all requirements of the curriculum in which one is enrolled. Requirements for some academic majors exceed this minimum.
   a. Because curricula are subject to change, intended degrees and majors, as well as second majors and minors, must be declared to be official. This may be done at the point of admission or readmission to the University or by submission of a Major Change form (https://www.ndsu.edu/registrar/forms/majorchange) to the Office of Registration and Records.
   b. Students follow the published curricula in place when a major/minor is declared or from the year of admission to a limited- or selective-enrollment program, whichever applies, to graduation provided enrollment at NDSU has not been discontinued for more than one calendar year.
   c. Students who advance into limited- or selective-enrollment programs will have their academic degree/plan status changed accordingly based on information provided to Registration and Records by the respective academic department.
   d. Students who discontinue enrollment at NDSU for more than one calendar year are subject to meet the curricular requirements in effect during the term of readmission.
   e. Each program of study presented by a candidate for the baccalaureate degree is audited for meeting the degree requirements by the Office of Registration and Records.
2. **Total degree credits:** Earn a minimum total of 120 credits in approved coursework. Requirements for some academic programs may exceed this minimum.
3. **General education requirements:** Satisfactory completion of the general education requirements as specified by the University.
4. **Scholastic standing requirement:** A minimum institutional grade-point average of 2.00 based on work taken at NDSU is required for graduation. When a course is taken and repeated at NDSU, only the most recent grade and credits earned will be used in computing the cumulative grade-point average. Some academic programs require higher minimum grade-point requirements.
5. **Upper-level credit requirements:** At least 36 of the credits presented for graduation must be in courses taken at the 300 and 400 level.
6. **Transfer Students:** Students with transfer credit from another institution must earn a minimum of 60 semester credits from a baccalaureate-degree granting or professional institution. Of these, at least 36 must be NDSU residence credits as defined below. Within these 36 resident credits, minimum requirements include 15 semester credits in courses numbered 300 or above (36 upper-level credits must still be earned in total) and 15 semester credits in the major field of study.
7. **Residence requirements:** Residence credits include credits registered and paid for at NDSU. These may include courses offered on the NDSU campus or Tri-College (p. 832). At least 36 credits must be NDSU resident credits.
8. **Financial obligations:** Satisfy all financial obligations owed to the university.
9. **Application for degree:** All candidates for a baccalaureate or Pharmacy Doctorate degree must indicate their intent to graduate when registering for their last semester. The application form (https://www.ndsu.edu/registrar/forms/degreeapp) is available online. Failure to apply by the published graduation application deadline of the planned semester of graduation may delay the awarding of the degree until the following semester. If a student fails to complete the required courses by the intended graduation term, the student must reapply for graduation in a following term.

Majors and Minors

Majors and minors are integral parts of baccalaureate degree curricula. Specific curriculum requirements for majors may be acquired from the appropriate departmental office or from Registration and Records. Minimum credit requirements for degrees are outlined in NDUS SBHE Policy 409 (https://www.ndus.edu/makers/procedures/sbhe/default.asp?PID=102&SID=5). Students are responsible for following the requirements in place at the time a major or minor is officially declared with the university.

Major: A major is a planned grouping of related courses that totals a minimum of 32 credits.

Minor: A minor is a similar grouping of courses that totals a minimum of 16 credits. A minimum of eight credits must be earned in residence at NDSU.

Second or Multiple Majors: A second (or multiple) major may be earned by completing the requirements of both (or all) majors offered under the same baccalaureate degree. At least 15 unique credits must exist between the majors.

Multiple majors or minors may be completed and recorded on the student's academic record after the degree for the first major has been awarded. When majors under different degrees are involved, the requirements for a second degree apply (See next section).

Second Degree

A second baccalaureate degree may be earned at NDSU with all of the following provisions:

1. All curriculum requirements are satisfactorily completed.
2. Each baccalaureate degree must be different. However, students may complete requirements for more than one major within a given degree, if available (see second /multiple majors).

Certificates

A certificate program is a specialized course of study requiring at least 9 credit hours at the undergraduate level or eight credit hours at the graduate level, per NDUS SBHE policy 409. Certificates may be earned while in pursuit of a degree or as standalone programs of study. Prospective students interested in certificate programs, but not seeking a degree, must be accepted to the university. Contact the Office of Admission (https://www.ndsu.edu/admission) or the Graduate College (https://www.ndsu.edu/gradschool) for further information. Curricular requirements and verification forms are available in academic departments offering certificates. Completed forms must be signed by the appropriate department chair (and Graduate College, if applicable) and submitted to Registration and Records in order for the certificate to be posted to a student's academic record and official documentation issued.

Exceptions to Academic Program Requirements

Academic policies and curricular requirements are designed to ensure that programs at NDSU are consistently of high quality. Students are expected to complete all curricular requirements, which includes the overall University requirements (includes general education), any college or department requirements if applicable, and major program of study requirements. Students may request substitutions or waivers for college or departmental requirements when extenuating circumstances prevail. Depending on the nature of the requested exception, departmental or college level approval is required.

Bachelor of Arts Requirement Using a Second Language

The Bachelor of Arts (B.A.) degree may be conferred upon students who complete the major requirements for their chosen field of study and have functional proficiency in at least one language other than English. The B.A. degree recognizes these students as having acquired the foundation for enhancing their ability to communicate, work, and study in an internationalized world. The B.A. signifies that these students have chosen to develop, through the equivalent of at least four semesters of coursework, both practical language skills and a comparative perspective on their own language and culture. The B.A. second language requirement fosters an awareness of the culturally conditioned nature of the students' assumptions about the world, and it better equips them with the mental agility needed to understand ways of thinking different from their own as they encounter the diversity of professional and personal relationships, as well as the intellectual and practical challenges of their future careers.

The second language requirement of the B.A. degree involves student demonstration of functional language proficiency over a sustained period of time, typically 14 credits of coursework. Given the sequential nature of language courses, the assessment of their abilities across the range of skills in speaking, reading, writing and listening comprehension is continuous and demanding. For this reason, NDSU requires that those students who have prior language-learning experience or who present language examination scores (CLEP, etc.) take, at minimum, the exit-level (202) course in order to verify their broad functional ability and basic cultural competence. It is important to note that the language requirement is not defined in credits but in terms of proficiency or communicative competence in all four skills of speaking, reading, writing and listening comprehension.

To fulfill the B.A. language requirement a student must demonstrate competence equivalent to that normally attained after four semesters of college study (NDSU level 202). Competency may be demonstrated in the following ways:

1. Completion in any second language of coursework at the NDSU 202 level or its equivalent with a grade of 'C' or better. Note that this requirement cannot be fulfilled by coursework taken pass/fail.

2. Successful completion of any second language course with a grade of 'C' or better that has the equivalent of NDSU 202 or higher as a prerequisite.
3. For students having previously passed the CLEP Examination (p. 836) 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. 835) with a minimum score of 4 in French, German or Spanish, taking one additional college-level language class at the 202 level or higher in order to demonstrate competency in all four skill levels. Students must complete this course with a 'C' or better.
4. English satisfies the B.A. language requirement for students whose official, certified transcripts demonstrate that their secondary or higher education was completed in a language other than English. It is the responsibility of the student to provide all necessary untranslated, official documentation to the Department of Modern Languages (https://www.ndsu.edu/modernlanguages) for verification. No credit will be awarded.
5. Students who are unable to provide the above mentioned certified documentation but who are native speakers of languages other than English may fulfill the second language requirement through proficiency in English by successful completion of the three-semester General Education English composition sequence and by passing an additional English (ENGL) course with a 'C' or better. Students having completed this sequence may apply to the Department of Modern Languages (https://www.ndsu.edu/modernlanguages) for a waiver of the Second Language requirement.
6. Requests for determination of proficiency in languages not taught at NDSU are considered by the Department of Modern Languages (https://www.ndsu.edu/modernlanguages). If a student would like to demonstrate proficiency through testing in a language that is not taught at NDSU, it is his/her responsibility to arrange for such testing. The proficiency test must be completed by a faculty or staff member at a college or university; the evaluator must hold at least a master's degree (in any discipline). The test must evaluate reading, writing, listening and speaking through the fourth semester (intermediate NDSU 202) college level. The student must provide documentation from the evaluator which includes a copy of the test, a letter from the evaluator assessing the level of proficiency, and a statement of the evaluator's credentials, including an explanation of his/her expertise in the language being tested, if the evaluator does not teach that language at the college level. No credit is awarded but proficiency requirement is fulfilled.

Graduation with Honor

Graduation with honor applies only to baccalaureate degrees. Candidates who have earned a minimum of 60 credits in residence at NDSU and a minimum institutional grade point average of 3.50 will graduate with honor. All final grades on the NDSU academic record will be included in grade point average calculations for graduating with honor. Students who meet these academic criteria will graduate according to one of the following honor levels:

Honor	Criteria
Summa Cum Laude	equal to or greater than 3.90
Magna Cum Laude	equal to or greater than 3.70 and less than 3.90
Cum Laude	equal to or greater than 3.50 and less than 3.70

Degree Audits

Each program of study presented by a candidate for the baccalaureate degree is audited for meeting the degree requirements by the Office of Registration and Records. Degree candidates are certified by the Office of Registration and Records according to total credits earned, institutional grade-point average, and other university requirements (See Degree and Graduation Requirements).

A degree audit is an official review of graduation requirements to determine a student's graduation eligibility. Undergraduate students who have completed a minimum of 75 credits are notified and asked to complete the degree audit request (https://www.ndsu.edu/registrar/forms/degreeaudit). Degree audits are not automatically completed as student educational and degree goals vary (multiple degree, majors, minors, etc.). An official degree audit is completed by the Office of Registration and Records typically two semesters prior to the student's reported graduation on the audit request.

At any time, however, undergraduate students and their advisers may track degree progress using the Academic Requirements Report (https://www.ndsu.edu/registrar/academics/advising/advisement) (automated degree audit) feature on Campus Connection. This functionality is interactive and also allows the student to plan for upcoming semesters within the advisement report. Instructions and information on how to access and read an Academic Requirements Report are available to students and advisers.

Scholastic Standing

Academic progress is measured by grades and credits earned. Students receive acknowledgment for high academic achievement and are given warning at the end of each semester via NDSU email when they become academically deficient.

To be eligible to register continuously without conditions, an undergraduate or professional student must maintain good academic standing, which is defined as a minimum cumulative institutional grade point average of 2.00 (4.00 scale).

Some programs of study have academic standards higher than the University minimum. Students should consult with their adviser or academic department for program specific requirements.

Records of all students are examined at the end of each grading period. Academic standing relates to the following:

Good Standing

Good standing reflects when a student's term GPA and cumulative GPA are both at or above 2.00.

Academic Warning

An academic warning is to alert a student that his/her term GPA is below the minimum required for good standing, even though the institutional cumulative GPA is at or above 2.00. An academic warning does not appear on the official academic transcript but does appear on the unofficial transcript. Students are notified of their academic warning status via official NDSU email.

Academic Probation

An academic probation is issued when a student who entered the grading period on good standing or academic warning earns an institutional cumulative GPA below the minimum 2.00 for good standing. An academic probation does not appear on the student's official academic transcript, but does appear on the unofficial transcript. Students are notified of their academic probation status via official NDSU email.

Continued Probation

Continued probation is a formal extension of the academic probation status. It is issued when a student enters the grading period on academic probation or continued probation, shows adequate progress by attaining a minimum term GPA of 2.00, but his/her cumulative institutional GPA is still below the minimum 2.00 for good standing. Continued probation does not appear on the student's official academic transcript, but does appear on the unofficial transcript. Students are notified of their continued probation status via official NDSU email.

Academic Suspension

Academic suspension is issued when a student enters the term on either probation or continued probation and earns both a term GPA and institutional cumulative GPA below the minimum 2.00 for good standing. This includes students admitted on probation for their first semester at NDSU or readmitted on probation following an academic suspension. A student may not be considered for readmission for two grading periods following an academic suspension (includes summer). An academic suspension appears on the student's official academic transcript. A suspension hold is placed on the student's record by the Office of Registration and Record which prevents all future registration. If a student has pre-registered for classes in a future semester, these courses will be administratively removed by the Office of Registration and Records. Students who are suspended are notified of their suspension status via official NDSU email.

Filing a Suspension Appeal Based on Extenuating Circumstances

A student who has been suspended may appeal the suspension ***but only if there are extraordinary circumstances beyond the student's control that can be supported with documentation.*** An Appeal Academic Suspension (https://www.ndsu.edu/fileadmin/registrar/forms/suspappeal.pdf) form is available online and must be submitted to the Office of Registration and Records no later than the deadline published on the appeal form. If approved, the student must make satisfactory academic progress in the subsequent term according to the published academic standards of the University (see above).

Readmission After Serving an Academic Suspension

To be considered for readmission after serving an academic suspension, students must sit out a minimum of two semesters (includes summer) and file a Reactivation/Petition for Readmission Form (https://www.ndsu.edu/pubweb/rr/forms/reactivation) to the Office of Registration and Records a minimum of 30 business days prior to the beginning of the semester in which the student is eligible for readmission or for when readmission is sought. The petition is reviewed by a college committee and if approved, the student will be readmitted on academic probation and may register for classes. Students who enrolled in courses at another institution while serving the terms of an NDSU academic suspension must arrange for an official transcript to be sent to the Office of Registration and Records **before** readmission will be considered. Students re-entering NDSU from an academic suspension who attended courses elsewhere must earn a minimum cumulative GPA of 2.00 in those classes. NDSU reserves the right to revoke readmission if official transcripts are not received or the final cumulative GPA from a sending institution is below 2.00.

An Academic Suspension from Another Institution

NDSU honors suspensions of other institutions. Transfer and returning students who have been suspended from another institution may not be considered for admission or readmission until one year has lapsed or the suspension has been lifted. Students who fail to report all previous college work are subject to dismissal or loss of credit or both. Courses previously completed at NDSU may only be repeated at NDSU for grade and GPA improvement on the NDSU academic record, with the exception of Tri-College courses (see Repeated Courses (p. 1397) section for more details).

Dean's List

To be eligible for inclusion on the Dean's List for any given semester, a student must have earned a minimum grade-point average of 3.50 during that term while completing at least 12 semester hours (nine semester hours during the summer) in graded coursework. Graded coursework includes the developmental course MATH 098. MATH 098 does not satisfy graduation requirements and does not calculate into the cumulative grade-point average on the academic record, but it is factored into the overall attempted credits and honor points for Dean's List consideration.

The Dean's List is only maintained for undergraduate students and professional (Pharm.D.) students. Credits taken simultaneously via transfer, 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).

Notification: The Office of Registration and Record notifies University News of Dean's List honorees.

Academic Forgiveness

A former NDSU student who has not completed a baccalaureate degree and has not been in attendance at NDSU for six (6) or more years, but who is presently enrolled at NDSU, may request to exclude from grade-point-average calculations all grades earned in selected full terms (quarters or semesters) completed at NDSU prior to the six-year interval.

The courses and grades for the terms selected will remain on the student's academic record, but credits, honor points, and grades will be excluded from grade-point average calculations. Excluded courses cannot be used to satisfy any academic requirements. A student may exercise this option only once by submitting a written request to the Office of Registration and Records (https://www.ndsu.edu/registrar).

Transfer and Test Credit

Transfer credit evaluations are conducted in the Office of Registration and Records (https://www.ndsu.edu/registrar). The evaluation process begins after a student is admitted to the university by the Office of Admission (https://www.ndsu.edu/admission), or has completed the reactivation process with the Office of Registration and Records, if a returning NDSU student. The evaluation process takes 6-8 weeks on average.

Evaluation of Transfer Credit from U.S. Institutions

The Office of Registration and Records administers the NDSU policies governing the acceptance of college credit from outside institutions. These requirements apply to returning students who have attended other institutions, as well as new NDSU students. Before credits may be evaluated for specific NDSU course equivalency or application to programs of study, transfer courses must be accepted for university credit according to the following criteria:

1. Credit by examination (p. 835), College-level coursework from regionally accredited colleges or universities (or equivalent for international institutions), and Joint Services transcripts are eligible for acceptance in transfer.
2. Course repeats
   a. Courses repeated elsewhere prior to attending NDSU will be accepted in transfer as indicated on the transferring institution's official transcript. Transfer courses taken from multiple institutions that have the same NDSU equivalent will be considered as a repeated course, and only the most recent attempted course will be accepted for transfer.
   b. Courses will not be accepted in transfer to replace any grades or credits earned at NDSU. If a course is completed at NDSU and an attempt is made to repeat that course elsewhere, the course is considered duplication and is not eligible for transfer. (See also Repeated Courses (p. 1397) policy)
3. Credit for a remedial course is not accepted for transfer if the course is remedial by definition of the transferring institution or if it is equivalent to a remedial course at NDSU. Remedial courses may, however, fulfill prerequisite requirements, if applicable.
4. Any credit by examination, such as AP or CLEP, credit awarded via placement, or life experience credit awarded by another institution is not accepted in transfer.
5. The Office of Registration and Records determines the applicability of transfer credit toward NDSU general education requirements (p. 820) according to institutional and North Dakota University System guidelines.
6. College-level credits that do not have course equivalents at NDSU will be accepted as free electives and may count only toward total credits. An academic department may determine whether these transfer electives may satisfy specific curricular requirements through a course substitution process. (See also General Education Administrative Policies (p. 823).)
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. 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.
9. The name of transfer institutions and total credits accepted by NDSU will be indicated on the official NDSU transcript. Individual transfer courses are not detailed on the academic transcript, but are provided in an official transfer evaluation and academic requirements report (https://www.ndsu.edu/registrar/academics/advising/advisement) after admission to the university.
10. Total transfer credits are converted to semester credits, if applicable.
11. Transfer grades are recorded but not computed in the institutional cumulative GPA. Transfer grades are used only for purposes of admission to the University, admission to certain programs, and for some scholarships and financial aid.

Evaluation of Transfer Credit from International Institutions

According to North Dakota University System policy effective January 2013, international transcripts must be submitted to an approved external evaluation service. Obtaining an evaluation is the sole responsibility of the student. Evaluations must be submitted according to the guidelines listed below. The guidelines for the evaluation of transfer credit listed for Domestic/US Institutions also apply to international transfer credit. NDSU students participating in an approved study-abroad program are not required to submit transcripts from study abroad experiences to an evaluation service. International students transferring from a North Dakota State University partnership institution are exempt from submitting an external international evaluation.

- Students must submit official transcripts to an evaluator that has been approved by the National Association of Credential Evaluation Services (NACES) (http://www.naces.org/members.htm) or the Association of International Credential Evaluators (AICE) (http://www.aice-eval.org).
- Official transcript(s) issued in English must be submitted to NDSU in addition to the evaluation unless the evaluation service provides certification of student documents and sends copies of transcript(s) to NDSU. Currently World Education Services (WES) (https://www.wes.org) is the only organization that provides NDSU with the required, certified documentation.
- New transfer students who have completed coursework at an institution outside the United States must submit transcripts to an approved evaluation service for a **course by course** evaluation.
- New international students should send evaluations directly to the NDSU Office of Admission (https://www.ndsu.edu/admission).
- New domestic students or United States permanent resident students should send evaluations directly to the NDSU Office of Admission (https://www.ndsu.edu/admission).
- Students must submit course descriptions for all completed coursework directly from the international institution to the NDSU Office of Registration and Records (https://www.ndsu.edu/registrar) .
- Effective January 2015, all international transfer English coursework from non-native English speaking countries will not be accepted. English Coursework will transfer as remedial credit, and will be listed as equivalent to ENGL DEV at NDSU.

Common Course Numbers

Institutions in the North Dakota University System have established common course numbers (CCN) (https://www.ndus.edu/employees/articulation-transfer/courses-with-common-transferrable-content) to facilitate transfer within the University System. Under the CCN agreement, transfer students who have successfully completed CCN courses will not be required to retake them at NDSU unless their degree program requires a higher grade. However, CCN courses will not fulfill residence requirements nor will 100- and 200-level courses fulfill upper-division requirements for graduation.

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 a transfer elective with the credit going towards the General Education Category: Wellness.
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 transfer 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

Graduate

Graduate Programs

Doctoral

History (p. 360)

Industrial & Manufacturing Engineering (p. 367)

Materials & Nanotechnology (p. 376)

Mathematics (p. 381)

Mechanical Engineering (p. 384)

Molecular Pathogenesis (p. 391)

Music (DMA) (p. 393)

- Performance
- Conducting

Natural Resources Management (p. 402)

Nursing (DNP) (p. 405)

Pharmaceutical Sciences (p. 407)

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Plant Sciences (p. 414)

Psychological Clinical Science (p. 420)

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STEM Education (p. 445)

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Masters

Accountancy (p. 238)

Advanced Athletic Training (M.S.) (p. 242)

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Architecture (http://bulletin.ndsu.edu/graduate/programs/architecture)

Athletic Traning (M.A.Trg.) (p. 374)

Biochemistry (p. 254)

Food Safety (p. 349)

Genomics & Bioinformatics (p. 350)

Health Nutrition and Exercise Science (p. 355)

- Dietetics*
- Exercise /Nutrition Science
- Leadership, Physical Education and Sport

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- Gerontology*
- Youth Development*

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- Performance

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Youth Program Management and Evaluation (p. 363)*

* Progam Available Online

Accountancy

Department Information

- **Program Coordinator:**
  Jill M. Zuber, Ph.D., CPA
- **Phone:**
  Barry Hall 200B
- **Email:**
  jill.zuber@ndsu.edu
- **Department Phone:**
  (701) 231-6651
- **Department Web Site:**
  www.ndsu.edu/business/graduate/macc/
- **Application Deadline:**
  Applications are reviewed on a rolling schedule.
- **Degrees Offered:**
  M.Acc.
- **Test Requirement:**
  GMAT 550 or GRE
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5

Program Description

The Master of Accountancy (M.Acc.) program at North Dakota State University is a non-thesis, professional program structured to advance the knowledge of qualified students with an undergraduate accounting degree. In addition, this program will enable students without an undergraduate accounting degree to prepare for a challenging but richly rewarding career in accounting. The accounting prerequisites for the program may be met with graduate courses, some of which are newly designed and online.

The Master of Accountancy (M.Acc.) program at NDSU is designed to have students complete graduate studies needed to advance their careers in public accounting, corporate accounting, or government accounting and to prepare them for the Certified Public Accountant (CPA) exam or Certified Management Accountant (CMA). Our approach to learning involves creating a collaborative environment in which students can develop analytical skills and gain in-depth accounting knowledge. Students will be prepared to identify accounting problems, research the problem and possible solutions

through the use of on-line databases, and present a recommended action. The learning environment also provides students with the opportunity to draw from the experiences of fellow students from diverse backgrounds.

Through the College of Business, North Dakota State University's M.Acc program is fully accredited by AACSB International (http://aacsb.edu), the premier accrediting agency in business administration and accounting.

A. **Admission requirements for NDSU accounting majors**

1. The applicant's overall undergraduate GPA should be at least 3.0 on a 4.0 scale.

2. The applicant's GPA for upper-division accounting courses should be at least 3.0 on a 4.0 scale.

3. The applicant does not have to complete the GMAT, if the student meets the minimum GPA requirements (requirements A.1. and A.2.).

4. If the applicant's GPA is below the 3.0 standards (requirements A.1. and A.2.), conditional admission to the program *may* be allowed under the following conditions:

    4.1. The student has significant post-graduation work experience OR
    4.2. The student takes the Graduate Management Admissions Test (GMAT) with an expectation that the student earn a score of at least 550.

5. Students must also submit a letter stating reasons for wanting a Master of Accountancy degree. Names of two NDSU accounting professors must be entered on the application, but no references are required.

6. If the above requirements are not met, the applicant *may* be granted conditional admission.

7. Conditional admission is granted solely at the discretion of the program coordinator and/or admissions committee.

B. **Admission Requirements for Students Graduating with Accounting Major from Tri-College Schools, North Dakota four-year not-for-profit schools and AACSB accredited Schools**

1. The student's overall GPA should be at least 3.0 on a 4.0 scale.

2. The student's GPA for upper-division accounting courses should be at least 3.0 on a 4.0 scale.

3. Applicants do not have to complete the GMAT, if the student meets the minimum GPA requirements (Requirements B.1. and B.2.).

4. If the student's GPA is below the 3.0 standards (Requirements B.1. and B.2.), conditional admission to the program *may* be allowed under the following conditions:

    4.1. The student has significant post-graduation work experience OR
    4.2. The student takes the Graduate Management Admissions Test (GMAT) with an expectation that the student earn a score of at least 550.

5. Students must also submit a letter stating reasons for wanting a Master of Accountancy degree and two letters of recommendation.

6. If the above requirements are not met, the student *may* be granted conditional admission.

7. Conditional admission is granted solely at the discretion of the program coordinator and/or admissions committee.

C. **Admission Requirements for All Others**

1. The student has an undergraduate degree from a regionally accredited school.

2. The student's overall GPA should be at least 3.0 on a 4.0 scale.

3. The student's GPA for upper-division accounting courses should be at least 3.0 on a 4.0 scale.

4. The student takes the Graduate Management Admissions Test (GMAT) with an expectation that the student earn a score of at least 550.

5. If the student has not completed all of the following core courses or their equivalent in their undergraduate program, the student *may* be conditionally admitted to the program.

    5.1. **Core courses**

        5.1.1. ACCT 311 (Intermediate Accounting I)
        5.1.2. ACCT 312 (Intermediate Accounting II)
        5.1.3. ACCT 320 (Cost Accounting)
        5.1.4. ACCT 418 (Tax I)

5.1.5. ACCT 421 (Audit I)
5.2. The student will be expected to complete any missing core courses within the first two semesters of the program.
5.3. Students must meet the minimum GPA standard of 3.0 for all of the core courses for final acceptance into the program.

6. If the student's undergraduate GPA is below the 3.0 standards (Requirements C.2. and C.3.), conditional admission to the program *may* be allowed under the following conditions:

6.1. The student has significant post-graduation work experience OR
6.2. The student takes the Graduate Management Admissions Test (GMAT) with an expectation that the student earn a score of at least 550.

7. Students must also submit a letter stating reasons for wanting a Master of Accountancy degree and two letters of recommendation.

8. If the above requirements are not met, the student *may* be granted conditional admission.

9. Conditional admission is granted solely at the discretion of the program coordinator and/or admissions committee.

D. **Conditional status expires and regular admission is granted if the applicant meets the terms of their conditional admission. See sections A.6., A.7., B.6., B.7., C.8. and C.9. above**.

E. **A student who attended a university outside of the United States must submit a course-by-course transcript evaluation from World Education Services (WES). See www.wes.org.**

Financial Assistance

A limited number of graduate assistantships are available each semester through the Master of Accountancy program. The program coordinator will send an application for the assistantship to all eligible students who have applied to the program by the application deadlines.

The total course requirements necessary to complete the M.Acc. degree will vary depending on the background of the student. Students without an undergraduate accounting degree will be required to take a core of undergraduate accounting courses in addition to the graduate courses required for the degree. See para. C.5. of the Admission Requirements. A student with an academic background in accounting will need to take 10 graduate-level courses (30 semester credit hours) and generally complete the degree in two or three semesters depending on the number of courses a student desires to take in a semester. Students are welcome to pursue the degree on a part-time or a full-time basis.

The graduate course work for the M.Acc. degree includes four required courses in accounting theory, applied professional research, legal aspects of business, and information resource management. In addition, the student must take five accounting electives from a list of courses that includes fraud examination, taxes, cost management, auditing, international financial reporting standards, and advanced financial accounting. Finally, the student must take one non-accounting elective from a list that includes courses on human resource management, international management, and organizational communication.

Code	Title	Credits
MIS 770	Information Resources Management	
ACCT 730	Legal Aspects of Business	
ACCT 735	Applied Professional Research	
ACCT 750	Accounting Theory	
Total Required Credit Hours		12
Select 5 of the following:		15
ACCT 610	Fraud Examination [1]	
ACCT 611	Advanced Fraud Examination [1]	
ACCT 615	Advanced Accounting [1]	
ACCT 619	Tax Accounting II [1]	
ACCT 620	Accounting Information Systems [1]	
ACCT 625	Government and Not-for-Profit Accounting [1]	
ACCT 640	Management Control Systems [1]	
ACCT 722	Auditing II	
ACCT 725	International Financial Reporting Standards	
ACCT 755	Financial Statement Analysis	
Select one of the of the following:		3
COMM 783	Advanced Organizational Communication I	
MGMT 640	International Management	
MGMT 650	Human Resource Management	

MGMT 651	Negotiation and Alternative Dispute Resolution	
MGMT 671	Leading the Nonprofit Organization	
MGMT 750	Advanced Organizational Behavior	
Total Credits		30

[1] Students cannot take the 600-level course if they took the 400-level course

NOTES

- Students must complete a minimum of 15 credits at the 700-level.
- Summer courses are offered if sufficient students register to take the class.

You must have completed the following undergraduate courses or their equivalent.

Code	Title	Credits
ACCT 311	Intermediate Accounting I	4
ACCT 312	Intermediate Accounting II	4
ACCT 320	Cost Management Systems	3
ACCT 418	Tax Accounting I	3
ACCT 421	Auditing I	3

Margaret (Peggy) Andersen, Ph.D.
Professor
Speciality: Accounting, Cost Management, and Theory

James W. Clifton, M.Acc., CPA
Assistant Professor of Accounting Practice
Speciality: Accounting, Fraud, and Taxation

Thomas D. Dowdell, Ph.D.
Professor
Speciality: Accounting and Auditing

Nancy J. Emerson, MAS, CPA, CFE
Senior Lecturer
Speciality: Accounting and Government/Nonprofit Accounting

Yongtao "David" Hong, Ph.D.
Associate Professor
Speciality: Advanced Accounting and International Standards

Bonnie Klamm, Ph.D., CPA
Professor
Speciality: Accounting Information Systems

Michael J. Peterson, Ph.D.
Associate Professor
Speciality: Accounting and Cost Management

Herbert Snyder, Ph.D.
Professor
Speciality: Auditing, Forensic Accounting

Limin Zhang, Ph.D.
Associate Professor
Speciality: Management Information Systems

Jill Zuber, Ph.D., CPA
Associate Professor
Speciality: Accounting and Taxation

Advanced Athletic Training

Department Information

- **Department Head:**
  Yeong Rhee, Ph.D.
- **Program Coordinator:**
  Kara Gange, Ph.D.
- **Department Location:**
  Bentson Bunker Fieldhouse
- **Department Phone:**
  (701) 231-5777
- **Department Web Site:**
  www.ndsu.edu/hnes/graduate_programs/advanced_athletic_training_post_professional/
- **Application Deadline:**
  Rolling application process starting December 1 for fall start
- **Degrees Offered:**
  M.S.
- **Test Requirement:**
  TOEFL iBT 100; IELTS 7; PTE Academic 68

Program Description

The Department of Health, Nutrition and Exercise Sciences (HNES) offers graduate study leading to the Master of Science (M.S.) in Advanced Athletic Training and a Master of Athletic Training (MATrg) degree. The HNES department also offers a Master of Science (M.S.) degree in HNES with options in Exercise/Nutrition Science and Dietetics (on line).

The Master of Science in Advanced Athletic Training is a post-professional degree consisting of 34 credits. The mission of post-professional graduate athletic training education is to expand the depth and breadth of applied and experiential knowledge and skills of the entry-level athletic trainer, to expand the athletic training body of knowledge, and to disseminate new knowledge in the discipline. At NDSU, the M.S. in Advanced Athletic Training program prepares the student with the increased depth and breadth in the following areas: Diagnostic Ultrasound, Therapeutic Modalities, Orthopedic Appliances, Emergency Care Techniques, Kinesio Tape® and Manual Therapies. The combination of research and clinical practice is emphasized in preparing the post-professional student for future employment.

1. Minimum overall GPA of 3.0 on a 4.0 scale.
2. Must be a BOC AT or eligible for the BOC exam and have graduated from a CAATE accredited professional (entry-level) graduate or undergraduate athletic training program.
3. Skype or interview with Athletic Training Faculty.

Admission Acceptance/Denial into the M.S.:

The M.S. application process is a very competitive process. The Application Committee reviews the graduate school and program application and determines if a student is granted an interview. The committee will set up a time with the student to complete the interview process. Criterion that is evaluated includes: overall GPA, certification status, quality of writing sample, quality of career goal statement, interview, and letters of reference. Exceptions to the requirements can be made upon recommendations from the Application Committee. Acceptance is *not* guaranteed simply upon satisfactory completion of the requirements. Once the Athletic Training Application Committee agrees to accept the student, the program director notifies the HNES Graduate Administrative Assistant, who notifies the NDSU Graduate School. Students are notified by the NDSU Graduate School of acceptance in the program. This letter should be received approximately 2 weeks after the Graduate School receives notification.

Code	Title	Credits
Required Courses		
HNES 702	Introduction to Advanced AT and Professionalism	
HNES 710	Introduction to Research Design and Methods in HNES	
HNES 720	Advanced Emergency Care	
HNES 722	Evidence Based Orthopedic Evaluation	
HNES 723	Advanced Techniques in Sports Medicine	
HNES 786	Diagnostic Ultrasound - Shoulder and Knee Basics	
HNES 787	Evidence Based Therapeutic Modalities	
HNES 788	Diagnostic Ultrasound - Case Studies and Ankle Basics	

HNES 798	Master's Thesis (6 credits)	
HDFS 705	Quantitative Methods in Developmental Science	
or STAT 725	Applied Statistics	
or EDUC 702	Statistics In Educational Research	
Electives: Minimum of 3 credits (must be 600/700 level)		3
Total credits		34

First Year					
Fall	**Credits**	**Spring**	**Credits**	**Summer**	**Credits**
HNES 702	1	HNES 723	3	HDFS 705, STAT 725, or EDUC 702	3
HNES 710	3	HNES 786	3		
HNES 720	3	HNES 798	2		
HNES 787	3				
	10		8		3
Second Year					
Fall	**Credits**	**Spring**	**Credits**		
HNES 798	2	HNES 722	3		
Elective 600/700 Course	3	HNES 788	3		
		HNES 798	3		
		Elective 600/700 level course	2		
	5		11		

Total Credits: 37

Shannon David, Ph.D., ATC
Ohio University, 2013
Research Interests: Quantification of Intervention Outcomes, Patient-Clinician Relationship

Kara Gange, Ph.D., ATC
North Dakota State University, 2010
Research Interests: Therapeutic Modalities and Diagnostic Ultrasound

Nicole German Knodel, Ph.D., ATC
North Dakota State University, 2008
Research Interests: Critical Thinking, Clinical Practice

Katie Lyman, Ph.D., ATC
University of South Florida, 2014
Research Interests: Kinesio Tape®, Manual Medicine, and Emergency Medicine

Agribusiness and Applied Economics

Department Information

- **Department Location:**
  500 Barry Hall
- **Department Phone:**
  (701) 231-7441
- **Department Email:**
  ndsu.agribusiness@ndsu.edu
- **Department Web Site:**
  www.ag.ndsu.edu/agecon/
- **Application Deadline:**
  March 1

- **Degrees Offered:**
  M.S.
- **Test Requirement:**
  GRE or GMAT
- **English Proficiency Requirements:**
  TOEFL iBT 79; IELTS 6.5

Program Description

The Agribusiness and Applied Economics Master of Science degree includes areas of specialization in applied economics, agribusiness, and transportation and logistics.

The Applied Economics area emphasizes course work in economic theory, research methods, and quantitative techniques. The option is designed to prepare students for careers in agricultural economics research in private and public sectors and for Ph.D. programs at other institutions.

The Agribusiness specialization is a broad-based program which combines training in agribusiness management, economic analysis, and agricultural sciences. Training may include biotechnology, processing, and food and environmental safety. Students are prepared for a variety of successful careers in agribusiness by fulfilling the requirements for expertise in quantitative methods and developing a rigorous background in economic theory and research.

The Departments of Agribusiness and Applied Economics and Civil Engineering, in conjunction with the Upper Great Plains Transportation Institute, offer an interdisciplinary graduate program in multimodal transportation. The program includes rural and non-metropolitan planning, highway and railroad engineering, freight transportation operations and economics, and agribusiness logistics and distribution. Both thesis and comprehensive study options are available.

Students of all options have complete access to well-equipped research facilities and to faculty supervision time. The department has an excellent placement record with national and international agricultural and business firms, as well as government agencies.

In addition to the Graduate School admission requirements (https://bulletin.ndsu.edu/graduate/admission-information), applicants to the program must have earned a grade of B or higher in intermediate microeconomics and statistics including linear regression, and a grade of C or better in calculus.

Students who do not meet all requirements for admission or have deficiencies in prerequisite course work, but show potential for successful graduate study, may be admitted under a conditional status. Evidence must be provided showing that the applicant's potential is not adequately reflected by his/her record. After meeting the specified standards of performance set by the department, the student, in consultation with the major adviser, may request a change to full graduate standing.

Financial Assistance

The department offers assistantships on a competitive basis. Graduate Research Assistantships (GRAs) provide monthly stipends plus tuition waivers. Students must pay a minimal activity fee each semester. Assistantships do not begin until the first semester of full graduate standing when courses that apply for the Master of Science degree are taken.

Most assistantships are half-time (20 hours per week) or one-quarter-time (10 hours per week). Students on assistantship perform research or teaching duties in the Department in return for their stipend. Assistantships are typically limited to 16 months.

Granting assistantships depends on academic performance, departmental needs, and availability of assistantships.

Students pursuing a Master of Science in Agribusiness and Applied Economics (thesis option or comprehensive study option) must complete all core courses. Students select elective courses (with approval of the adviser and supervisory committee) to fulfill the remaining Graduate School credit requirements. It is required that students have competence in calculus, multiple regression analysis, and intermediate microeconomics.

Code	Title	Credits
Core Courses		
AGEC 701	Research Philosophy	1
ECON 710	Advanced Econometrics	3
AGEC 739	Analytical Methods for Applied Economics	3
AGEC 741	Advanced Microeconomics	3
Thesis Option		
Minimum of 16 credits numbered 601-689, 691; 700-789, 791; 800-889 and 891		
AGEC 798	Master's Thesis (6-10 credits)	
Comprehensive Study Option		

Minimum of 21 credits numbered: 601-689, 691; 700-789, 791; 800-889 and 891		
Of which a minimum of 7 credits of quantitative course work including: ECON 610 and the Core Courses listed above.		
AGEC 797	Master's Paper (2-4 credits)	
Total Credits:		30

James Caton, Ph.D.
George Mason University, 2016
Research Interests:Entrepreneurship Agent-based Computational Economics, Market Process Theory, Monetary Economics

William Nganje, Ph.D.
University of Illniois at Urbana-Champaign, 1999
Research Interests: Agriculturel Finance, Food Safety Economics

Erik Hanson, Ph.D.
University of Minnesota, 2016
Research Interests: Agricultural Finance, Farm Management, Marketing and Production Economics

Robert Hearne, Ph.D.
University of Minnesota, 1995
Research Interests: Natural Resource and Environmental Economics

Jeremy Jackson, Ph.D.
Washington University in St. Louis, 2008
Research Interests: Microeconomics, Political Economy, Public Finance

Siew Hoon Lim, Ph.D.
University of Georgia, 2005
Research Interests: Production Economics, Transportation, Industrial Organization

Dragan Miljkovic, Ph.D.
University of Illinois, 1996
Research Interests: Agricultural Prices, International Trade, Agricultural and Food Marketing and Policy

Frayne Olson, Ph.D.
University of Missouri, 2007
Research Interests: Crop Marketing Strategies, Crop Supply Chain Management, Agricultural Contracting, Agricultural Risk Management

Timothy Petry, M.S.
North Dakota State University, 1973
Research interests: Livestock Marketing

David Ripplinger, Ph.D.
North Dakota State University, 2011
Research Interests: Production Economics and Marketing

David Roberts, Ph.D.
Oklahoma State University, 2009
Research Interests: Natural Resource and Environmental Economics, Econometrics, Production Agriculture

David M. Saxowsky, J.D.
The Ohio State University, 1979
Research Interests: Agricultural Law

Saleem Shaik, Ph.D.
University of Nebraska, 1998
Research Interests: Agriculture Policy and Risk Management, Agriculture Production Economics

Anupa Sharma, Ph.D.
Virginia Polytechnic Institute and State University, 2016
Research Interests: Economics, Agriculture Business and Management

Cheryl J. Wachenheim, Ph.D.
Michigan State University, 1994
Research Interests: Agribusiness

Tom Wahl, Ph.D.
Iowa State University, 1989
Research Interests: International Marketing and Trade, Agricultural Trade Policy, Marketing and Price Analysis

William W. Wilson, Ph.D.
University of Manitoba, 1980
Research Interests: Commodity Marketing, Agribusiness, Industrial Organization

Lei Zhang, Ph.D.
University of Texas at Dallas, 2011
Research Interests: Applied Econometrics, Macroeconomics and Monetary Economics, Regional and Urban Economics

Agricultural and Biosystems Engineering

Department Information

- **Department Chair:**
  Sreekala Bajwa, Ph.D.
- **Graduate Coordinator:**
  Shafiqur Rahman, Ph.D.
- **Department Location:**
  Agricultural and Biosystems Engineering Building
- **Department Phone:**
  (701) 231-7261
- **Department Web Site:**
  www.ndsu.edu/aben/
- **Application Deadline:**
  International applications are due May 1st for fall and August 1 for spring. Domestic applications must be received at least one month prior to the start of the semester.
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 79; IELTS 6.5

Program Description

The Department of Agricultural and Biosystems Engineering offers graduate study leading to M.S. and Ph.D. degrees. The program emphasizes solving engineering problems for agricultural production, food and biofuels processing, and environmental resources management. Advanced work may involve specialized training in the following areas: irrigation and drainage engineering; agricultural hydrology; soil and water resources management; livestock waste management; air quality, process engineering for food and biofuels, and other bioproducts; agricultural machine systems; precision agriculture; machine vision and intelligent sensors for biological systems; and post-harvest handling and storage of biomass feedstocks and other biological materials.

Student research and academic programs are tailored to individual student needs and interests. Interdisciplinary approaches to agricultural and biosystems engineering programs are fostered.

The Department of Agricultural and Biosystems Engineering graduate program is open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full standing to the program, the applicant must meet the Graduate School's admission requirements and have a baccalaureate degree in engineering or have taken the equivalent of the basic undergraduate engineering courses.

Any student receiving an M.S. or Ph.D. degree from the NDSU ABEN department must have taken the following fundamental courses prior to attaining the graduate degree. If the courses (or their equivalent) were not taken prior to matriculating at NDSU, they should be taken in addition to other coursework required for the graduate degree.

- Mathematics through Differential Equations (NDSU: MATH 266 Introduction to Differential Equations)
- Statics (NDSU: ME 221 Engineering Mechanics I) and Dynamics (NDSU: ME 222 Engineering Mechanics II); these two may be substituted by a calculus-based Physics I class
- Thermodynamics (NDSU: ME 350 Thermodynamics and Heat Transfer); may be substituted with ABEN 644 Transport Processes, which may also count toward graduate degree

- Fluid Mechanics (NDSU: CE 309 Fluid Mechanics or ME 352 Fluid Dynamics)
- Physics II/Electricity and Magnetism (NDSU: PHYS 252 University Physics II)

Financial Assistance

Research assistantships are available and dependent on the grant funding of faculty research programs. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research. Students must be accepted into the Graduate School before they are eligible for an assistantship.

M.S. Degree

The M.S. degree program requires completion of 30 semester credit hours beyond the baccalaureate degree as detailed below. A Plan of Study (PoS) should be developed with the adviser by the end of the first semester of work. An oral examination covering the research-based paper or thesis and the student's understanding and ability to apply the subject matter to the research is required. Students typically require two years to complete their MS degree. An overall GPA of 3.0 or higher must be maintained.

The ABEN M.S. program requirements are:

Code	Title	Credits
Didactic Course Work (601-689, 691; 700-789, 791; 800-889 and 891)		16
ABEN 790	Graduate Seminar	
Additional Credits (as needed to complete 30 total credits)		
ABEN 798	Master's Thesis	6-10
Total Credits Required		30

- 30 credits after the B.S.
- 20-24 credit hours are from course work, while 6-10 credit hours are typically provided for a master's thesis
- A minimum of 6 credits of NDSU ABEN courses numbered 601-689 and 700-789 is required
- ABEN Graduate Seminar (ABEN 790)

Ph.D. Degree

Ph.D. candidates are encouraged to indicate their research interests when applying for admission and to select an adviser before entering the program. Typically, 3-4 years are required to complete the Ph.D. program after the completion of an M.S. degree.

The degree requirements are in accordance with the NDSU Graduate School requirements. The student's academic adviser will usually be selected during the acceptance process. Prior to the end of the first academic year, the student and academic adviser will arrange for appointment of a Graduate Advisory Committee.

The student and major adviser will prepare a Plan of Study by the end of the first year in residence. The student's Graduate Advisory Committee, the ABEN Department Chair, and the Dean of the Graduate School shall approve the Plan of Study. The Plan of Study (PoS) must be filed in the Graduate School of NDSU. An overall GPA of 3.0 or above must be maintained.

The ABEN Ph.D. program requirements are:

Code	Title	Credits
Didactic credit (601-689, 691; 700-789, 791; 800-889 and 891)		27
ABEN 899 and ABEN 790		30-45
Additional Credits (as need to complete 60 credits (post-master's) or 90 credits (post-bachelor's)		
Total credits		60-90

- 60 credits after the M.S. or 90 credits after the B.S.
- A minimum of 27 credits from NDSU courses numbered 601-689 and 700-789, at least 15 credits of which must be numbered 700-789
- A minimum of 30 credits of NDSU ABEN dissertation and graduate seminar after the M.S. or 45 credits after the B.S.
- A minimum of 9 credits of NDSU ABEN courses numbered 601-689 or 700-789, 15 credits if entering with other than an ABEN B.S.
- ABEN Graduate Seminar (ABEN 790)
- It is expected that one or more journal articles will be submitted for publication prior to the award of the degree.

*Any student receiving an M.S. or Ph.D. degree from the NDSU ABEN department must have taken the following fundamental courses prior to attaining the graduate degree. If the courses (or their equivalent) were not taken prior to matriculating at NDSU, they should be taken in addition to other coursework required for the graduate degree.

- Differential Equations (NDSU: Math 266)
- Statics (NDSU: ME 221) and Dynamics (NDSU: ME 222); these two may be substituted by a calculus-based Physics I class
- Thermodynamics (NDSU: ME 350); may be substituted with ABEN 644 which may also count toward graduate degree
- Fluid Mechanics (NDSU: CE 309 or ME 352)
- Physics II/Electricity and Magnetism (NDSU: PHYS 252)

The major adviser may appeal to the ABEN Graduate Committee (not the student's graduate advisory committee) for substitutions or waivers of these requirements.

Examinations

Comprehensive Examinations: Both a written and an oral examination will be taken after completion of the greater portion of the course work phase of the Ph.D. program. The written examination will be conducted to test the student's understanding and ability to apply the subject matter related to the chosen research area(s). The format and sequence of the written and oral examinations are dependent on the academic adviser and the examining committee. The examination will be graded pass, fail or marginal pass. If the student does not pass the written component of the comprehensive examination, the student will be provided another opportunity to pass the examination. If the student does not pass the written examination second time, the student must wait one semester before taking the examination for the third time. Failure of the third attempt will prevent the student from proceeding further in the Ph.D. program.

The oral examination will also be coordinated by the academic adviser. In this examination, the student will be required to provide a short presentation of the research progress to the date of the oral examination. The format of the examination is dependent on the academic adviser and the examining committee. This examination is to assess the student's ability to communicate his/her research problem, and how he/she is applying scientific and engineering principles to solve the research problem. This examination may be used by the committee to further ascertain the student's level of understanding of subject matter as observed from the written examination. This examination is graded pass or fail. If a student fails the oral examination, the student will be advised of the deficiencies and will be given a second opportunity to pass the examination. Should both attempts to pass an examination result in failure, the candidate may request to take the examination a third time. A request for a third examination requires the support of the supervisory committee, the Department Chair, and the Dean of the Graduate School after consultation with the Graduate Council. Failure of the third attempt will prevent the student from proceeding further in the Ph.D. program.

Successful completion of both written and oral examinations will formally admit the student into candidacy for the Ph.D. in Agricultural and Biosystems Engineering. At least one semester must elapse between admission to candidacy and final PhD. oral examination of the dissertation.

Final Examination: After the research work is completed, the student will write a Ph.D. dissertation following the guidelines of the Graduate School. The final oral PhD. examination will be arranged after the approval of his/her academic adviser. The complete Ph.D. dissertation will be distributed to the examining committee members a minimum of one week before the final examination. The student will present the complete research work during this final examination. After passing the final examination, the student will complete all the appropriate suggested changes of the committee. The student will follow the procedures as defined by the Graduate School to complete the submission of the Ph.D. dissertation.

Sreekala G. Bajwa, Ph.D.
University of Illinois at Urbana-Champagne, 2000
Research Interests: Remote Sensing, Precision Agriculture, Unmanned Aerial Systems, Bio-composites

Thomas Bon, Ph.D.
North Dakota State University, 2003
Research Interests: Machine Systems, Electronics and Instrumentation

Igathinathane Cannayen, Ph.D.
Indian Institute of Technology, 1997
Research Interests: Biomass Harvest, Storage, Collection and Pre-Processing

Kenneth J. Hellevang, Ph.D.
North Dakota State University, 1989
Research Interests: Post Harvest Technology, Structures

Xinhua Jia, Ph.D.
University of Arizona, 2004
Research Interests: Soil and Water Engineering, Hydrology

Zhulu Lin, Ph.D.
University of Georgia, 2003

Research Interests: Water and Soil Resources, Environmental Modeling

Scott W. Pryor, Ph.D.
Cornell University, 2005
Research Interests: Biorenewable Products and Bioprocessing

Shafiqur Rahman, Ph.D.
University of Manitoba, 2004
Research Interests: Livestock Waste Management. Water Quality and Air Quality Assessment and Mitigation, Dust and Particulate Matter Emission

Thomas S. Scherer, Ph.D.
University of Minnesota, 1986
Research Interests: Soil and Water Resources Management, Irrigation Systems

Halis Simsek, Ph.D.
North Dakota State University, 2012
Research Interests: Water and Wastewater Treatment, Animal and Agricultural Waste Management

Dean D. Steele, Ph.D.
University of Minnesota, 1991
Research Interests: Irrigation and Environmental Engineering

Dennis P. Wiesenborn, Ph.D.
Rice University, 1989
Research Interests: Food and Added Value Process Engineering for Food, Biofuels, and Other Bioproducts

Agricultural Education

Department Information

- **Department Chair:**
  Chris Ray, Ph.D.
- **Program Coordinator:**
  Adam Marx, Ph.D.
- **Department Location:**
  School of Education, FLC 210
- **Department Phone:**
  (701) 231-7921
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  M.S., M.Ed.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

Agricultural Education offers graduate study leading to the M.Ed. and M.S. degrees. Advanced work may involve specialized training in vocational education, extension education, international extension, and agricultural education.

Degree programs are planned cooperatively to meet the needs of individual students. Candidates are encouraged to include supporting work relevant to subject matter areas of interest. Some courses focus on problems related to various phases of Agricultural Education, including secondary, post-secondary, adult, and extension programs. Others emphasize issues common to all service areas in agricultural and extension education. Provision may be made for candidates to include internships in agribusiness, natural resources education, or other aspects of agricultural and extension education in their programs. Candidates should work closely with an adviser.

The NDSU programs in education are accredited by National Council for Accreditation of Teacher Education and are approved by the ND Education Standards and Practices Board. Changes in national and state legislation, standards, or rules can affect academic program requirements.

In addition to the Graduate School's required application materials, the program requires submission of a statement of career goals consistent with the five propositions of the National Board of Professional Teaching Standards (NBPTS) (http://www.nbpts.org), as well as reasons for applying to the program.

Admission is considered only after all required application materials have been received and reviewed. Where appropriate, all international student requirements must be met. If a program has a cohort group with enrollment limitations, an entrance interview will be required.

Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data. A student must meet all requirements for full admission.

NOTE: The School of Education reserves the right to obtain additional information about the student's professional competence from qualified professionals.

Master's programs within the School of Education require a minimum of 30 semester credits (minimums vary by academic program). The Master of Science (M.S.) degree requires a disquisition. The Master of Education (M.Ed.) degree is a non-disquisition, practitioner-oriented degree. Programs vary on requiring a written comprehensive exam or a portfolio/oral.

> ***NOTE:*** Earning an academic/professional degree does not necessarily lead to state credential or licensure. People seeking licensure must provide evidence of the required number of years of teaching or counseling, and, in the case of school administration, administrative experience. Potential and current students should consult with the appropriate academic program coordinator for advice about licensure, certification, or credentialing after communicating with the appropriate state official.

Code	Title	Credits
Core Courses		18
EDUC 750	Reflective Practice and Research in Education	
EDUC 751	Students and Their Learning	
EDUC 752	Curriculum Design and Delivery	
EDUC 753	Managing/ and Monitoring Learning	
Major/Concentration		18
Choose from the following:		
H&CE 724	Program Development In Vocational Education	
H&CE 740	Vocational Philosophy and Policy	
H&CE 743	SAE/Adult Programs	
H&CE 756	Program Development and Evaluation	
H&CE 781	Professional Development in Agricultural Education	
H&CE 787	Issues In Education	
H&CE 795	Field Experience	
Electives (as approved by adviser)		
H&CE 794	Practicum/Internship (OR)	
H&CE 798	Master's Thesis (for M.S. students only)	
Total Credits		30

Adam A. Marx, Ph.D.
University of Missouri, 2014
Research Interests: Adolescent Career Decision-Making, Student Engagement, Teacher Development

Animal Sciences

Department Information

- **Acting Chair:**
  David Buchanan, Ph.D.
- **Graduate Coordinator:**
  Anna Grazul-Bilksa, Ph.D.
- **Department Location:**
  102 Hultz Hall
- **Department Phone:**
  (701) 231-7641
- **Department Web Site:**

www.ag.ndsu.edu/ansc/

- **Application Deadline:**
  Applications are accepted for fall, spring and summer semester admits.
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Animal Sciences offers graduate study leading to M.S. and Ph.D. degrees. Advanced work may involve specialized training in the following areas: animal breeding, animal nutrition, animal genetics, animal health, physiology of reproduction, nutritional physiology, and meat science.

Student research and academic programs are tailored to individual student needs and interests. Interdisciplinary approaches to Animal Sciences programs are fostered.

The Department of Animal Sciences graduate program is open to all qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School's requirements, to be admitted with full status to the program, an applicant must have adequate preparation in animal sciences or in a complementary area of life sciences and have a background or interest in agriculture.

Financial Assistance

Research assistantships are available. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research.

The Animal Sciences program has two options for the M.S. degree: the thesis option and the comprehensive study option. The M.S. program requires completion of 30 semester credits of approved graduate and letter-graded course work with an overall GPA of 3.0 or better. The Ph.D. program requires the completion of 90 semester credits (or the equivalent) of graduate approved and letter graded course work with an overall GPA of 3.0 or more.

Each student must choose an adviser, usually based upon area of academic and research interest when starting the program. By the end of the first year of residence, the student must have selected an advisory/supervisory committee and have an approved graduate plan of study, including a research proposal. The advisory/supervisory committee advises the student and administers the graduate exams to the student. Students are referred to the Animal Sciences Graduate Student Handbook for information regarding additional requirements.

Candidates for the M.S. normally complete their degree requirements in two years. Candidates for the Ph.D. generally complete their degree requirements in three to four years.

The M.S. candidates are required to take an oral examination which covers both the research and academic subject matter covered in their program. Candidates for the Ph.D. are required to take a preliminary written and oral examination directed toward the academic subject matter of their chosen discipline and a final defense of a research based thesis.

Code	Title	Credits
Required Courses for M.S. Degree		
Didactic Course Work (601-689, 691; 700-789, 791; 800-889 and 891)		16
Statistical Courses (e.g. STAT 661 Applied Regression Models; PLSC 724 Field Design I)*		6
ANSC 790	Graduate Seminar	2
ANSC 792	Graduate Teaching Experience (**)	2
ANSC 798	Master's Thesis	6-10
Total Credits		30

* Other NDSU statistical courses or Equivalents (transferred degree(s) or course(s))

** Required or students receiving assistantships. All graduate students are encouraged to obtain teaching experience each semester.

See information in Graduate Bulletin

Marc L. Bauer, Ph.D.
University of Kentucky, 1996
Research Interests: Nutritional Physiology with emphasis on Nutrient Metabolism and Utilization in Ruminants

Eric P. Berg, Ph.D.
Purdue University, 1996

Research Interests: Influence of Environment, Nutrition, and Genetic Factors as They Impact Meat-Animal Production Efficiency, Health, Carcass Composition, and Meat Quality

Erika Berg, Ph.D.
University of Missouri, 2006
Research Interests: The Impact of Therapeutic Horsemanship on Human and Equine Participants. Maternal and Environmental Influence on Equine Neonatal Physiology

Kasey Maddock Carlin, Ph.D.
Iowa State University, 2005
Research Interests: Meat Science with emphasis on Physiological and Biochemical Changes in Muscle Postmortem on Meat Quality

Joel S. Caton, Ph.D.
New Mexico State University, 1987
Research Interests: Ruminant Nutrition with emphasis on Nutrition and Reproduction interactions, Forage Utilization, Digestive Physiology and Selenium Metabolism

Carl Dahlen, Ph.D.
University of Minnesota, 2009
Research Interests: Beef Cattle Production

Neil Dyer, DVM, M.S., Diplomate ACVP
Iowa State University, 1991
Research Interests: Infectious Diseases of Domestic Animals; Public Health

Lauren Hanna, Ph.D.
Texas A & M University, 2013
Research Interest: Animal Genetics; Genomics

Anna T. Grazul-Bilska, Ph.D.
University of Agriculture and Technology, Olsztyn, Poland, 1983
Research Interests: Applied and Basic Aspects of Embryology and Ovarian Function in Livestock Species

Carolyn Hammer, DVM, Ph.D.
Iowa State University, 2003
Research Interests: Equine Preventative Medicine, Growth and Development, Immunology

Greg Lardy, Ph.D.
University of Nebraska,1997
Research Interests: Cow-Calf Nutrition, By-Product Utilization, Range Nutrition

Rob Maddock, Ph.D.
Texas A&M University, 2000
Research Interests: Factors Affecting Beef Quality and Value, Consumer Acceptance of Meat Products

Miranda Meehan, Ph.D.
North Dakota State University, 2012
Research Interests: Riparian Ecology and Management, Livestock and Wildlife Interactions, Impacts of Energy Development on Livestock Production

Dale A. Redmer, Ph.D.
University of Missouri, 1983
Research Interests: Regulation of Ovarian and Uterine Function, Including Angiogenesis and Endocrine Control of Follicular and Placental Development in Farm Animals

Lawrence P. Reynolds, Ph.D.
Iowa State University, 1983
Research Interests: Maternal and Placental Physiology During Pregnancy in Livestock Including Cellular and Molecular Aspects

Gerald Stokka, DVM, M.S.
Iowa State University, 1982
Research Interest: Immunology; Preventive Medicine; Animal Stewardship-well-being

Kendall Swanson, Ph.D.
University of Kentucky, 2001
Research Interests: Ruminant Nutrition

Kimberly Vonnahme, Ph.D.
University of Wyoming, 2003
Research Interests: Nutritional Impacts on Placental Function in Livestock

Sarah A. Wagner, DVM, Ph.D.
Iowa State University, 2003
Research Interests: Food Animal Pharmacology and Therapeutics, Dairy Cattle Health

Alison Ward, Ph.D.
University of Saskatchewan, 2011
Research Interests: Nutritional and Genetic Interactions; Epigenetics, Especially In Regards to Maternal Nutrition and Fetal Programming

In addition to the above listed faculty, there are numerous adjunct faculty members who participate in the graduate program.

Anthropology

Department Information

- **Interim Department Chair:**
  Jeffrey Bumgarner, Ph.D.
- **Graduate Coordinator:**
  Pamela Emanuelson, Ph.D.
- **Department Location:**
  Minard 428
- **Department Phone:**
  (701) 231-8657
- **Department Email:**
  ndsu.anthropology@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/socanth
- **Application Deadline:**
  For full consideration, applications must be received by February 15 for fall semester and September 15 for spring semester
- **Degrees Offered:**
  M.A., M.S.
- **English Proficiency Requirements:**
  TOEFL ibt 100; IELTS 7

Program Description

The Department of Sociology and Anthropology offers an M.S. and M.A. degree in Anthropology. The program centers on human heritage past, present and future, both cultural and material, and it is based on the principle that graduate level education in Anthropology is a desirable preparation for a growing number of career orientations. The precise plan of study for each student is established in consultation with the academic adviser. Graduate students are also expected to enhance their course work and degree research by engaging in professional development activities such as paper or poster presentations and/or attendance at academic conferences, campus and community service, and teaching and research assistantships. Sample positions that our graduates have obtained include university and college teaching, contract archaeology, folklore program coordination, international studies administration, National Park Service archaeology, not-for-profit program event coordination management, teaching English in other countries abroad, and research analysis as cultural experts.

The focus of graduate education in Anthropology is directed toward both the development of applied anthropologists and the advanced training of those seeking to pursue a doctoral degree. Students may elect to take courses in a specialty area, or they may pursue a background in general anthropology. Areas of specialization include cultural anthropology and archeology.

The Anthropology graduate program provides students with the opportunity to expand their background and perspectives in research methods and theory. Consequently, the first year of the program is designed to expose students to anthropological theory and a variety of research methods. Research facilities include the Archaeology Technologies Laboratory and Anthropology Materials Laboratory.

Two program options are available for students. In the thesis option, students work on a research-based thesis. Students typically test theoretical assumptions using primary or secondary data. The comprehensive study option is designed for students who wish to combine their studies with some type of specialized field or internship experience. Students electing this option are required to complete a comprehensive study paper related to their experience, such as evaluating a program.

Students in the Anthropology graduate program benefit from a favorable faculty-to-student ratio.

The Anthropology graduate program is open to qualified graduates from universities and colleges of recognized standing. To be admitted with full standing to the program, the applicant must meet the Graduate School's requirements and have adequate preparation in anthropology.

Financial Assistance

Teaching assistantships are available to qualified applicants. Research assistantships may also be available, contingent on faculty research funds. Applicants for assistantships are considered on the basis of scholarship and potential to undertake advanced study and research. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference must be received by the Graduate School no later than February 15.

The masters degree (M.A. or M.S.) in Anthropology credit requirements consists of a minimum 30 credits (for the thesis option) or 35 credits (for the paper option), of which 16 must be didactic credits. Core requirements include the following:

- Successfully complete a theory-oriented Anthropology course (such as ANTH 680 Development of Anthropological Theory)
- Successfully complete a methods-oriented Anthropology course (such as ANTH 681 Qualitative Methods in Cultural Anthropology)
- Complete additional coursework to finish the 30-credit requirement (24 for thesis, 26 for paper)
- Complete a research-based thesis or a comprehensive study paper and pass an oral defense of the thesis or paper administered by the student's supervisory committee.

Jeffrey T. Clark, Ph.D.
University of Illinois at Urbana-Champaign, 1987
Research Interests: Archaeology, Digital Archaeology, Paleoenvironmental Studies, Archaeological Method/Theory, Heritage and Material Culture, Oceania, North America

John L. Creese, Ph.D.
University of Toronto, 2011
Research Interests: Archaeology, Spatial Analysis, Household and Settlement Archaeology, Material Culture, Theory, North America and Great Lakes

Kristen R. Fellows, Ph.D.
University of Pennsylvania, 2013
Research Interests: Anthropological Archaeology, Historical Archaeology, Ethnohistory, African Disaspora, Archaeology of Plantations; Colonial Encounters; Globalization and Transnationalism; Feminist Archaeology, the Caribbean; North America

Julia Kowalski, Ph.D.
University of Chicago, 2014
Research Interests: Gender, Kinship, and Transnational Rights Discourse in India and in the United States

Lecturers

Travis Kitch, M.S.
North Dakota State University, 2003
Research Interests: Archaeology, Medical Anthropology

Biochemistry

Department Information

- **Department Chair:**
  Gregory Cook, Ph.D.
- **Graduate Admissions Director:**
  Mukund P. Sibi, Ph.D.
- **Department Location:**
  Ladd Hall
- **Department Phone:**
  (701) 231-8694
- **Department Web Site:**
  www.ndsu.edu/chemistry
- **Application Deadline:**
  March 1 for fall, September 1 for spring. Spring admissions are given occasionally depending on fellowship availability and faculty interests. If there are no spring openings, spring applications are automatically considered for the subsequent fall semester.
- **Degrees Offered:**

Ph.D., M.S.

- **Test Requirement:**
  GRE (general required; subject recommended)
- **English Proficiency Requirements:**
  TOEFL ibT 81 (23 speak; 21 write) –TA, 71 – RA; IELTS 6.5 – TA; 6 – RA

Program Description

The Department of Chemistry and Biochemistry offers graduate study leading to the M.S. and Ph.D. degrees. The department also participates in the interdisciplinary Ph.D. program in Cellular and Molecular Biology.

At the start of the first year of study, entering graduate students take entrance examinations in chemistry and biochemistry, as well as analytical, inorganic, organic, and physical chemistry. The graduate student progress committee uses these exams for advisory purposes in recommending course work during the first year. As a consequence, programs are individually tailored to the needs of each student.

The chemistry, biochemistry, and molecular biology of plant, animal, insect, and microbial systems are studied through advanced course work and research. Selection of the area of emphasis depends on the interests of the student. Typically, course work is completed in one to one-and-a-half years for M.S. candidates, and two years for Ph.D. candidates, leaving later years for full-time thesis research. The typical time to complete a graduate degree averages three years for the M.S. degree and approximately five years for the Ph.D.

Research Opportunities and Infrastructure

The Department of Chemistry and Biochemistry has more than 10 externally funded faculty research programs. Research expenditures have averaged $1.8 million over the last 10 years, with more than $2.2 million in the last two years.

All research and most teaching activities within the department occur within three centrally-located buildings, including two connected facilities, Ladd Hall and Dunbar Laboratory, as well as the Quentin Burdick Building, located across the street.

Most departmental offices, classrooms and teaching labs, as well as some research labs are located in Ladd Hall, while Dunbar and the third floor of the Quentin Burdick Building primarily consist of research laboratories. Ladd Hall also houses departmental glass, machine, and electronics shops.

Modern instrumentation is vital to research in the chemical sciences. The quality and quantity of instrumentation within the department has been greatly enhanced in the last few years through aggressive fundraising efforts and university matching support.

The department has recently upgraded its mass spectrometry capabilities to include a Bio-TOF III with accurate mass analysis, ESI and CI ionization; as well as an Esquire 3000 Plus - an Ion trap instrument with MS-MS and proteomics capabilities. A dedicated LC can be integrated with the both the instruments.

The Organic Spectroscopy Laboratory is primarily devoted to maintenance and operation of Nuclear Magnetic Resonance (NMR) spectrometers. The recently upgraded facility includes three modern high-field instruments: Varian 500, 400, and 300 MHz spectrometers. All have multinuclear, 2-D, and variable temperature capabilities, and the 400 MHz instrument has been recently upgraded for solids capabilities. This center also includes the departmental FTIR.

The Materials Characterization Laboratory houses the departmental crystallography facilties, including a Bruker single crystal CCD X-ray diffractometer with low temperature capabilities, a Philips MPD (Multi- Purpose Diffractometer), two Philips X-ray powder diffractometers, and a Kevex X-ray fluorescence unit. CHN Elemental analysis, thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), and differential thermal analysis (DTA) are also available.

The Center for Protease Research - Core Biology Facility is a new facility housing equipment and technical personnel for performing bioassay, cell and tissue culture, and molecular biology experiments. For bioassays, the facility has a fluorimeter capable of top or bottom reading and the capability to handle both 96- and 384-well plates. For sample preparation, researchers can utilize cell and tissue culture capabilities such as flow hoods and culture chambers. In addition, RT-PCR and FPLC protein purification technology is available.

The chemistry library, located in Ladd Hall, provides graduate students and faculty with convenient 24-hour access to more than 200 journals and approximately 10,000 volumes. Literature searching via SciFinder is supported.

Prospective students are encouraged to visit the Department of Chemistry and Biochemistry website (http://www.ndsu.edu/chemistry) for the latest descriptions of research programs and instrumentation.

The graduate programs in biochemistry are open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full standing to the program, the applicant must meet the Graduate School's admission requirements, have adequate preparation for the study of chemistry and biochemistry at the graduate level, and show potential to undertake advanced study and research as evidenced by academic performance and experience.

Applications will be considered at any time. Application materials should be submitted directly to the Graduate School and need to be received before May 1 to be considered for the upcoming academic year.

Financial Assistance

The student must first apply to the Graduate School and be accepted in full or conditional status before he/she is eligible for an assistantship in the Department of Chemistry and Biochemistry.

Graduate students in the Department of Chemistry and Biochemistry are supported during both the academic year and during summer months by either teaching assistantships (TA) or research assistantships (RA). As of the 2014-2015 academic year, the standard stipend is $22,000 per year for both RAs and TAs. University tuition (no fees) is waived for all TAs and RAs in good academic standing.

Master of Science

The Master of Science program requires the completion of a total of 30 graduate semester credits with an overall GPA of 3.0 or better. This total is comprised of both class work and research credit, but must consist of at least 16 semester credits from letter-graded course work. The Ph.D. program requires the completion of a total of 90 graduate semester credits with an overall GPA of 3.0 or better. This total is comprised of both class work and research credit, but must consist of at least 27 semester credits from letter-graded course work.

Code	Title	Credits
Required Courses		
CHEM 720	Introduction to Chemical Research	2
CHEM 790	Graduate Seminar (second year seminar)	1
or BIOC 790	Graduate Seminar	
UNIV 720	Scientific Integrity	1
CHEM 790	Graduate Seminar (defense seminar)	1
or BIOC 790	Graduate Seminar	
Didactic Credits (601-689, 691; 700-789, 791; 800-889 and 891)		16 *
CHEM 798	Master's Thesis	6-10
or BIOC 798	Master's Thesis	
Total Credits Required		30
As part of total semester credits, the following departmental courses are recommended for students based on discipline:		
Analytical		
CHEM 632	Analytical Chemistry II	3
CHEM 730	Separations	2
CHEM 732	Advanced Analytical Chemistry	4
CHEM 736	Mass Spectrometry	2
Biochemistry and Molecular Biology		
BIOC 673	Methods of Biochemical Research	3
BIOC 674	Methods of Recombinant DNA Technology	3
BIOC 701	Comprehensive Biochemistry I	4
BIOC 702	Comprehensive Biochemistry II	4
Inorganic		
CHEM 724	Chemical Applications of Group Theory	1
CHEM 725	Advanced Survey of Inorganic Chemistry	3
CHEM 727	Organometallic Chemistry	3
CHEM 728	Physical Methods for Chemical and Biomolecular Research	2
CHEM 744	Organic Spectroscopy	2
Organic		
CHEM 741	Physical Organic Chemistry I	4
CHEM 742	Physical Organic Chemistry II	2
CHEM 744	Organic Spectroscopy	2
CHEM 745	Organic Synthesis	4
Physical		
BIOC 665		
CHEM 760	Statistical Thermodynamics	4

CHEM 763	Kinetics	2
CHEM 764	Dynamics	2

* A minimum of 10 must be from courses numbered 701-789; 791 or 800-889; 891

Each student chooses a thesis adviser within six months of beginning graduate school. As this is one of the most important decisions made in graduate school, students are strongly urged to visit multiple faculty members to discuss research opportunities. In addition, faculty seminars during the fall semester are designed to acquaint new students with the available research programs.

By the end of the first academic year, each student selects an advisory and examination committee, which consists of the thesis adviser, two other faculty members in the chemistry department, and one faculty member from a department outside the Department of Chemistry and Biochemistry.

Candidates for the PhD degree are required to earn at least 90 semester credits, which can include credits for seminar and research. No fewer than 27 of these 90 semester credits shall be earned in courses carrying graduate credit (courses numbered 601 to 789), and of these 27 credits, a minimum of 20 must be from courses numbered 701 to 789. Of these 20 credits, the requirement is 8 total credits in at least two fields of study other than the major area, selected from:

- Analytical Chemistry
- Biochemistry & Molecular Biology
- Coatings and Polymeric Materials
- Inorganic Chemistry
- Materials & Nanotechnology
- Microbiology
- Organic Chemistry
- Physical Chemistry
- Other related area (e.g., Physics, Math, Pharmacy, Engineering, Zoology)

A student matriculating with a Master's Degree, including one earned at an international institution, must earn not fewer than 60 graduate credits at NDSU. Of these credits, not fewer than 15 credits must be NDSU courses numbered from 701 to 789. Courses numbered 601-689 may be used for the Plan of Study as long as they have not been taken in an undergraduate or previous graduate program. Approved courses are Department of C&B 625, 626, 627, 628 and 630.

Code	Title	Credits
Required Courses		
CHEM 720	Introduction to Chemical Research	
BIOC 790	Graduate Seminar (second year seminar)	
or CHEM 790	Graduate Seminar	
BIOC 790	Graduate Seminar (proposal seminar)	
or CHEM 790	Graduate Seminar	
BIOC 790	Graduate Seminar (public presentation)	
or CHEM 790	Graduate Seminar	
BIOC 790	Graduate Seminar (defense seminar)	
or CHEM 790	Graduate Seminar	
UNIV 720	Scientific Integrity	
As part of total semester credits, the following departmental courses are required for students based on program:		
CHEM 725	Advanced Survey of Inorganic Chemistry	
BIOC 673	Methods of Biochemical Research	
BIOC 674	Methods of Recombinant DNA Technology	
BIOC 701	Comprehensive Biochemistry I	
BIOC 702	Comprehensive Biochemistry II	
CHEM 732	Advanced Analytical Chemistry	
CHEM 741	Physical Organic Chemistry I	
CHEM 759	Intermediate Physical Chemistry	
BIOC 899	Doctoral Dissertation	

Admission to candidacy for the Ph.D. degree is accomplished by satisfying three requirements: 1) satisfactory performance in course work with a minimum 3.0 grade-point average, 2) satisfactory performance on a written comprehensive examination, taken by the end of the fourth semester, and

3) satisfactory defense of an original research proposal on a topic approved by the student's advisory committee. The defense of this proposal must occur at least eight months prior to the final oral examination.

Following completion of dissertation research, the candidate must complete a written dissertation and an oral presentation to the department and advisory committee.

Christopher L. Colbert, Ph.D.
Purdue University, 2000
Postdoctoral, Howard Hughes Medical Institute, 2000-2004
Research Interests: Structural Biology and Metalloprotein Biochemistry

Heldur Hakk, Ph.D. (adjunct)
North Dakota State University, 1997
Research Interests: Fate and Metabolism of Environmental Contaminants

Stuart J. Haring, Ph.D.
University of Iowa, 2004
Postdoctoral, University of Iowa, 2004-2008
Research Interests: DNA Metabolism and Cell Cycle Regulation

Erika Offerdahl, Ph.D.
University of Arizona, 2008
Research Interests: Biochemistry/STEM Education

Sangita C. Sinha, Ph.D.
Purdue University, 2000
Postdoctoral, Howard Hughes Medical Institute, 2001-2005
Research Interests: Biochemistry and Structural Biology of Host-Pathogen Interaction

D. K. Srivastava, Ph.D.
Banaras Hindu University, 1980
Research Interests: Mechanistic Enzymology

John Wilkinson, Ph.D.
Vanderbilt University, 2001
Postdoctoral, University of Michigan, 2001-2006
Research Interests: Metabolic Control of Cancer Progression

Biological Sciences

Department Information

- **Department Head:**
  Wendy Reed, Ph.D.
- **Graduate Coordinator:**
  Katie Reindl, Ph.D.
- **Department Location:**
  218 Stevens Hall
- **Department Phone:**
  (701) 231-7087
- **Department Email:**
  ndsu.biological.sciences@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/biology/
- **Application Deadline:**
  Applications must be submitted by January 15 for full consideration for GTA or GRA positions.*
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5

*Applicants will not be considered without a department faculty member who has agreed to serve as the major adviser. For e-mail addresses for faculty members and for additional information about our programs, please visit our web site at http://www.ndsu.edu/biology/.

Program Description

The Department of Biological Sciences offers graduate study leading to Master of Science and Doctor of Philosophy degrees. Master of Science degrees are available in Biology and Environmental and Conservation Sciences.

Doctor of Philosophy degrees are available in Botany, Genomics, Cellular and Molecular Biology, Environmental and Conservation Sciences, STEM Education and Zoology. Advanced work may involve specialized training in the following areas: aquatic biology, behavior, biology education research, cell biology, comparative biochemistry and physiology, cancer biology, conservation biology, ecology, endocrinology, developmental biology, evolution, fisheries biology, molecular biology, plant biology, population biology, prairie pothole ecology, evolutionary ecology and wildlife biology.

Student research and academic programs are tailored to individual needs and interests. Interdisciplinary approaches to biological problems are encouraged.

Research Facilities and Equipment

The Department of Biological Sciences occupies approximately 20,000 square feet of floor space in Stevens Hall for research. The NDSU Library has extensive holdings of journals, monographs, books, and other reference materials covering various fields in biology. The library offers full access to online catalogs and databases.

Faculty in the department have research programs ranging from molecular biology to ecosystem ecology and work with a wide variety of organisms across multiple levels of organization, from cellular mechanisms to ecosystem function. Modern equipment is available for conducting research in cell and molecular biology and field ecology and behavior. The department has access to a vascular plant herbarium with 240,000 specimens emphasizing Northern Great Plains flora, a lichen herbarium consisting of about 15,000 specimens with a worldwide representation of taxa, and a vertebrate collection with approximately 10,000 specimens.

The department offers access to a range of equipment and facilities necessary for laboratory research, including greenhouses, animal rooms, growth chambers, tissue culture facilities, ultracentrifuges, spectrophotometers, electrophoresis, light microscopes, gas chromatography, GC-mass spectrometry, and high performance liquid chromatography. Facilities are available for protein and DNA sequencing, oligonucleotide synthesis, interactive laser cytometry, scanning transmission and electron microscopy, and confocal microscopy.

The graduate programs in the Department of Biological Sciences are open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full status to the program, the applicant must meet all Graduate School admission requirements.

Applications should be submitted directly to the Graduate School. For full consideration for GTA or GRA positions, applications must be submitted by January 15. Applicants will not be considered without a department faculty member who has agreed to serve as the major adviser. Correspondence with one or more departmental faculty members before and during the application process is essential. For email addresses for faculty members and for additional information about our programs, please visit our website at www.ndsu.edu/biology/.

Financial Assistance

Research assistantships and teaching assistantships are available. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, as well as financial need.

A student must first be accepted by the Graduate School before consideration for financial assistance. Assistantships include a waiver of tuition.

In addition to research and teaching assistantships, there are other types of financial support. A limited number fellowships are available through the Graduate School. Outstanding scholarship and financial need are primary considerations for these fellowships. Scholarships in specific areas are also available through the Department of Biological Sciences. These are generally supplemental and do not include tuition waivers. Students are considered for these awards after enrollment, with primary considerations being scholastic performance and research at NDSU.

Students must select a major adviser prior to their arrival for graduate studies.

The Master of Science program generally requires a minimum of 24 months of full-time study, during which an overall GPA of 3.0 or better must be maintained. The Master of Science degree may be earned by either of two options. The thesis option emphasizes completion of a research project. The comprehensive study option requires more course work, and instead of conducting research and presenting a thesis, the candidate presents a paper or papers approved by the adviser to the examining committee, demonstrating ability for scholarly study and written expression. Candidates under both options must present a seminar on the thesis research or comprehensive study, and must pass an oral examination.

Code	Title	Credits
Master of Science (M.S.)		30
Basic Research Principles		

BIOL 790	Graduate Seminar
UNIV 720	Scientific Integrity (or equivalent as approved by committee)
BIOL 842	Quantitative Biology (or equivalent as approved by committee)
Biological Content Courses to be approved by the advisory committee.	
BIOL 798	Master's Thesis

The Ph.D. program generally requires a minimum of 36 months of full-time study, during which an overall GPA of 3.0 or better must be maintained. Candidates for the Ph.D. are required to take a preliminary written and oral examination directed to academic subject matter and a final defense of the dissertation.

Code	Title	Credits
Doctor of Philosophy (Ph.D.)		90
Basic Research Principles		
BIOL 790	Graduate Seminar	
UNIV 720	Scientific Integrity (or equivalent as approved by the advisory committee)	
BIOL 842	Quantitative Biology (or equivalent as approved by the advisory committee)	
Biological Content Courses to be approved by the advisory committee.		
BOT 899	Doctoral Dissertation	

Laura Aldrich-Wolfe, Ph.D.
Cornell University, 2006
Research Interests: Community ecology, mycorrhyza and plant-fungal interactions

Julia H. Bowsher, Ph.D.
Duke University, 2007
Research Interests: Evolutionary and Developmental Biology of Insects

Malcolm G. Butler, Ph.D.
University of Michigan, 1980
Research Interests: Aquatic Ecology, Limnology, Fisheries, Water Quality, Wildlife Management

Mark E. Clark, Ph.D.
University of Tennessee, 1996
Research Interests: Fish and Wildlife Ecology, Population Biology, Ecological Modeling, Quantitative Ecology

Ned A. Dochtermann, Ph.D.
University of Nevada, 2009
Research Interests: Evolutionary and Behavioral Ecology

Erin H. Gillam, Ph.D.
University of Tennessee-Knoxville, 2007
Research Interests: Evolution and Behavioral Function of Communication Signals Using Bats as a Model

Kendra J. Greenlee, Ph.D.
Arizona State University, 2004
Research Interests: Comparative Physiology, Insect Respiration and Immunology

Timothy J. Greives, Ph.D.
Indiana University, 2009
Research Interests: Hormones and Behavior, Seasonality, Biological Rhythms, Reproductive Eco-physiology

Jill Hamilton, Ph.D.
University of British Columbia, 2012
Research Interests: Plant Evolutionary Genomics

Britt Heidinger, Ph.D.
Indiana University, 2007
Research Interests: Physiological Ecology, Senescence, Stress Physiology

Angela Hodgson, Ph.D.
University of Minnesota, 2010

Research Interests: Ecosystem Biology and Wildlife Conservation Biology

Donna L. Jacob, Ph.D.
University College Dublin, 2003
Research Interests: Wetland Science, Biogeochemistry

Jennifer L. Momsen, Ph.D.
Rutgers, 2007
Research Interests: Biology Education at the Undergraduate Level

Lisa M. Montplaisir, Ph.D.
University of Arizona, 2003
Research Interests: Science Education, Teaching and Learning, Curriculum Development

Keith Murphy, Ph.D.
Louisiana State University, 1989
Research Interests: Hereditary Diseases of the Domestic Dog

Marinus L. Otte, Ph.D.
Vrije Universiteit, 1991
Research Interests: Wetland Science, Biogeochemistry, Plant Ecophysiology

Wendy L. Reed, Ph.D.
Iowa State University, 2000
Research Interests: Physiological Ecology, Evolution of Life Histories, Maternal Effects

Katie M. Reindl, Ph.D.
North Dakota State University, 2006
Research Interests: Cancer Cell Biology, Identification and Validation of New Drug Targets

Matthew Smith, Ph.D.
University of Arkansas, 2012
Research Interests: Patterns of Phenotypic Variation in Natural Populations

Craig A. Stockwell, Ph.D.
University of Nevada, 1995
Research Interests: Evolutionary Ecology of Vertebrate Populations, Conservation Biology, Fisheries Biology

Jon Sweetman

Steven E. Travers, Ph.D.
University of California-Santa Barbara, 1998
Research Interests:
Plant Evolutionary Ecology

Emeritus

William J. Bleier, Ph.D.
Texas Tech University, 1975
Research Interests: Blackbirds, Animal Depredation, Avian Ecology

Gary K. Clambey, Ph.D.
Iowa State University, 1975
Research Interests: Ecology and Biogeography, Environmental Analysis and Planning, Structure Function Relations in Midwestern Ecosystems, Human Ecology

Theodore L. Esslinger, Ph.D.
Duke University, 1974
Research Interests: Lichenology; Taxonomy, Chemosystematics, and Floristics of Lichens; Emphasis on the Parmeliaceae and Physciaceae

James W. Grier, Ph.D.
Cornell University, 1975
Research Interests: Eagles and Other Birds of Prey, Herpetology, Aquatic Organisms, Fossils, Animal Population Dynamics, Habitat Ecology

Gary L. Nuechterlein, Ph.D.
University of Minnesota, 1980

Research Interests: Behavioral Ecology of Birds; Wildlife Ecology, Particularly of Nongame Species

Adjunct

Michael J. Anteau, Ph.D.
Louisiana State University, 2006

Ned H. Euliss, Jr., Ph.D.
Oregon State University, 1989

Mark A. Hanson, Ph.D.
North Dakota State University, 1990

Douglas H. Johnson, Ph.D.
North Dakota State University, 1986

George M. Linz, Ph.D.
North Dakota State University, 1982

Daniel C. McEwen, Ph.D.
North Dakota State University, 2008

David M. Mushet, Ph.D.
North Dakota State University, 2010

Marsha A. Sovada, Ph.D.
North Dakota State University, 1993

Steve K. Windels, Ph.D.
Michigan Technological University, 2008

Brian Wisenden, Ph.D.
University of Western Ontario, 1993

Biomedical Engineering

Department Information

- **Program Coordinator:**
  Annie Tangpong, Ph.D.
- **Email:**
  Annie.Tangpong@ndsu.edu
- **Department Location:**
  Dolve 101E
- **Department Phone:**
  (701) 231-8839
- **Department Web Site:**
  engineering.und.edu/bme/ (http://engineering.und.edu/bme)
- **Application Deadline:**
  February 15 for fall semester; September 15 for spring semester. Applications received after the deadline will still be considered, but preference is given to those submitted by the deadline.
- **Degrees Offered:**
  Ph.D., M.S.

Program Description

The graduate-level (M.S. and Ph.D.) programs in Biomedical Engineering (BME) are offered jointly by NDSU's College of Engineering, UND's School of Medicine and Health Sciences, and UND's College of Engineering and Mines.

The BME programs provide opportunities for technically qualified persons to attain specialized knowledge in an area of industry need, and to enhance career opportunities. The objective of the jointly-sponsored, interdisciplinary graduate programs is to:

- Meet the needs of regional students interested in biomedical engineering.
- Attract women and under-represented minorities into a developing field.
- Educate and train students through courses and research focused on biomedical research and device development.
- Advance the biomedical knowledge base through collaborative research directed by faculty from UND's School of Medical and Health Sciences, College of Engineering and Mines, and NDSU's College of Engineering and other qualified researchers from the two universities.
- Through biomedical research and device development, develop intellectual property to generate company spin-offs, attract new companies, and subsequent economic development.

For more information: engineering.und.edu/bme/ (http://engineering.und.edu/bme)

Ph.D.:

a) Bachelor of Science degree from an ABET accredited engineering program

b) Students holding a B.S. degree in other disciplines may be admitted to Qualified Status with an obligation to acquire the necessary background undergraduate engineering knowledge. The exact requirements will be determined on a case-by-case basis

c) Graduate Record Examination General Test for applicants from non-ABET accredited programs

d) Minimum GPA is 3.0 (4.0 scale) is required. Conditional admittance may be obtained for GPA less than 3.0.

M.S.:

a) Bachelor of Science degree from an ABET accredited engineering program.

b) Students holding a B.S. degree in other disciplines may be admitted to Qualified Status with an obligation to acquire the necessary background undergraduate engineering knowledge. The exact requirements will be determined on a case-by-case basis.

c) Graduate Record Examination General Test for applicants from non-ABET accredited programs.

d) Minimum GPA is 3.0 (4.0 scale) is required. Conditional admittance may be obtained for GPA less than 3.0.

Financial Assistance

Research and/or teaching assistantships may be available to qualified students. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. The availability of research and teaching assistantships is contingent upon current funding levels. Refer to the program website for current funding opportunities.

For more information: engineering.und.edu/bme/ (http://engineering.und.edu/bme)

Code	Title	Credits
M.S. (30 credits)		
Anatomy & Physiology		3-6
ZOO 660	Animal Physiology (or UND- EE-590 Special Topics: Anatomy and Physiology and for BME (6-credits))	3
ENGR 790	Seminar (or UND-ENGR 562 Seminar (1 credit), or UND-EE 570 Seminar (1 credit))	3
BRG Related Courses		6-9
Graduate Preparation (e.g. Grant Writing)		1-3
Internship (industrial, clinical, or research lab):		3-6
Electives (approved by adviser)		9 (max)
Master's thesis (9) or Master's project (non-thesis option) (3)		

Code	Title	Credits
Ph.D. (90 credits)		
Anatomy & Physiology		3-6
ZOO 660	Animal Physiology (or UND- EE-590 Special Topics: Anatomy and Physiology and for BME (6-credits))	3
ENGR 790	Seminar (one credit each semester, 3-6 total)	1-5
or UND-ENGR 562 Seminar (1 credit), or UND-EE 570 Seminar (1 credit)		
BRG Related Courses		12-15
ENGR 899	Doctoral Dissertation	1-15
Graduate Preparation (e.g. Grant Writing)		3-6

Internship (industrial, clinical, or research lab):	3-6
Electives (approved by adviser)	36 (max)

For more information: engineering.und.edu/bme/ (http://engineering.und.edu/bme)

Business Administration

Department Information

- **Program Director:**
  Derek Lehmberg, Ph.D.
- **Email:**
  derek.lehmberg@ndsu.edu
- **Program Coordinator:**
  Paul Brown, MBA
- **Email:**
  paul.brown@ndsu.edu
- **Department Location:**
  Barry Hall
- **Department Phone:**
  (701) 231-9407
- **Department Web Site:**
  www.ndsu.edu/business/graduate/mba
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring semester. Domestic applicants should apply at least six weeks prior to the start of classes.
- **Degrees Offered:**
  M.B.A.
- **Test Requirement:**
  GMAT or GRE
- **English Proficiency Requirements:**
  TOEFL iBT 79; IELTS 6.5

Program Description

The Master of Business Administration program at North Dakota State University is a non-thesis, professional program structured to serve qualified students with undergraduate degrees in various fields. The program is designed to provide the student with an effective set of analytical skills, a broad view of the way organizations work, and an understanding of the functional areas of business. The NDSU program takes a generalist approach to graduate business education while providing a variety of electives to give the student the opportunity to pursue a particular area of interest in business or a related discipline. Concentrations in the health care industry, and in supply chain and logistics are offered.

NDSU business faculty use a variety of teaching methods: case studies, group and individual projects, field research, computer applications, guest lecturers, student presentations, and discussion. Class interaction provides rich opportunity to network with aspiring professionals from a wide range of industries and countries. The student is able to acquire and improve problem-solving, teamwork, and communication skills and to apply these skills in business situations. Teleconferencing software enables distance learners to fully participate in class and complete the MBA program off-site.

Financial Assistance

The College of Business offers financial assistance through graduate assistantships and scholarships. Applicants must be admitted on a conditional or full-standing basis. Assistantships include a stipend and tuition waiver accompanying work within the college.

The tuition waiver is limited to graduate course work. Awards are based on academic excellence as determined by grade point average, high potential as measured by the GMAT score, and the financial needs of the student. Applications are available at www.ndsu.edu/business.

The total course requirements necessary to complete the MBA degree will vary depending on the background of the student. An adequate background in the functional areas of business is necessary for all students.

Foundation course areas include accounting, economics, statistics, management, marketing, and finance. Based on previous course work, some or all of these courses may be waived.

Beyond the foundation course requirements, all students must complete 30 semester hours of graduate work. Graduate courses in the MBA Program include the following eight required 3-credit core courses:

Code	Title	Credits
Core Courses		
MBA 701	Strategic Cost Management	3
MBA 702	Advanced Financial Management	3
MBA 703	Advanced Organizational Behavior	3
MBA 704	Supply Chain and Operations Management	3
MBA 705	Strategic Marketing Management	3
MBA 706		3
MBA 707	Microeconomics for Managers	3
MBA 708	Advanced Strategic Management	3
Elective course options for plan of study:		14
MBA 711	Financial Risk Management	
MBA 712	Advanced Investment Management	
MBA 713		
MBA 714		
MBA 721	Creating and Marketing Innovations	
MBA 722	Marketing Analytics and Customer Intelligence	
MBA 723		
MBA 724	Integrated Marketing Communications	
MBA 732	Managerial Leadership: Essential Competencies	
MBA 733	Management Decision Making	
MBA 734	Negotiations and Alternative Dispute Resolution	
MBA 751	Business Analytics Concepts	
MBA 752	Business Analytics Strategy	
MBA 753	Business Analytics Methods	
Total Credits		38

Health Care Industry Concentration

Code	Title	Credits
Core Courses		24
PH 704	Public Health Management and Policy	3
Two of the following courses:		6
PH 710	Healthcare Delivery in the United States	
PH 720	Environmental Health	
PH 741	Social and Behavioral Sciences in Public Health	
PH 765	Cultural Competence Health Care	
Total Credits		33

Supply Chain Logistics Concentration

Code	Title	Credits
Core Courses		24
Additional nine credits selected from the following set of courses:		9
TL 711	Logistics Systems	
TL 715	Introduction to ERP	
TL 721	International Logistics Management	
TL 723	Advanced Supply-Chain Planning Across the Enterprise	
TL 725	ERP Configuration	
TL 729	Adaptive Planning in Logistics Systems	

TL 731	Logistics Decision Analysis	
Total Credits		33

Margaret Andersen, Ph.D.
Indiana University, 1989
Field: Accounting

Somnath Banerjee, Ph.D.
University of Central Florida, 2015
Field: Marketing

Scott Beaulier, Ph.D.
George Mason University, 2004
Field: Economics

John Bitzan, Ph.D.
University of Wisconsin-Milwaukee, 1997
Field: Economics

Linlin Chai, Ph.D.
Iowa State University, 2016
Field: Marketing

Jun Chen, Ph.D.
University of North Carolina at Charlotte, 2014
Field: Accounting & Information Systems

James W. Clifton, M.Acc.
University of North Dakota, 1988
Field: Accounting

Thomas D. Dowdell, Ph.D.
Temple University, 2004
Field: Accounting

Rajani Ganesh-Pillai, Ph.D.
University of Central Florida, 2009
Field: Marketing

Yongtao "David" Hong, Ph.D.
Drexel University, 2008
Field: Accounting

Huichi Huang, Ph.D.
Syracuse University, 2012
Field: Accounting

Fariz Huseynov, Ph.D.
University of Memphis, 2009
Field: Finance

Joseph M. Jones, Ph.D.
University of Missouri-Columbia, 1991
Field: Marketing

Bonnie Klamm, Ph.D., CPA
Virginia Commonwealth University-Richmond, 1999
Field: Accounting Information System

Michael Krush, Ph.D.
University of Nebraska – Lincoln, 2009
Field: Marketing

Derek Lehmberg, Ph.D.
University of Western Ontario, 2010

Field: Strategic Management

Jin Li, Ph.D.
University of Alberta, 2007
Field: Marketing

Gerry Macintosh, Ph.D.
University of Nebraska-Lincoln, 1992
Field: Sales and Sales Management

Joshua Marineau, Ph.D.
University of Kentucky, Lexington, 2012
Field: Organizational Behavior

Supavich Pengnate, Ph.D.
Oklahoma State University, 2013
Field: Management Information Systems

Michael J. Peterson, Ph.D.
The University of Iowa, 2002
Field: Accounting

Tim O. Peterson, Ph.D.
Texas A&M University at College Station, 1988
Field: Management/Organizational Behavior

Frederick Riggins, Ph.D.
Carnegie Mellon University, 1994
Field: Management Information Systems

Herbert Snyder, Ph.D.
Syracuse University, 1994
Field: Auditing, Forensic Accounting

Charles D. Stevens, Ph.D.
University of Kansas, 1998
Field: Human Resource Management

Joseph G. Szmerekovsky, Ph.D.
Case Western Reserve University, 2003
Field: Operations

Chanchai Tangpong, Ph.D.
University of Southern Illinois, 2002
Field: Strategic Management

Ruilin Tian, Ph.D.
Georgia State University, 2008
Field: Finance

Rodney D. Traub, Ph.D.
Purdue University, 1994
Field: Operations Management

Newell Wright, Ph.D.
Virginia Polytechnic Institute, 1993
Field: Marketing

Limin Zhang, Ph.D.
University of Arizona, 2005
Field: Management Information Systems

Wei "David" Zhang, Ph.D.
Syracuse University, 2001
Field: Finance

Jill Zuber, Ph.D.
University of Arkansas, 2007
Field: Accounting

Emeritus

Bahman Bahrami, Ph.D.
University of Nebraska-Lincoln, 1983
Field: Managerial Economics, Management Information Systems, Labor Relations and Negotiation

C. Frederick Eisele, Ph.D.
University of Iowa, 1971
Field: Labor Management and Negotiation

Karen Froelich, Ph.D.
University of Minnesota, 1994
Field: Strategic Management

Terry W. Knoepfle, J.D., CPA
University of North Dakota, 1981
Field: Business Law and Tax Accounting

Cellular and Molecular Biology

Department Information

- **Program Coordinator:**
  Jane Schuh, Ph.D.
- **Department Phone:**
  (701) 231-6456
- **Department Web Site:**
  www.ndsu.edu/cellularmolecularbiology/
- **Application Deadline:**
  February 15 is the deadline for applicants seeking consideration of financial assistance (fellowship, assistantships) for fall semester and July 1 for spring semester.
- **Degrees Offered:**
  Ph.D.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The CMB program was formed in 1988 and was the first interdisciplinary graduate program at NDSU. The program was designed to respond to the evolving nature of research in the life sciences in which it was recognized that biological phenomena emerge from molecular and cellular events and that the elucidation of such processes increasingly relies on multidisciplinary approaches.

The CMB program provides cross training of graduate students in the areas of biochemistry and cellular and molecular biology. In this setting, students learn the most up-to-date approaches from a variety of fields. Integration across concepts as well as the application of various approaches to addressing biological problems is developed through their preliminary exam, in which students are required to write a research proposal in the format of a national granting agency different from their dissertation research, and to defend it orally. The students also develop and conduct an original line of research under the supervision of their major adviser. The program also brings together faculty with common interests and who use common approaches and equipment. Such a community of scientists fosters collaboration and engenders a sense of cooperation that leads to shared use of common equipment.

The CMB program prepares students for careers in academia and private industry. All graduates of the program have obtained permanent positions in their field or are engaged in postdoctoral training.

Nearly 40 faculty members in many different departments and representing a variety of colleges participate as faculty mentors. The program is led by the CMB Director, who receives guidance on policy, procedure, and program administration from a multidisciplinary group of faculty who serve on the CMB Steering Committee.

Program Objectives

The CMB program has been designed to respond to the evolving nature of research in the life sciences in which it was recognized that biological phenomena emerge from molecular and cellular events and that the elucidation of such processes increasingly relies on multidisciplinary approaches. In addition, new applications of sensor technology, disease diagnosis and treatment, and other emerging technologies require that scientists work across historical boundaries of their disciplines.

This is a research-oriented degree that requires advanced skills areas of biochemistry, cellular biology, molecular biology, and contemporary research techniques. Prospective students must have a high quantitative aptitude and be prepared to undertake rigorous graduate-level training in research including quantitative methods.

The Cellular and Molecular Biology Ph.D. program is open to qualified graduates of universities and colleges of recognized standing. To be admitted with full status to the program, the applicant must:

- Hold a baccalaureate degree from an educational institution of recognized standing.
- Have earned a cumulative grade point average (GPA) in all courses of at least 3.0 or equivalent at the baccalaureate level. Applications may be submitted directly to The Graduate School at any time.
- Have adequate preparation and show potential to undertake advanced study and research as evidenced by academic performance and experience.
- If possible, applicants should identify at least one Cellular and Molecular Biology faculty member with whom they wish to study.

A recent score (within 12 months) for the general Graduate Record Examination or successful completion of a relevant M.S. degree is required. No minimum GRE score is required, but investigators may use this as a piece of evidence in consideration of the student's application. Foreign students are required to have proficiency in English as shown by a TOEFL iBT of 71 or higher or an IELTS of 5.5 or higher, unless they have matriculated from an institution in which instruction is conducted in English.

The following undergraduate courses are required for graduate work in the CMB program:

- **Biology** - One year of general biology with laboratory and one course in genetics are required. Cellular biology or cellular physiology, animal or plant physiology, and microbiology are recommended.
- **Chemistry -** One year of general chemistry with laboratory and two sequential terms of organic chemistry with laboratory are required. Biochemistry is recommended.
- **Mathematics -** Two terms of life sciences calculus are required.
- **Physics** - Two sequential terms of general physics with laboratories (above the concept level) are required.
- **Recommended** - introductory courses in computer science, statistics, and technical writing.
- With program approval, up to 3 courses may be attempted within the first year of resident study to correct deficiencies in required courses. Graduate credit will not be earned for these courses.

Applicant Selection

Applications for the CMB program are accepted on a rolling basis throughout the year; however, for full consideration for a CMB program stipend, application must be made by the deadlines listed for fall admission (July 1). Acceptance into the program is based upon both the quality of the application and the capacity of the program.

As a program that encompasses many departments and core areas of research, as well as being an interdisciplinary training program, it is helpful to potential advisors to know what aspects of research the student is interested in. Students are encouraged to explore potential advisors' work and identify areas of interest that align with one or more CMB faculty research program(s). These areas should be addressed in the applicant's statement of purpose. If an applicant is open to a broad range of research, it is helpful to identify that as well (for example, working with plant genetics, any aspect of infectious disease, aspects of either cancer biology or therapeutics, etc). Students are only admitted to the program if a successful match with a CMB faculty member can be made, so this is a critical aspect of the application demonstrating what the student will bring to the research endeavor.

Participating Departments/Programs

North Dakota State University offers an interdisciplinary program leading to the doctoral degree in Cellular and Molecular Biology. The CMB program is a joint effort of the Colleges of Agriculture, Food Systems, Natural Resources; Science and Math; Health Professions; and Engineering and includes the Departments of Animal Sciences, Biological Sciences, Chemistry and Biochemistry, Coatings and Polymeric Materials, Electrical & Computer Engineering (Bioengineering), Microbiological Sciences, Pharmaceutical Sciences, Physics, and Plant Sciences.

Financial Assistance

Self-funded students who provide their own support through sponsored funding sources (governmental or grant funding only) may contact CMB faculty members with whom they wish to work or the CMB Director to inquire which investigators are accepting students so that a successful research mentorship can be arranged.

While the CMB program offers a limited number of competitive graduate assistantships that includes a full tuition waiver, financial support is usually provided by the department or laboratory in which the student will carry out research. Therefore, applicants are encouraged to research participating faculty members' areas of expertise and identify them in their statement of purpose. Students are encouraged to contact those with whom they would like to work regarding availability of positions and funding. In instances where specific investigators are not identified in the Statement of Purpose, the Director will contact faculty members who are accepting new students for their appraisal of the application.

Code	Title	Credits
BIOC 701	Comprehensive Biochemistry I (required)	
BIOC 702	Comprehensive Biochemistry II (required)	
BOT 820	Advanced Cell Biology	
Select one of the following:		
BIOC 719	Molecular Biology of Gene Expression and Regulation	
MICR 783	Advanced Bacterial Genetics and Phage	
PLSC 731	Plant Molecular Genetics	
BIOC 674	Methods of Recombinant DNA Technology (required)	
PLSC 684	Plant Tissue Culture and Biotechnology	
ANSC 899	Doctoral Dissertation	
Each student is expected to seek out professional development by attending regular seminars in their home department or in conjunction with their research interests (for example, a seminar series or COBRE science series). Students are required to present at least one scientific seminar per year throughout the program. In addition, students will supplement their knowledge of molecular biology, cell biology, and research techniques by fulfilling the remaining credits in their plan of study with a selection from the following list of electives. Other appropriate electives may be used if approved by the student's advisory committee, as well as the program Director with input from the Steering Committee:		
Molecular Biology		
ANSC 773	Energy Metabolism	
ANSC 774	Nitrogen Metabolism	
ANSC 875	Vitamins and Minerals	
BIOC 716	Protein and Enzyme Biochemistry	
BIOC 723	Structural Basis of Membrane Transport and Signaling	
BIOL 679	Biomedical Genetics and Genomics	
PSCI 746	Neuropharmacology	
PSCI 747	Cardiovascular Pharmacology	
PSCI 762	Advanced Biopharmaceutics	
PPTH 759	Host-Parasite Genetics	
PPTH 759	Host-Parasite Genetics	
Cellular Biology		
ANSC 813	Domestic Animal Endocrinology	
ANSC 828	Advanced Reproductive Biology	
ANSC 830	Growth Biology	
BIOC 683	Cellular Signal Transduction Processes and Metabolic Regulation	
MICR 775	Molecular Virology	
MICR 781	Advanced Bacterial Physiology	
PSCI 765	Cancer Cell Biology	
PPTH 760	Advanced Mycology	
ZOO 682	Developmental Biology	
Techniques		
ANSC 758	Molecular Biological Techniques in Animal Sciences	
BIOC 675	Computer Applications in Biochemistry and Molecular Biology	
CHEM 728	Physical Methods for Chemical and Biomolecular Research	

CHEM 729	X-Ray Structure Determination
CPM 771	Modern Methods of Polymer Characterization
ECE 713	Introduction to Lab-on-a-Chip Technology
PLSC 721	Genomics Techniques

Research

In addition to didactic credits, students take research credits to fulfill their dissertation studies on a topic of significant and original work. They must pass an oral and written preliminary examination which signifies their matriculation to doctoral candidacy. They also present a public presentation of their work in conjunction with a final dissertation examination on their research to attain the doctoral degree.

Laura Aldrich-Wolfe
Biological Sciences
Cornell University, 2006
Field: Community Ecology, Mycorrhizas, Plant-Fungal Interactions

Teresa Bergholz
Microbiological Sciences
Michigan State University, 2007
Field: Functional Genomics of Foodborne Pathogens

Eugene Berry
Microbiological Sciences
Northeastern University, 1983
Animal Virology (Ss (+) RNA Viruses), Genetic Variation,
Field: Mechanisms of Pathogenesis and Virulence

Julia Bowsher
Biological Sciences
Duke University, 2007
Field: Evolutionary Development and Biology

Amanda Brooks
Pharmaceutical Sciences
University of Wyoming, 2006
Field: Molecular Biology, Spider Silk as a Drug Delivery System

Yongki Choi
Physics
City University of New York, 2010
Field: Early Detection of Cancer Cells, Single Molecule Enzymology, Biotechnology

Chris Colbert
Chemistry and Biochemistry
Purdue University, 2000
Field: Structure Biology with a Focus on the Biochemistry of Proteins Involved In Iron Import and Utilization

Glenn Dorsam
Microbiological Sciences
Virginia Commonwealth University, 1998
Field: Epigenetic Regulation

Anna Grazul-Bilska
Animal Sciences
University of Agriculture and Technology, 1983
Field: Animal Embryology and Reproductive Physiology and Endocrinology, Assisted Reproductive Technology

Kendra Greenlee
Biological Sciences
Arizona State University, 2004
Field: Developmental Physiology and Immunology

Tim Greives
Biological Sciences

Indiana University, 2009
Endocrine Regulation of Seasonality, Reproductive Neuroendocrinology, Hormones and Behavior

Jill Hamilton
Biological Sciences
University of British Columbia - 2012
Field: Plant Evolutionary Genomics

Lauren Hanna
Animal Sciences
Texas A&M University, 2013
Field: Quantitative Genetics, Animal Breeding, Whole System Approaches To Genomic Associations of Quantitative Traits

Stuart Haring
Chemistry and Biochemistry
Texas A&M University, 2013
Field: Cellular DNA Duplication (Replication) and Mutation Prevention (Repair)

Britt Heidinger
Biological Sciences
University of Iowa, 2004
Field: Physiological Ecology

Yagna Jarajapu
Pharmaceutical Sciences
Indiana University, 2007
Field: Bone Marrow Dysfunction and Vascular Repair in Diabetes, ACE2-Angiotensin-(1-7)/Mas Receptor Pathway in Bone Marrow Cells, Regulation of Bone Marrow Mobilization by Leptin

Estelle Leclerc
Pharmaceutical Sciences
Glasgow Caledonian University, 2002
Field: Melanoma, Pancreatic Cancer; Monoclonal Antibodies as Diagnostic and Therapeutic Agents; Mechanism of RAGE Signaling

Guodong Liu
Chemistry and Biochemistry
Hunan University, 2001
Field: Development of Nano-Bioprobes for Biosensors and Bioassays for Detection of Nucleic Acids and Proteins

Phil Mcclean
Plant Sciences
University of Paris XI, 1994
Field: Dry Bean Genetics and Biotechnology

Dharmakeerthi "Karthik" Nawarathna
Electrical and Computer Engineering
Colorado State University, 2982
Field: Biomedical Engineering

Stephen O'Rourke
Pharmaceutical Sciences
University of Wisconsin-Madison, 1995
Field: Cerebral Vascular Function in Health and Disease

Birgit Pruess
Microbiological Sciences
Ruhr-Universitat Bochum, 1991
Field: Bacterial Physiology, Biofilm Biology, and Food Safety

Steven Qian
Pharmaceutical Sciences
University of Iowa, 1999
Field: Chemistry and Biology of Free Radical and COX-Catalyzed Fatty Acid Peroxidation as Related to Human Health and Disease

Mohi Quadir

Coatings and Polymeric Materials
Freie University of Berlin, 2010
Field:Polymeric Materials for Drug Delivery

Sheela Ramamoorthy
Microbiological Sciences
Virginia Tech, 2006
Field: Virology, Immunology, and Vaccinology

Jiajia Rao
Plant Sciences
University of Massachusetts-Amherst, 2013
Field: Food Chemistry and Ingredient Technology

Katie Reindl
Biological Sciences
North Dakota State University, 2006
Field: Cancer Cell Biology, Cancer Prevention and Treatment, Evaluating Bioactive Food Components

Larry Reynolds
Animal Sciences
Iowa State University, 1983
Field: Nutrition and Pregnancy in Ruminants

Kenton Rodgers
Chemistry and Biochemistry
University of Iowa, 1988
Field: Inorganic and Bioinorganic Chemistry

Jane Schuh
Microbiological Sciences
North Dakota State University, 2002
Field: Environmental Allergic Asthma Triggered By Mold

Sangita Sinha
Chemistry and Biochemistry
Purdue University, 2000
Field: Biochemistry and Structural Biology of Host-Pathogen Interactions

Kristine Steffen
Pharmaceutical Sciences
North Dakota State University, 2007
Field: Biology of Obesity and Post-Bariatric Outcomes, Gastrointestinal Microbiome Research

Chengwen Sun
Pharmaceutical Sciences
Jilin University, 2000
Field: Blood Pressure Regulation, Cell Signaling

Kendall Swanson
Animal Sciences
University of Kentucky, 2000
Field: Ruminant Nutrition, Energy Metabolism, Protein Metabolism, Pancreatic Function, Beef Cattle Production

Sathish Venkatachalem
Pharmaceutical Sciences
University of Madras
Field: Pulmonary Physiology and Pharmacology

Danling Wang
Electrical and Computer Engineering
Peking University, 2003; University 0f Washington, 2014
Field: Sensor Design, Fabrication, and Application of Early-State Human Disease Monitoring and Diagnosis

Alison Ward

Animal Sciences
University of Saskatchewan, 2011
Field: Livestock Epigenetics, Nutrient-Gene Interactions, and Developmental Programming

John Wilkinson
Chemistry and Biochemistry
Vanderbilt University, 2001
Field: Cancer Cell Metabolism, Cell Death Pathways, Mitochondrial Gene Expression, Animal Models of Tumorigenesis

Qifeng Zhang
Electrical and Computer Engineering
Peking University, 2001
Field: Nanomaterials for Sensor and Biomedical Applications, Nanotechnology

Cereal Science

Department Information

- **Department Chair:**
  Richard Horsley, Ph.D.
- **Program Coordinator:**
  Frank Manthey, Ph.D.
- **Department Location:**
  Plant Sciences, Loftsgard Hall
- **Department Phone:**
  (701) 231-7971
- **Department Web Site:**
  www.ag.ndsu.edu/cerealscience/
- **Application Deadline:**
  : International applications are due May 1st for Fall and August 1 for Spring. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

Cereal Science is a graduate program in the College of Agriculture Food Systems and Natural Resources and is administered by the Department of Plant Sciences. The Cereal Science graduate program offers graduate study leading to the M.S. and Ph.D. degrees in Cereal Science. Advanced work may involve research in the areas of proteins, carbohydrates, enzymes, and lipids of cereals, legumes, and other northern-grown crops; barley malting and brewing; and wheat milling, baking, and pasta processing. Functional foods and stability of bioactive compounds in food systems are also predominant areas of research.

The program has a close working relationship with the Northern Crops Institute and the USDA Hard Red Spring and Durum Wheat Quality Laboratory housed in the Harris Hall complex.

Research Facilities and Equipment

Faculty in the Cereal Science graduate program maintains specialized equipment that evaluates cereal and food quality, including laboratory equipment such as spectrophotometers, gas chromatographs, LC-MS, GC-MS, high-performance liquid chromatographs, various electrophoretic devices, a differential scanning calorimeter, and Rapid ViscoAnalyzer.

Flour mills, ranging up to pilot-plant size; two completely equipped bake shops; continuous bread-baking equipment; rheological instruments for dough testing; several pasta-processing units; malting equipment; Asian noodle making equipment; soy milk/tofu processing machines; a wet processing pilot plant; laboratory-scale UHT processing unit; HT/ST extruder; and a microbrewery are some examples of the specialized equipment.

The Cereal Science graduate program is open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full standing status to the program, the applicant must meet the Graduate School requirements and have adequate preparation in biochemistry/chemistry and the biological sciences, including microbiology.

Financial Assistance

Applicants must apply to the Graduate School and be accepted in full or conditional status before being eligible for an assistantship in the Cereal Science graduate program. All graduate students must qualify and be awarded a Graduate Research Assistantship. Alternative support, equivalent to a Graduate Research Assistantship, may be provided to a student by a sponsor such as a private company, university or government. The number of Graduate Research Assistantships varies from year to year, depending on industrial support and grant funding. Graduate tuition is waived for students with assistantships.

Selection of the major adviser will be made on the basis of the student's interest, source of funding, the availability of faculty members and a common desire of the student and professor to work together on a program that will enable the student to attain the desired degree. If a Graduate Research Assistantship is assigned to a specific research project, the project leader will be the major adviser of the Graduate Research Assistant.

Master of Science

The Master of Science program requires a minimum of 21 semester credits of course work with an overall GPA of 3.0 or better, as well as 10 research credits (CFS 798). With assistance from the adviser, a supervisory/advisory and examining committee is established and a plan of study developed. The student is required to prepare and defend a written research proposal. The plan of study and written research proposal must be approved within the first four and six months of study, respectively. For M.S. students, a final oral examination is required, where the student defends the thesis and is asked questions covering academic subject matter.

Code	Title	Credits
CFS 650	Cereal Technology	3
CFS 790	Graduate Seminar	2
PLSC 710	Professional Development I	1
CFS 798	Master's Thesis	10
Statistics (one of the following courses)		3
PLSC 724	Field Design I	
STAT 662	Introduction to Experimental Design	
STAT 725	Applied Statistics	
Technology Group		6
CFS 630	Food Unit Operations	
CFS 670	Food Processing II	
CFS 671	Food Processing Laboratory	
CFS 758	Fundamentals of Flour Testing and Bakng (s/b Baking)	
CFS 759	Milling	
CFS 760	Pasta Processing	
CFS 761	Malting and Brewing	
Science Group		6
MICR 653	Food Microbiology	
CFS 660	Food Chemistry	
CFS 661	Food Chemistry Laboratory	
CFS 662	Food Ingredient Technology	
CFS 664	Food Analysis	
CFS 672	Cereal and Food Fermentation	
CFS 674	Sensory Science of Foods	
CFS 764	Carbohydrate Chemistry	
CFS 765	Advanced Cereal and Food Chemistry I	
CFS 766	Advanced Cereal and Food Chemistry II	
MICR 752	Advanced Topics in Food Safety Microbiology	
Total Credits		30 (minimum)

Doctorate of Philosophy (Ph.D.)

The Graduate School minimum requirement is 90 credits or no fewer than 60 credits if an M.S. degree is earned prior to the Ph.D.

The Ph.D. program requires the completion of a minimum of 31 semester credits of required course work with an overall GPA of 3.0 or better, as well as 25 research credits (CFS 899). Remaining credits can be fulfilled as elective courses or as additional research credits (CFS 899). With assistance from the adviser, a supervisory/advisory and examining committee is established and a plan of study developed. The student is required to prepare and defend a written research proposal. The plan of study and written research proposal must be approved within the first six and nine months of study, respectively. Ph.D. candidates are required to take a preliminary written and oral examination covering academic subject matter and a final oral defense of a research-based dissertation.

Code	Title	Credits
CFS 650	Cereal Technology (Students that have previously taken CFS 650 can opt to take additional CFS 899 credits or another 600/700 course worth 3 credits.)	3
PLSC 710	Professional Development I	1
PLSC 711	Professional Development II	1
CFS 765	Advanced Cereal and Food Chemistry I	4
CFS 766	Advanced Cereal and Food Chemistry II	4
PLSC 790	Graduate Seminar	2
CFS 892	Graduate Teaching Experience	2
PLSC 899	Doctoral Dissertation	30
Statistics (one of the following courses)		3
STAT 662	Introduction to Experimental Design	
PLSC 724	Field Design I	
STAT 725	Applied Statistics	
Technology Group		9
CFS 630	Food Unit Operations	
CFS 670	Food Processing II	
CFS 671	Food Processing Laboratory	
CFS 759	Milling	
CFS 760	Pasta Processing	
CFS 761	Malting and Brewing	
Science Group		6
CFS 660	Food Chemistry	
CFS 661	Food Chemistry Laboratory	
CFS 662	Food Ingredient Technology	
CFS 664	Food Analysis	
CFS 672	Cereal and Food Fermentation	
CFS 674	Sensory Science of Foods	
CFS 764	Carbohydrate Chemistry	
MICR 752	Advanced Topics in Food Safety Microbiology	
Additional Credits		30

- Students entering the program with an eligible M.S. Degree (i.e. within the last ten years) may transfer in 10 credits of CFS 798 or equivalent toward the 90 credit Graduate School requirement.
- If the student has had an equivalent statistics course to the one stated above or if the student requires additional training in statistics, the appropriate statistics course will be taken as agreed upon by the Graduate Student and the Student's Advisory Committee.
- Students entering the program with an eligible M.S. Degree (i.e. within the last ten years) may transfer 20 credits of Graduate level course work toward the 90 credit Graduate School requirement. Additional credits may include research credits or coursework.

An accelerated **Master of Science program** is available for students currently enrolled in the undergraduate Food Science program at North Dakota State University. Students will be required to complete 31 credits consisting of 19 didactic credits (600/700 level), 2 graduate seminar credits (CFS 790) and 10 research credits (CFS 798) and maintain a graduate GPA of 3.0. Students will be required to complete a thesis.

Fifteen (15) of the didactic credits can be used to meet the requirement for the B.S. degree. A graduate stipend or assistantship will not be provided until the B.S. degree is granted. However, students are eligible for hourly funding (i.e., time slip) if available at any time after being accepted into the accelerated M.S. program and may qualify for tuition waiver on graduate courses. Upon completion of the B.S. degree requirement, students are eligible for assistantships pending availability. Differential tuition applies. Graduate tuition rates will apply to graduate level courses while undergraduate tuition applies to undergraduate courses.

Eligibility and Admission:

An online submission to the Graduate School is required. Students interested in the accelerated M.S. degree should consider submitting the application during their junior year or just before their senior year. For eligibility and admission please see information below.

At the time of application, the student:

- Must have completed at least **60 credits** towards their B.S. degree before conditional admission.
- Must have completed at least **30 credits** at NDSU before conditional admission.
- Must have a cumulative **GPA of 3.5** at NDSU to be eligible for conditional admission.
- Must have completed an introductory food science course (CFS 200 Introduction to Food Systems or CFS 210 Introduction to Food Science and Technology), introductory food processing (CFS 370 Food Processing I), MATH 146 Applied Calculus I or higher and general chemistry (CHEM 121 General Chemistry I).
- Must have completed or be concurrently taking MICR 350 General Microbiology, CHEM 341 Organic Chemistry I and BIOC 460 Foundations of Biochemistry and Molecular Biology I. MICR 202 Introductory Microbiology, CHEM 240 Survey of Organic Chemistry, and BIOC 260 Elements of Biochemistry courses, respectively, cannot serve as substitutes for the aforementioned courses.

Rules for Accepted Students:

- All admissions will be conditional. The minimum condition is completion of the B.S. degree prior to full standing in M.S. program.
- No undergraduate courses (100-400) may be counted toward a M.S. degree.
- Courses completed at the 600 level prior to be accepted to the program may be counted toward a M.S. degree.
- A maximum of 15 credits in the M.S. program can be used to meet the requirements for the B.S. degree.
- Students entering the M.S. degree with a B.S. degree in hand may not use courses earned as part of the bachelors program for the M.S. requirements.
- The student must meet all of the requirements that would normally be expected of a student in the M.S. program.
- All incoming graduate students will be given a written examination before the beginning of their first semester to assess their proficiency in English / Scientific writing.
- Graduate stipend or assistantship will not be provided until B.S. degree is granted. However, students are eligible for hourly funding (time slip) if available and may qualify for a tuition waiver. Upon completion of the B.S. degree requirement, students are eligible for and assistantships pending availability.

Bingcan Chen, Ph.D.
University of Massachusetts-Amherst, 2012
Research Interests: Food and Cereal Chemistry

Clifford A. Hall III, Ph.D.
University of Nebraska-Lincoln, 1996
Research Interests: Phytochemical Stability in Food Systems, Pulse Utilization and Quality, Flaxseed, Chemical Food Safety, Effect of Processing On Food Safety Issues

Frank Manthey, Ph.D.
North Dakota State University, 1985
Research Interests: Durum Wheat Quality, Pasta/Noodle Processing, and Milling

Jiajia Rao
University of Massachusetts-Amherst, 2013
Research Interests:Food Chemistry and Ingredient Technology

Paul B. Schwarz, Ph.D.
North Dakota State University, 1987
Research Interests: Malting Barley Quality

Kalidas Shetty, Ph.D.
University of Idaho, 1989
Research Interests: Plant Metabolism and Food Security

Senay Simsek, Ph.D.
Purdue University, 2006
Research Interests: Wheat Quality and Carbohydrate Research

Anuradha Vegi, Ph.D.
North Dakota State University, 2008

Research Interests: Teaching Techniques

Affiliate/Adjunct Faculty

Linda Dykes, Ph.D.
Texas A&M University, 2008
Research Interests: Wheat Quality

Jae Ohm, Ph.D.
Kansas State University, 1996
Research Interests: Cereal Chemistry

Chemistry

Department Information

- **Department Chair:**
  Gregory Cook, Ph.D.
- **Graduate Coordinator:**
  Guodong Liu, Ph.D.
- **Email:**
  guodong.liu@ndsu.edu
- **Department Location:**
  Ladd Hall
- **Department Phone:**
  (701) 231-8694
- **Department Web Site:**
  www.ndsu.edu/chemistry/
- **Application Deadline:**
  March 1 for fall, September 1 for spring Spring admissions are given occasionally depending on fellowship availability and faculty interests. If there are no spring openings, spring applications are automatically considered for the subsequent fall semester.
- **Degrees Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE (general required; subject recommended)
- **English Proficiency Requirements:**
  TOEFL ibT 81 (23 speak; 21 write) –TA, 71 – RA; IELTS 6.5 – TA; 6 – RA

Program Description

The Department of Chemistry and Biochemistry offers programs leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in Chemistry. At the start of the first year of study, entering graduate students take entrance examinations in analytical, inorganic, organic, and physical chemistry, as well as chemistry and biochemistry. The graduate student progress committee uses these exams for advisory purposes in recommending course work during the first year. As a consequence, programs are individually tailored to the needs of each student. Typically, course work is completed in one to one-and-a-half years for M.S. candidates, and two years for Ph.D. candidates, leaving later years for full-time thesis research. The typical time to complete a graduate degree averages three years for the M.S. degree and approximately five years for the Ph.D.

Research Opportunities and Infrastructure

The Department of Chemistry and Biochemistry has more than 10 externally funded faculty research programs. Research expenditures have averaged $1.8 million over the last 10 years, with more than $2.2 million in the last two years.

All research and most teaching activities within the department occur within three centrally-located buildings, including two connected facilities, Ladd Hall and Dunbar Laboratory, as well as the Quentin Burdick Building, located across the street.

Most departmental offices, classrooms and teaching labs, as well as some research labs are located in Ladd Hall, while Dunbar and the third floor of the Quentin Burdick Building primarily consist of research laboratories. Ladd Hall also houses departmental glass, machine, and electronics shops.

Modern instrumentation is vital to research in the chemical sciences. The quality and quantity of instrumentation within the department has been greatly enhanced in the last few years through aggressive fundraising efforts and university matching support.

The department has recently upgraded its mass spectrometry capabilities to include a Bio-TOF III with accurate mass analysis, ESI and CI ionization; as well as an Esquire 3000 Plus - an Ion trap instrument with MS-MS and proteomics capabilities. A dedicated LC can be integrated with the both the instruments.

The Organic Spectroscopy Laboratory is primarily devoted to maintenance and operation of Nuclear Magnetic Resonance (NMR) spectrometers. The facility includes three modern high-field instruments: Varian 500, 400, and 300 MHz spectrometers. All have multinuclear, 2- D, and variable temperature capabilities, and the 400 MHz instrument has been recently upgraded for solids capabilities. This center also includes the departmental FTIR.

The Materials Characterization Laboratory houses the departmental crystallography faculties including a Bruker single crystal CCD X-ray diffractometer with low temperature capabilities, a Philips MPD (Multi- Purpose Diffractometer), two Philips X-ray powder diffractometers, and a Kevex X-ray fluorescence unit. CHN Elemental analysis, thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), and differential thermal analysis (DTA) are also available.

The Center for Protease Research - Core Biology Facility is a new facility housing equipment and technical personnel for performing bioassay, cell and tissue culture, and molecular biology experiments. For bioassays, the facility has a fluorimeter capable of top or bottom reading and the capability to handle both 96- and 384-well plates. For sample preparation, researchers can utilize cell and tissue culture capabilities such as flow hoods and culture chambers. In addition, RT-PCR and FPLC protein purification technology is available.

The chemistry library, located in Ladd Hall, provides graduate students and faculty with convenient 24-hour access to more than 200 journals and approximately 10,000 volumes. Literature searching via SciFinder is supported.

Prospective students are encouraged to visit the Department of Chemistry and Biochemistry website (http://www.ndsu.edu/chemistry) for the latest descriptions of research programs and instrumentation.

The graduate programs in chemistry are open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full standing to the program, the applicant must meet the Graduate School's admission requirements, have adequate preparation for the study of chemistry at the graduate level, and show potential to undertake advanced study and research as evidenced by academic performance and experience.

Financial Assistance

The student must first apply to the Graduate School and be accepted in full or conditional status before he/she is eligible for an assistantship in the Department of Chemistry and Biochemistry.

Graduate students in the Department of Chemistry and Biochemistry are supported during both the academic year and during summer months by either teaching assistantships (TA) or research assistantships (RA). As of the 2014-2015 academic year, the standard stipend is $22,000 per year for both RAs and TAs. University tuition (no fees) is waived for all TAs and RAs in good academic standing.

Master of Science

The Master of Science program requires the completion of a total of 30 graduate semester credits with an overall GPA of 3.0 or better. This total is comprised of both class work and research credit, but must consist of at least 16 semester credits from letter-graded course work.

Code	Title	Credits
Required Courses		
CHEM 720	Introduction to Chemical Research	2
CHEM 790	Graduate Seminar (second year seminar)	1
or BIOC 790	Graduate Seminar	
UNIV 720	Scientific Integrity	1
CHEM 790	Graduate Seminar (defense seminar)	1
or BIOC 790	Graduate Seminar	
Didactic Credits (601-689, 691; 700-789, 791; 800-889 and 891)		16 *
CHEM 798	Master's Thesis	6-10
or BIOC 798	Master's Thesis	
Total Credits Required		30
As part of total semester credits, the following departmental courses are recommended for students based on discipline:		
Analytical		
CHEM 632	Analytical Chemistry II	3
CHEM 730	Separations	2
CHEM 732	Advanced Analytical Chemistry	4

CHEM 736	Mass Spectrometry	2
Biochemistry and Molecular Biology		
BIOC 673	Methods of Biochemical Research	3
BIOC 674	Methods of Recombinant DNA Technology	3
BIOC 701	Comprehensive Biochemistry I	4
BIOC 702	Comprehensive Biochemistry II	4
Inorganic		
CHEM 724	Chemical Applications of Group Theory	1
CHEM 725	Advanced Survey of Inorganic Chemistry	3
CHEM 727	Organometallic Chemistry	3
CHEM 728	Physical Methods for Chemical and Biomolecular Research	2
CHEM 744	Organic Spectroscopy	2
Organic		
CHEM 741	Physical Organic Chemistry I	4
CHEM 742	Physical Organic Chemistry II	2
CHEM 744	Organic Spectroscopy	2
CHEM 745	Organic Synthesis	4
Physical		
BIOC 665		
CHEM 760	Statistical Thermodynamics	4
CHEM 763	Kinetics	2
CHEM 764	Dynamics	2

* A minimum of 10 must be from courses numbered 701-789; 791 or 800-889; 891

Doctor of Philosophy

The Ph.D. program requires the completion of a total of 90 graduate semester credits with an overall GPA of 3.0 or better. This total is comprised of both class work and research credit, but must consist of at least 27 semester credits from letter-graded course work.

Code	Title	Credits
Required Didactic Courses		
CHEM 720	Introduction to Chemical Research	2
UNIV 720	Scientific Integrity	1
CHEM 725	Advanced Survey of Inorganic Chemistry	4
CHEM 732	Advanced Analytical Chemistry	4
CHEM 741	Physical Organic Chemistry I	4
CHEM 759	Intermediate Physical Chemistry	4
Required Non-Didactic Courses		
CHEM 790	Graduate Seminar (second year seminar)	1
CHEM 790	Graduate Seminar (proposal seminar)	1
CHEM 790	Graduate Seminar (defense seminar)	1
CHEM 899	Doctoral Dissertation (Number of research credits determined by student and supervisory committee)	1-68
Additional credits numbered 601 - 689, 691, 700 - 789 and 791 may also count toward the 90 credit total required by the School of Graduate and Interdisciplinary Studies if approved by the student's advisory and examination committee.		
Total Credits		90

* A student matriculating with a master's degree, including one earned at an international institution, must earn not fewer than 60 graduate credits at NDSU. These credits must include the 19 listed above under Required Didactic Courses. Courses numbered 601-689 may be used for the Plan of Study as long as they have not been taken in an undergraduate or previous graduate program. Approved courses are Department of Chemistry & Biochemistry 625, 626, 627, 628. 630, and 676.

ADDITIONALLY, The following departmental courses ARE available for students; CONSULT WITH COMMITTEE FOR RECOMMENDATIONS:

Code	Title	Credits
Analytical		
CHEM 632	Analytical Chemistry II	3
CHEM 730	Separations	2
CHEM 736	Mass Spectrometry	2
Biochemistry and Molecular Biology		
BIOC 673	Methods of Biochemical Research	3
BIOC 674	Methods of Recombinant DNA Technology	3
BIOC 701	Comprehensive Biochemistry I	4
BIOC 702	Comprehensive Biochemistry II	4
Inorganic		
CHEM 724	Chemical Applications of Group Theory	1
CHEM 727	Organometallic Chemistry	3
CHEM 728	Physical Methods for Chemical and Biomolecular Research	2
CHEM 744	Organic Spectroscopy	2
Organic		
CHEM 742	Physical Organic Chemistry II	2
CHEM 744	Organic Spectroscopy	2
CHEM 745	Organic Synthesis	4
Physical		
CHEM 665	Survey of Physical Chemistry	4
CHEM 760	Statistical Thermodynamics	4
CHEM 763	Kinetics	2
CHEM 764	Dynamics	2
CHEM 676	Introduction to Computational Quantum Chemistry	3

Each student chooses a thesis adviser within six months of beginning graduate school. As this is one of the most important decisions made in graduate school, students are strongly urged to visit multiple faculty members to discuss research opportunities. In addition, faculty seminars during the fall semester are designed to acquaint new students with the available research programs.

By the end of the first academic year, each student selects an advisory and examination committee, which consists of the thesis adviser, two other faculty members in the chemistry department, and one faculty member from a department outside the Department of Chemistry and Biochemistry.

Admission to candidacy for the Ph.D. degree is accomplished by satisfying three requirements:

1. satisfactory performance in course work with a minimum 3.0 grade point average,
2. satisfactory performance in comprehensive examinations taken by the end of the 4th semester, and
3. satisfactory defense of an original research proposal on a topic approved by the student's advisory committee.

The defense of this proposal must occur at least eight months prior to the final oral examination. Following completion of dissertation research, the candidate must complete a written dissertation and an oral presentation to the department and advisory committee.

Uwe Burghaus, Ph.D.
Free University of Berlin, 1995
Postdoctoral, University of Genoa, Italy, 1995-1997
Research Area: Surface Physical Chemistry

Gregory R. Cook, Ph.D.
Michigan State University, 1993
Postdoctoral, Stanford University, 1994-1996
Research Area: Synthetic Organic Chemistry

John F. Hershberger, Ph.D.
Yale University, 1986
Postdoctoral, Columbia University, 1986-1989
Research Area: Experimental Physical Chemistry, Laser Kinetics

Denley Jacobson, Ph.D.
Purdue University, 1984
Postdoctoral, California Institute of Technology, 1984-1986
Research Area: Gas Phase Ion Chemistry

Svetlana Kilina, Ph.D.
University of Washington, Seattle 2007
Los Alamos National Lab, 2007-2010
Research Area: Computational Chemistry

Guodong Liu, Ph.D.
Hunan University, 2001
Postdoctoral, New Mexico State University, 2002-2004;
Postdoctoral, Pacific Northwest National Laboratory, 2004-2006
Research Area: Nanotechnology and Biological Sensing

James Nyachwaya, Ph.D.
University of Minnesota, 2012
Research Area: Chemistry / STEM Education

Seth C. Rasmussen, Ph.D.
Clemson University, 1994
Postdoctoral, University of Oregon, 1995-1999
Research Area: Inorganic/Organic Materials Chemistry, Chemical History

Kenton R. Rodgers, Ph.D.
University of Iowa, 1988
Postdoctoral, Princeton University, 1989-1993
Research Area: Inorganic and Bioinorganic Chemistry

Mukund P. Sibi, Ph.D.
City University of New York, 1980
Postdoctoral, Dartmouth College, 1980-1982; University of Waterloo, 1982-1985
Research Area: Synthetic Organic Chemistry; Natural Products

Jayaraman Sivaguru, Ph.D.
Tulane University, 2003
Postdoctoral, Columbia University, 2003-2006
Research Area: Photochemistry, Photocatalysis (Organic and Supramolecular), Asymmetric Lighted Induced Synthesis, Molecular Recognition, Supramolecular Photochemistry, Photo-Degradation of Bio-Based Polymers

Wenfang Sun, Ph.D.
Institute of Photographic Chemistry, Chinese Academy of Sciences, 1995
Postdoctoral, University of Alabama, Birmingham, 1997-1999
Research Area: Organic Materials Chemistry

Pinjing Zhao, Ph.D.
Cornell University, 2003
Postdoctoral, Yale University, 2004-2006; University of Illinois at Urbana- Champaign, 2006-2007
Research Area: Inorganic and Organometallic Chemistry

Civil Engineering

Department Information

- **Department Chair:**
  David R. Steward, Ph.D.
- **Graduate Program Coordinator:**
  Kalpana Katti, Ph.D.
- **Department Location:**
  201 Civil and Industrial Engineering Bldg.
- **Department Phone:**
  (701) 231-7244
- **Department Web Site:**

www.ndsu.edu/ce/

- **Application Deadline:**
  February 15 for fall admission; September 15 for spring admission
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Civil and Environmental Engineering offers the M.S. and Ph.D. degrees in civil engineering and the M.S. degree in environmental engineering. Also, the College of Engineering offers a program leading to a Ph.D. degree in engineering in which civil engineering is a possible area of specialization. The department also participates in several interdisciplinary programs such as Environmental and Conservation Sciences, Materials & Nanotechnology and Transportation and Logistics.

Specialty areas in the M.S. and Ph.D. degrees in civil engineering include construction, environmental, geotechnical, materials, structural, transportation, and water resources engineering. Other related areas are also accommodated. The academic and research foci are tailored to individual needs and interests. To complement the major area of study, additional courses are often selected from other disciplines. The programs are designed to advance the technical knowledge, competence, and interdisciplinary understanding of the students and to prepare them for entering or advancing within the civil engineering profession.

Application to the Civil Engineering program is open to qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School admission requirements, the applicant must have adequate preparation in civil engineering. A master's degree in civil engineering is preferred for applicants to the Ph.D. program.

Financial Assistance

Research and/or teaching assistantships may be available. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference (and TOEFL results for international applicants) must be submitted to the Graduate School.

For teaching assistantships, TOEFL and additional requirements for eligibility can be found on the Graduate School webpage.

The Master of Science degree is offered in the thesis format. This format emphasizes research, and the ability to analyze and interpret data and to prepare a scholarly thesis. The student and adviser develop a program of study consisting of at least 30 credit hours of graduate level material to meet individual educational goals. An overall GPA of 3.0 or better must be maintained. An oral defense of the research-based thesis is required.

The Doctor of Philosophy degree requires a total of 90 credits beyond the baccalaureate degree in civil engineering with an overall GPA of 3.0 or higher (60 credits beyond an M.S. degree in Civil Engineering or a sub-area of Civil Engineering) for graduation. A dissertation advisory committee should be formed and a plan of study should be filed by the end of first year after admission. A minimum of 30 hours of additional course work chosen by the student and his/her advisory committee from appropriate existing Civil Engineering graduate courses, new courses, and courses outside the department must be completed.

An M.S. degree from another institution may substitute for up to 30 credits of the 90 credits required; however, suitability of transfer or use of courses and research credits in the plan of study would be decided by the adviser and advisory committee.

A comprehensive preliminary exam is administered after completion of the greater portion of the course work. The committee chair will coordinate the examination. The format and duration will be determined by the committee. The student will present a research proposal within one year after the preliminary examination. A minimum of 30 and a maximum of 40 credit hours can be earned for research, preparation, and defense of a dissertation in Civil Engineering. A minimum of 12 credit hours in a minor or cognate area as deemed appropriate by the student and the advisory committee may be completed by the student. The student will defend his/her dissertation in a final examination attended by the advisory committee members and other academics.

Achintya N. Bezbaruah, Ph.D.
University of Nebraska-Lincoln, 2002
Research Interests: Environmental sensors, Recalcitrant and micro pollutants, Contaminant fate and transport, Small community water and wastewater treatment, Environmental management

Xuefeng (Michael) Chu, Ph.D.
University of California, Davis, 2002
Research Interests: Watershed Hydrologic and Environmental Modeling, Overland Flow and Infiltration, Integrated Modeling of Flow and Contaminant Transport

S. Gajan, Ph.D.

University of California, Davis, 2006
Research Interests: Geotechnical Engineering, Earthquake Engineering, Dynamic Soil - Structure Interaction

Ying Huang, Ph.D.
Missouri University of Science & Technology, 2012
Research Interests: Structural Health Monitoring/Smart Structures for Transportation Infrastructure, Intelligent Transportation Systems, Applications of Adaptive and Smart Materials , Finite Element Modeling and Multi-Hazard Assessment and Mitigation

Dinesh Katti, Ph.D., P.E.
University of Arizona, 1991
Research Interests: Geotechnical Engineering, Constitutive Modeling of Geologic Materials, Expansive Soils, Multiscale Modeling, Steered Molecular Dynamics, Computational Mechanics, Nanocomposite, and Bio-nanocomposites. Computational Biophysics

Kalpana Katti, Ph.D.
(Graduate Coordinator)
University of Washington, 1996
Research Interests: Advanced Composites, Nanomaterials, Biomaterials, Biomimetics, Materials Characterization and Modeling, Analytical Electron Microscopy, and Microspectroscopy, Bone Tissue engineering

Wei Lin, Ph.D.
State University of New York at Buffalo
Research Interests: Water and Wastewater Treatment, Hazardous Waste Management

Zhibin Lin, Ph.D., P.E.
University of Wisconsin, 2010
Research Interests: Advanced Materials, High-Performance, Resilient and Sustainable Bridge Systems, Structural Durability and Structural Health Monitoring in Bridges and Earthquake Engineering

Kelly Rusch, Ph.D., P.E.
Louisiana State University, 1992
Research Interests: Microbial System Design and Modeling, Biofuels and Bioproducts, Engineering Education Research, Aquaculture Engineering, and Water and Wastewater Treatment.

Gary R. Smith, Ph.D.
Purdue University, 1986
Research Interests: Quality Control and Systems Applications, Decision Analysis and Modeling Techniques, Safety Performance Measurement and Improvements in Labor Productivity

Amiy Varma, Ph.D.
Purdue University, 1993
Research Interests: Transportation Systems and Planning, Traffic Engineering, Airports, and Infrastructure Management

Mijia Yang, Ph.D., P.E.
University of Akron, 2006
China University of Mining and Technology, 1999
Research Interests: Advanced Materials, Structural Assessment, Solid Mechanics

Adjunct & Emeritus

Eakalak Khan, Ph.D. (adjunct)
University of California, Los Angeles, 1997
Research Interests: Water and Wastewater Quality, Water and Wastewater Treatment, and Storm Water and Non-point Source Pollution

Denver D. Tolliver, Ph.D. (adjunct)
Virginia Polytechnic University, 1989
Research Interests: Transportation, Planning and Economics

Robert Zimmerman, Ph.D. (adjunct)
North Dakota State University, 1991
Research Interests: Water and Wastewater Treatment, Solid Waste

G. Padmanabhan, Ph.D. (emeritus)
Purdue University, 1980
Research Interests: Stochastic Hydrology, Water Resource Systems, and Hydrologic Modeling

Coatings & Polymeric Materials

Department Information

- **Department Chair:**
  Dean C. Webster, Ph.D.
- **Department Location:**
  Research I, Research Park
- **Department Phone:**
  (701) 231-7633
- **Department Web Site:**
  www.ndsu.edu/cpm/
- **Application Deadline:**
  April 15 for fall semester. Applications are reviewed for all semesters, however fall start is preferred.
- **Degrees Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE: Required for international applicants (unless the applicant has earned a bachelor's degree from a regionally accredited university within the United States); Recommended for all applicants
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5

Program Description

The Department of Coatings and Polymeric Materials offers graduate studies leading to the M.S. and Ph.D. degrees in polymers and coatings science, and students in the department may also get a Ph.D. in the Materials and Nanotechnology program. The departmental research bridges between basic and applied research in the field of polymers and coatings. There is a unique atmosphere and opportunities for cross-disciplinary research experience, often accomplished by multi-disciplinary research activities with, for example, chemistry or engineering departments. Advanced research work involves specialized training in the following areas: colloidal and interfacial chemistry of polymers and coatings, polymer synthesis, adhesion, durability, spectroscopy, corrosion, electrochemistry, nanomaterials design and synthesis, computational modeling, life cycle assessment, and rheology. The department has an industrial advisory board consisting of leading industrial scientists and/or former graduates who provide new directions and other feedback to the program.

During the fall semester, the faculty meet with the new students to acquaint them with the research programs in the department. Because students are required to team with a research adviser by the end of the first semester in residence, they are required to discuss research opportunities with all faculty members.

Research Facilities and Equipment

The Department of Coatings and Polymeric Materials is housed in a modern building in the NDSU Research and Technology Park on the northwest corner of the campus. This building consists of nearly 40,000 square feet of space for research and teaching. Modern equipment and instrumentation have profoundly influenced the development of instruction and are the cornerstones of research in the chemical sciences. The Department of Coatings and Polymeric Materials possesses extensive instrumentation to characterize polymers and colloids ranging from state-of-the-art spectrometers, thermal analysis systems, advanced electrochemical equipment to study corrosion, and atomic force microscopes, as well as equipment for paint making and testing. Other modern research facilities, including state-of-the-art electron microscopy, high-performance computing and NMR laboratories, are readily available to all researchers on the NDSU campus and in the NDSU Research and Technology Park.

The Department of Coatings and Polymeric Materials graduate program is open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full standing status to the program, the applicant must meet the Graduate School admission requirements and have adequate preparation in a science or engineering field.

Financial Assistance

The student must first be accepted in full or conditional status before he/she is eligible for an assistantship in the Department of Coatings and Polymeric Materials. To be considered for an assistantship, the Graduate School application packet must be complete no later than April 15. International students must also submit a TOEFL or IELTS score. General and subject GRE scores are highly encouraged if they are available to the student. Graduate students may be supported during both the academic year and summer months by either teaching or research assistantships.

The current monthly stipend is $1,750+ per month, for an annual stipend of $21,000+. University tuition is waived for qualified TAs and RAs

The Master of Science program requires the completion of 16 credits of letter-graded course work with an overall GPA of 3.0 or better. The Ph.D. program requires the completion of 27 credits of letter-graded course work with an overall GPA of 3.0 or better. Each student must choose a thesis

(research) adviser within three to six months of beginning graduate school. After two semesters, the student must also select a supervisory committee. This committee advises the student and administers oral examinations. Candidates for the M.S. program normally satisfy course requirements within one year of study. Ph.D. candidates typically take about two years to complete courses, leaving later years for full-time dissertation research.

Candidacy qualifying examinations are administered twice annually. All Ph.D. candidates are required to pass the qualifying exam and defend an original written research proposal at least eight months prior to the final dissertation examination. The proposal topic must be approved by the student's research adviser, and the supervisory committee administers the oral exam. Lastly, following completion of dissertation research and the presentation of an acceptable written dissertation, the candidate defends it before the supervisory committee.

Accelerated M.S. Program

An accelerated M.S. degree program is available for students enrolled in a major at NDSU and the Coatings and Polymeric Materials minor program. This program will allow qualified students to complete a B.S. plus M.S. degree in as little as five years. Students should declare their intent to enroll in the accelerated M.S. program during their sophomore year. Contact the department for more information on the requirements for the program.

Dante Battocchi, Ph.D.
University of Trento, 2001
North Dakota State University, 2012
Research Interests: Electrochemical Noise Measurements, Scanning Vibrating Electrode Technique (Svet), Organic Metal-Rich Primers Characterization and Development, Materials Protection and Metal Corrosion

Stuart G. Croll, Ph.D.
University of Leeds, 1974
Research Interests: Weathering Durability of Coatings, Service Lifetime Prediction, Colloidal Stability, Molecular Modeling, Pigment-Polymer Interactions, Film Formation Processes, Coating Physics, Art Conservation

Erik Hobbie, Ph.D.
University of Minnesota, 1990
Research Interests: Nanotechology, Nanoparticles Polymers, Optics and Rheology

Ghasideh Pourhashem, Ph.D.
Drexel University, 2014
Research Interests: Environmental impact assessment to inform decision making, Life cycle assessment (LCA) and techno-economic analysis (TEA) of bio-based products, Industrial Ecology, bio-based product policy

Mohiuddin Quadir, Ph.D.
Freie University Berlin, Germany, 2010
Research Interest: Organic Polymer Chemistry, Functional self-assembly of polymers, Biomaterials, Application-guided modification of polymers for pharmaceutical and medical use, Bio-based materials

Bakhtiyor Rasulev, Ph.D.
Uzbek Academy of Science, 2002
Research Interests: Cheminformatics, Computational Chemistry of Polymers and Coating Materials, Quantitative Structure-Activity Relationship, Predictive Models Development, Molecular Modeling, Nanoparticles, Physico-Chemical Properties and Toxicity Assessment

Andriy Voronov, Ph.D.
Lviv Polytechnic National University, 1994
Research Interests: Polymer Synthesis, Micellar Self-Assembly, Sustainable Biobased Polymeric Materials, Responsive Polymers for Biomedical Applications, Polymers for Biomimetic Conversion of Biomass, Polymer Latexes, Polymer Hydrogels, Polymer Thin Films.

Dean Webster, Ph.D.
Virginia Polytechnic Institute and State University, 1984
Research Interests: Polymer Synthesis, Thermosets, Polymerization Reactions, Bio-based materials, Marine Coatings, Combinatorial and High Throughput Methods.

Research Faculty

Dennis E. Tallman (formerly of NDSU Dept. of Chemistry)
The Ohio State University, 1968
Research Interests: Analytical And Physical Electrochemistry, Corrosion Mechanisms, Corrosion Control By Coatings, Electroactive Conducting Polymers, Scanning Probe Techniques Microelectrodes And Microelectrode Arrays

Adjunct Faculty

Bret Chisholm, (PolyOne Corporation)

University of Southern Mississippi, 1993
Research Interests: Electrochemical Noise Measurements, Scanning Vibrating Electrode Technique (Svet), Organic Metal-Rich Primers Characterization and Development, Materials Protection and Metal Corrosion

Matthew S. Gebhard (DSM)
Stanford University, 1990
Research Interests: Rheology in Coatings Processes, Final Film Properties, Architectural Binder Technology

Victoria Gelling, Ph.D. (Sherwin-Williams)
North Dakota State University, 2002
Research Interests: Electrochemistry, Corrosion, Environmentally Compliant Corrosion Inhibitors

Loren W. Hill, Ph.D. (Consultant)
Pennsylvania State University, 1965
Research Interests: Structure-Property Relationships of Thermoset Coatings, Dynamic Mechanical Analysis

Theodore Provder, Ph.D. (Consultant)
University of Wisconsin, 1965
Research Interests: Chromatographic and Separation Methods of Polymers, Particle Size Measurements

Richard R. Roesler, Ph.D. (Consultant)
University of Washington, 1969
Research Interests: Blocked Polyisocyanates, Polyurethane Pispersions, High Solids Amine Functional Coreactants for Polyisocyanate

Brian S. Skerry, Ph.D. (Sherwin-Williams)
University of Manchester, 1980
Research Interests: Corrosion and Coatings

College Teaching Certificate

Department Information

- **Program Director:**
  Paul Kelter, Ph.D.
- **Department Location:**
  FLC 314, Office of Teaching and Learning
- **Department Phone:**
  (701) 231-6336
- **Department Web Site:**
  www.ndsu.edu/otl/college_teaching_certificate.html
- **Degrees Offered:**
  Certificate (Students enrolled in the CTC program must be concurrently enrolled in a graduate program leading to a degree.)

Program Description

The College Teaching Certificate (CTC) is a three-semester (9 credit) program in pedagogy for NDSU graduate students from across campus who plan to teach in a college or university and individuals who already have a graduate degree and work on campus. Students study contemporary education research focused on higher education issues, as well as gain experience in the teaching and learning process through microteaching modules, field experience, peer observations, and a structured practicum.

To be admitted to the program, the applicant must:

1. Be a current degree-seeking student in a enrolled graduate program.
2. Submit a completed College Teaching Certificate Application (https://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Forms/Student_Forms/CTC_App_.pdf) to the Graduate School.
3. Hold a baccalaureate degree from an educational institution of recognized standing.
4. At the baccalaureate level, have earned a cumulative grade point average (GPA) in all courses of at least 3.0 on a 4.0 scale.

Code	Title	Credits
The College Teaching Certificate is a three-semester, 9 credit program		
Foundation Courses (choose one)		3
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences (Fall, annually)	

HDFS 802	Teaching Developmental Science (Spring every odd year, 2017, 2019, 2021)	
STEM 810	Teaching College Science (Fall, annually)	
Electives (choose one)		3
AHSS 796	Special Topics (Emerging Trends in Teaching and Learning Online-Spring, annually)	
EDUC 728	Instructional Technology for Teaching and Learning (Fall 2017 (Normal rotation less than once per year))	
EDUC 753	Managing/ and Monitoring Learning (Spring, annually)	
EDUC 853	Instructional Methods for Adult Learners	
HDFS 880	Supervision and Teaching Couple and Family Therapy	
STEM 820	STEM Curriculum and Instruction (Spring, every even year (2018, 2020, 2022))	
STEM 840	Designing Technology-infused Learning Environments in Higher Education	
Required Teaching Practicum		3
EDUC 792	Specialized Studies for K-12 Teachers (*)	
or EDUC 892	Graduate Teaching Experience	
Total Credits		9

*Refers to courses cross-listed to be taken under a prefix in the student's major field. For example, a HDFS major would take HDFS 892. This experience requires a minimum of 15 face-to-face teaching hours, with the remaining credit hours to be dedicated to preparing lesson plans, evaluating student data, and developing assessments. The field experience will be designed in consultation with a faculty teaching mentor. Students will prepare a 2-page field experience proposal for approval from the CTC director during the semester prior to the experience.

Notes:

1. This schedule is subject to change.
2. Every course has an enrollment cap. Please check with the course instructor about this.
3. **Once requirements are completed a student must submit the Verification of College Teaching Certificate** (https://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Forms/Student_Forms/Verification__CTC.pdf) **form.**

Communication

Department Information

- **Department Chair:**
  Stephenson Beck, Ph.D.
- **Graduate Coordinator:**
  Zoltan Majdik, Ph.D.
- **Department Location:**
  Minard Hall 338
- **Department Phone:**
  (701) 231-7705
- **Department Web Site:**
  www.ndsu.edu/communication/
- **Application Deadline:**
  Ph.D - March 1; M.S. and M.A. - March 15, October 15
- **Degrees Offered:**
  Ph.D., 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

Program Description

The graduate program in communication offers graduate study leading to the M.A., M.S., and Ph.D. degrees. The program prepares students for academic and management positions, as well as advancement within current career fields.

The department tailors student research projects and academic programs to individual needs and interests. Students may take interdisciplinary graduate course work to enhance their program of study. Information is available on the department's website, www.ndsu.edu/communication.

Admission Requirements

Programs are open to students holding baccalaureate degrees from accredited universities or colleges.

Master of Science or Arts

To be admitted with full status to the program, the applicant must meet the Graduate School requirements; have adequate study in communication, journalism or a related area; and provide a score for the Graduate Record Examination (GRE).

Doctor of Philosophy

To be admitted with full status to the program, the applicant must meet the Graduate School requirements. In addition to materials required by the Graduate School applicants must submit:

- A CV or resume which clearly identifies your current position, including your responsibilities; your professional publications and papers; your service and professional activity; and your teaching and training experiences
- A scholarly writing sample where the candidate is first author (single authorship preferred), such as a master's thesis, proposal, or chapter; conference paper; final course paper
- Evidence of effective teaching **potential** (please include one or more of the following): teaching evaluations, teaching philosophy statement, recommendation letter(s) may speak to experience or potential of applicant, peer evaluations/observations, sample syllabi, sample lesson plan/assignment, etc.
- Graduate Record Exam (GRE) scores
- TOEFL test results (required for international students)

Financial Assistance

Students admitted at full or conditional status may apply for teaching assistantships at the master's or doctoral degree level. Initially, teaching assistants conduct lab sessions for the Comm 110 class. Teaching assistants may have opportunities to teach other classes during their program. The teaching assistantship deadline is March 15 for the following fall semester.

Graduate assistants receive a stipend and tuition waiver. Applications are available from the department office or online from the department's website, www.ndsu.edu/communication.

Master's program

The Master of Arts program is designed for students who are interested in conducting qualitative or rhetorical research, while the Master of Science program is designed for those interested in quantitative research. Both programs require completion of 30 credit hours of graduate coursework with an overall GPA of 3.0 or better. The student can elect to complete a research-based thesis, for which six of the 30 credits are awarded, or a written exam, for which three credits are awarded. A prospectus meeting and final defense of the thesis/written exam is required.

Code	Title	Credits
Core		
COMM 700	Research Methods in Communication	3
COMM 711	Communication Theory	3
Research Tools		
Select at least two of the following:		6
COMM 704	Qualitative Research Methods in Communication	
COMM 707	Quantitative Research Methods in Communication	
COMM 767	Rhetorical Criticism	
SOC 700	Qualitative Methods	
SOC 701	Quantitative Methods	
STAT 725	Applied Statistics	
Students pursuing the M.A. degree must take at least one qualitative methods course (COMM 704, COMM 708, COMM 767, or SOC 700). Students pursuing the M.S. degree must complete at least one quantitative methods course (COMM 707, COMM 710, SOC 701, or STAT 725).		
Elective Specialization		
12-15 credits of additional coursework, depending on whether the thesis or exam option is selected. Students can select from a wide range of specializations, pending approval from their adviser. Students may also choose graduate-level electives from other departments that may enhance specialized communication study goals.		12-15

Thesis or Exam	
The thesis option requires six credits of COMM 798. The exam option requires three credits of COMM 799.	3-6

Doctor of Philosophy

The Ph.D. program is designed to be completed in 4 years, and requires at least 60 credit hours beyond the master's degree. These hours will be in a planned course of study approved and overseen by the student's adviser and advisory committee.

The department currently offers two areas of concentration:

- Media and Society
- Organizational Communication

Students with a master's degree in another discipline may be required to complete additional graduate course work in specific areas of communication deemed necessary by the student's adviser and advisory committee. Graduate work taken beyond the master's degree may be judged applicable by the advisory committee, but post-master's graduate credits beyond 9 semester hours will not count toward the 60 credit minimum required for the Ph.D.

Students are strongly encouraged to take all of the Summer Scholar courses.

Course Requirements

Minimum of 30 credit hours in core or content concentration:

Code	Title	Credits
Core Courses		
COMM 701	Advanced Research Methods in Communication I	3
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences	3
COMM 711	Communication Theory	3
COMM 735 or 783 Media and Society or Org Comm Theory Course		3
Content Concentration		
Minimum of 12 credit hours in the department's 700-level courses in the student's major concentration area		12
Minimum of 9 credit hours in the department's 700-level courses in the student's minor concentration area		9
Research Courses		
Exclusive of COMM 701, maximum of 6 credit hours of independent study		12
Dissertation		
Dissertation		15

Comprehensive Exam

When coursework is nearly completed, the DGS will consider the program of study and student’s professional presentations and publications to determine readiness for the comprehensive exam process. Doctoral students will meet with their advisers to prepare for the comprehensive examination.

After completion of the written examination, the doctoral committee will evaluate the written work. If the committee deems the work to be acceptable, the advisor will schedule an oral examination in which the student will defend his or her exam.

Dissertation

Under the guidance of an adviser and advisory committee, doctoral candidates will submit and defend a dissertation prospectus and ultimately a completed dissertation.

Stephenson J. Beck, Ph.D.
University of Kansas, 2008
Research Interests: Group and Organizational Communication, Interaction Analysis, Communication Strategy

Ann Burnett, Ph.D.
University of Utah, 1986
Research Interests: Legal Communication, Small Group Communication, Interpersonal Communication, Gender and Communication

Ross F. Collins, Ph.D.
University of Cambridge, 1992

Research Interests: Media History, International Media

Elizabeth Crisp Crawford, Ph.D.
University of Tennessee, 2007
Research Interests: Visual Storytelling, Advertising Message Strategy, Advertising Education

Zoltan Majdik, Ph.D.
University of Southern California , 2008
Research Interests: Science and Risk Communication in Biotechnological Practice, Rhetorical and Argumentation Theory, Ethics and Moral Theory

Mark Meister, Ph.D.
University of Nebraska, 1997
Research Interests: Rhetorical and Critical Theory, Environmental Communication

Robert Mejia, Ph.D.
The College at Brockport, 2012
Research Interests: Media and Cultural Studies, Political Economy of the Media, Technology Studies, Game Studies, Rhetoric of Health and Disease

Charles Okigbo, Ph.D.
Southern Illinois University, 1982
Research Interests: Social and Behavioral Change Communication, Health Communication

Carrie Anne Platt, Ph.D.
University of Southern California, 2008
Research Interests: Rhetoric of Cultural Politics, Gender and Technology, Media in Society

Melissa A. Vosen Callens, Ph.D.
North Dakota State University, 2010
Research Interests: Online Pedagogy, Emerging Media and Classroom Technology, Representations of Race and Gender in Popular Culture

Justin A. Walden, Ph.D.
Pennsylvania State University, 2013
Research Interests: Organizational Communication, Organizational and Individual Technology Adoption, Employee/Brand Advocacy

Catherine Kingsley Westerman, Ph.D.
Michigan State University, 2008
Research Interests: Organizational Communication, Workplace Friendships

David Westerman, Ph.D.
Michigan State University, 2007
Research Interests: Computer Mediated Communication, Interpersonal Communication

Emeritus

Robert S. Littlefield, Ph.D.
University of Minnesota

Paul E. Nelson, Ph.D.
University of Minnesota

Judy C. Pearson, Ph.D.
Indiana University

Jerry Richardson, M.A.
University of Washington

Lou Richardson, M.A.
North Dakota State University

Community Development

Department Information

- **Program Coordinator:**
  Gary Goreham, Ph.D.
- **Email:**

gary.goreham@ndsu.edu

- **Department Location:**
  Minard 428
- **Department Phone:**
  (701) 231-7637
- **Department Web Site:**
  www.ndsu.edu/ced/
- **Application Deadline:**
  International application materials must be received before May 1 for the fall semester and prior to August 1 for spring and summer semesters. Domestic applications must be received at least one month prior to the start of the semester.
- **Degrees Offered:**
  M.A., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Sociology and Anthropology, in cooperation with the Department of Agribusiness and Applied Economics, offers a master's degree in Community Development. The degree is a multi-institutional, multi-disciplinary, online program in conjunction with the Great Plains Interactive Distance Education Alliance (IDEA). Other institutions participating in this program include Iowa State University, Kansas State University, the University of Nebraska-Lincoln, and South Dakota State University.

The primary audience for this program is community economic development officials and specialists already employed in the field.

The program requires a total of 36 credit hours, including 16 credits (six courses) of core courses, 15 credits in two of the four track areas, and up to six credits of thesis. The four track areas include Building Economic Capacity, Natural Resource Management, Working with Native Communities, and Non-profit Leadership.

Program Objectives

The objectives of the Community Development graduate degree program are to:

- Increase the skills, knowledge, and competencies of community economic development officials who are currently employed and have limited opportunity to participate in an on-campus degree program.
- Provide graduate training for individuals entering the community economic development career field who require training/degrees for career advancement.
- Enhance the community economic development skills, knowledge, and competencies of individuals working with Native American communities, natural resource-based communities, non-profit organizations, and/or state and local government.

A total of 36 credits are required for the master's degree program. Students will write a thesis or complete a creative component (Plan B) to capstone the degree program, which will be worth six credit hours. The student's schedule of courses must be approved by the faculty adviser and the campus coordinator. Students may select either a Master of Science (M.S.) or Master of Arts (M.A.) option. The M.A. option requirement normally includes two (2) years of a foreign language. This requirement can be satisfied with undergraduate courses and/or a proficiency examination.

Students will be required to take all of the six core courses and an additional 15 credits selected from at least two tracks.

There are presently four tracks that have been developed from which students may choose. These include:

- Building Economic Capacity
- Natural Resource Management
- Working with Native Communities
- Non-profit Leadership

Code	Title	Credits
Core Courses Credits		16
CED 709	Community Development Orientation	
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

NATURAL RESOURCE MANAGEMENT TRACK

Code	Title	Credits
CED 731	Ecological Economics	3
CED 733	Sustainable Communities	3
CED 735	Policy and Politics of Coastal Areas	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	Wellness in Native Communities	1
CED 726	Youth Development in Native Communities	1
CED 727	Indian Country Agriculture and Natural Resources	1
CED 728	Role of Tribal Colleges in Economic Development	1

BUILDING ECONOMIC CAPACITY TRACK

Code	Title	Credits
CED 741	Economic Development Strategies and Programs	3
CED 742	Economic and Fiscal Impact Analysis	1
CED 743	Cost-Benefit Analysis	1
CED 744	Local Economic Analysis	1
CED 745	Land Management Planning	3

Computer Science

Department Information

- **Department Head:**
  Kendall E. Nygard, Ph.D.
- **Graduate Coordinator:**
  Jun Kong, Ph.D.
- **Department Location:**
  258 QBB
- **Department Phone:**
  (701) 231-8562
- **Department Email:**
  gradinfo@cs.ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/cs/
- **Application Deadline:**
  February 1 for fall semester; September 1 for spring semester**
- **Degrees Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE

- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5

**Spring admissions are given only occasionally, depending on funding and faculty research needs. If there are no spring openings, spring applicants are automatically considered for the subsequent fall semester. There are no summer admissions for any Computer Science program.

Program Description

The Department of Computer Science and Operations Research offers the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in Computer Science. Graduate course work in Operations Research is offered and may be used to provide an operations research concentration to either program. For additional information, please contact the department at (701) 231-8562 or gradinfo@cs.ndsu.edu.

In addition to the minimum Graduate School requirements, the following items are required for all Computer Science applicants seeking an advanced degree:

Master of Science

- The applicant must have a bachelor's degree from an educational institution of recognized standing. Admission to the program is competitive; the following minimum requirements are necessary but are not sufficient for automatic admission.
- The applicant must show, by a combination of educational background, academic performance, and work experience, the potential to succeed in advanced study and research in computer science. Minimum preparation usually includes the ability to program in one or more modern, commonly used high-level languages (such as Java or C++); and experience in using data structures such as linked lists and binary trees. Minimum preparation for unconditional admission to the master's program would normally include courses in computer science principles and theory equivalent to the NDSU courses.

Code	Title	Credits
CSCI 161	Computer Science II	4
CSCI 222	Discrete Mathematics	3
CSCI 366	Database Systems	3
CSCI 372	Comparative Programming Languages	3

- The applicant for the Computer Science M.S. degree program must have a cumulative grade point average (GPA) in all previous courses of at least 3.0 (out of 4.0) or equivalent to attain full standing.
- The applicant for the Computer Science M.S. degree program must have a score above the median (50^{th} percentile) for the quantitative reasoning portion of the GRE exam.
- International students are welcome to apply. They must submit TOEFL, IELTS, or PTE Academic score. Minimum requirements are: TOEFL score of at least 550 (paper based) or 79 (internet based); IELTS score of at least 6.5; or PTE Academic score of at least 53.
- Eligibility for a teaching assistantship requires the following additional requirements: minimum TOEFL ibT score of 81 (IELTS of 7), a TOEFL ibT Speaking subscale score of 23 or above and a TOEFL ibT Writing subscale score of 21 or above. The IELTS equivalent scores are 6.0 and 6.0 respectively.
- These individuals must have a minimum TOEFL ibT score of 79 (IELTS of 6.5) and must score at or above the 40th percentile on the TOEFL ibT Speaking and Writing subscales (currently 19 and 21 respectively). The IELTS equivalent scores are 5.5 and 6.0 respectively.

Doctor of Philosophy

The applicant must have at least a four-year bachelor's degree, or a master's degree in computer science. In some cases, students with a degree in a closely related area may be considered, provided the course work includes exposure to the skills listed under M.S. above. Students with only a bachelor's degree should have substantial computer science experience, whether acquired through course work or professional experience.

Admission to the program is competitive, and requirements for admission to this program are more rigorous than for admission to the M.S. program. Students applying with a bachelor's degree only should meet a minimum GPA of 3.25 in previous coursework. The applicant for Computer Science Ph.D. degree program must have a GRE score above the median (50th percentile) for the quantitative reasoning portion. The admissions committee will evaluate the applicant's overall academic record, as well as any relevant employment and professional experience. Of particular importance is evidence of the applicant's potential for scholarship and independent research at the Ph.D. level. International students are welcome. English Language requirements are the same as for the Computer Science M.S. program.

The graduate admissions committee reviews all applications during the month following the application deadline and considers accepted students for any available assistantship positions within the department. If an assistantship is not offered at time of admission, accepted students can then fill out an application on the Computer Science website for later consideration.

Financial Assistance

Assistantships are available to selected graduate students. Teaching one section of a lower division service course requires 10 hours of work per week and qualifies the student for a waiver of graduate tuition and a monthly stipend. Other assistantships that provide a stipend and tuition waiver include research assistantships, which involve assisting faculty with their research, and graduate service assistantships, which involve tutoring, grading or computer-related work with faculty members or organizations on campus. Related prior experience increases the likelihood of a teaching or tutoring assistantship being awarded. For all assistantships, a student's chances are greater after they have been at NDSU one or two semesters.

Code	Title	Credits
Master of Science in Computer Science Degree Requirements		
Semester core courses (required of all students):		
CSCI 713	Software Development Processes	
CSCI 724	Survey of Artificial Intelligence	
CSCI 741	Algorithm Analysis	
CSCI 765	Introduction To Database Systems	
Additional 700-800 level Computer Science courses selected in consultation with your adviser.		
Thesis Option & Comprehensive Study Options		
CSCI 790	Graduate Seminar	
Thesis Option		32
Additional graduate coursework		8-12
CSCI 798	Master's Thesis (6-10 credits)	
Comprehensive Study Option		32
Additional Graduate Coursework		14-16
CSCI 797	Master's Paper (2-4 credits)	
Culminating Experience-Based Option		36
Additional Graduate Coursework		21
CSCI 771	Software Development Project I	

Students seeking an option in cybersecurty must take 9 credits from the below list. No more than 3 credits can be from CSCI 790.

Code	Title	Credits
CSCI 676	Computer Crime & Forensics	3
CSCI 791	Temporary/Trial Topics (cybersecurity focus)	1-5
CSCI 793	Individual Study/Tutorial (cybersecurity focus)	1-5
CSCI 790	Graduate Seminar (cybersecurity focus)	1-3
CSCI 689	Social Implications of Computers	3
CSCI 773	Foundations of the Digital Enterprise	3
CSCI 783	Topics In Software Systems (cybersecurity focus)	3

- Research adviser should be selected by the end of the second semester at NDSU.
- A Plan of Study listing coursework and examination committee members should be completed by the end of the second semester at NDSU.
- All course work must be approved by the student's adviser, Supervisory Committee, department chair, and graduate dean through the plan of study.
- A maximum of 9 semester credits may be transferred into the program. There may be a maximum of 6 credits of independent study.
- Comprehensive Examination (on the core courses) should be completed by the end of the fourth semester.
- Final Oral Examination on the student's research.

Code	Title	Credits
Doctor of Philosophy in Computer Science degree requirements		90
Core Courses: (or their equivalent in transfer or examination credits)		
CSCI 713	Software Development Processes	
CSCI 724	Survey of Artificial Intelligence	
CSCI 741	Algorithm Analysis	
CSCI 765	Introduction To Database Systems	

Five to ten additional courses selected in consultation with your adviser.

CSCI 899	Doctoral Dissertation

Students seeking an option in cybersecurty must take 9 credits from the below list. No more than 3 credits can be from CSCI 790.

Code	Title	Credits
CSCI 676	Computer Crime & Forensics	3
CSCI 793	Individual Study/Tutorial (cybersecurity focus)	1-5
CSCI 796	Special Topics (cybersecurity focus)	1-5
CSCI 790	Graduate Seminar (cybersecurity focus)	1-3
CSCI 791	Temporary/Trial Topics (cybersecurity focus)	1-5
CSCI 669	Network Security	3
CSCI 773	Foundations of the Digital Enterprise	3
CSCI 783	Topics In Software Systems (cybersecurity focus)	3

- Research adviser should be selected by the second semester at NDSU.
- A minimum of 15 didactic credits numbered 700 -789 or 800-898, of which at least 9 are not included in the Computer Science Core Courses listed above.
- 30-45 semester credit hours of research – The Ph.D. requires a research contribution to be made under the supervision of one of the Computer Science Department's graduate faculty members.
- Research proposal presentation and preliminary oral examination (qualifying exam) should be completed by the fourth semester at NDSU
- Satisfactory completion of the Comprehensive Exam at the PhD Level. (written based on the core courses)
- Dissertation
- Final oral examination on the dissertation

Some additional information regarding the course work:

- A student holding a Master of Science degree from an educational institution of recognized standing may use:
  - 30 credits previously completed toward the 90 total credits required for the doctoral degree **OR**
  - Up to 9 credits previously earned graduate level courses with a grade of B or better may be used toward the 90 total credits for the doctoral degree.
- The 90 credits (including any credits transferred) must be computing-related with at least 45 credits involving significant graduate level computer science material. Generally, these credits would be offered by a computer science department.
- The 90 credits may include a maximum of 15 credits of non-didactic courses (independent studies or seminars). Seminars are limited to 4 of those credits.
- The student's advisory committee, the department chair, the college dean, and the graduate dean all must approve the course work on the plan of study.

Department Faculty

Anne Denton, Ph.D.
University of Mainz, 1996
Research Interests: Data Mining, Bioinformatics, Scientific Informatics, Databases, Geospatial Data, Cloud Computing

Dean Knudson, Ph.D.
Northwestern University, 1972
Research Interests: Software Engineering, International Capstone Programs, University/Industry Relationships

Jun Kong, Ph.D.
University of Texas, Dallas, 2005
Research Interests: Human Computer Interaction, Mobile Computing, Software Engineering

Juan (Jen) Li, Ph.D.
University of British Columbia, 2008
Research Interests: Large-scale Distributed System (P2P and Cloud Computing, Distributed Search, Routing Algorithms), Semantic Web Technologies, Social Networks, Information Retrieval, Knowledge Discovery

Simone Ludwig, Ph.D.
Brunel University, 2004
Research Interests: Swarm Intelligence, Evolutionary Computation, Fuzzy Reasoning, Cloud Computing

Kenneth Magel, Ph.D.
Brown University, 1977
Research Interests: Software Engineering, Human-Computer Interfaces, Software Complexity, and Software Design

Kendall Nygard, Ph.D.
Virginia Polytechnic Institute and State University, 1978
Research Interests: Data Science, Optimization Modeling, Smart Grid, Sensor Networks, Agents, Artificial Intelligence, Security, Adaptive Systems, Swarm Intelligence

Saeed Salem, Ph.D.
Rensselaer Polytechnic Institute, 2009
Research Interests: Bio-Informatics and Data Mining

Brian Slator, Ph.D.
New Mexico State University, 1988
Research Interests: Artificial Intelligence, Educational Media

Jeremy Straub, Ph.D.
University of North Dakota, 2015
Research Interests: Multi-tier Mission Architecture & Control, Autonomous Data Link Reduction, Autonomous Vehicle Control, Machine Vision, Super Resolution

Vasant Ubhaya, Ph.D.
University of California-Berkeley, 1971
Research Interests: Algorithm Analysis, Approximation and Optimization

Gursimran Walia, Ph.D.
Mississippi State University, 2009
Research Interests: Empirical Software Engineering, Software Errors and Software Quality Improvement, Requirements Engineering, Human Cognition in Software Engineering, Managing and Estimating Software Quality

Changhui Yan, Ph.D.
Iowa State University, 2005
Research Interests: Bioinformatics, Computational Biology, Genomics, Machine Learning, Data Mining, Big Data, Cloud Computing

Professors of Practice

Oksana Myronovych, Ph.D.
North Dakota State University, 2009

Mark Pavicic, Ph.D.
Columbia University, 1985

Affiliate Faculty

Otto Borchert, Ph.D.
North Dakota State University, 2015
Research Interests: Artificial Intelligence, Educational Games, STEM Learning

Hyunsook Do, Ph.D.
University of Nebraska, 2007
Research Interests: Software Engineering, Software Testing, Regression Testing, Software Maintenance, Requirements Verification, Software Empirical Methodologies

Hassan Reza, Ph.D.
North Dakota State University, 2002
Research Interests: Software Architecture, Cloud Computing, Architectural Analysis & Description

Xiaodong Zhang, Ph.D.
Dalhousie University, Canada, 2001
Research Interests: Satellite Sensing, Geographic Information Systems

Construction Management and Engineering

Department Information

- **Department Chair:**
  Zhili (Jerry) Gao, Ph.D.
- **Graduate Coordinator:**
  Gary Smith, Ph.D.
- **Department Location:**
  Engineering 106
- **Department Phone:**
  (701) 231-6521
- **Department Web Site:**
  www.ndsu.edu/construction/
- **Application Deadline:**
  Fall: May 1; Spring: October 1 for M.S. and Master of Construction Management, November 1 for Certificate
- **Degrees Offered:**
  M.S., MCM, Certificate
- **Test Requirement:**
  GRE (M.S. applicants)
- **English Proficiency Requirements:**
  M.S.: TOEFL ibT: 81, IELTS: 7, PTE Academic 54; Master of Construction Management: TOEFL iBT: 79, IELTS: 6.5, PTE Academic: 53

Programs

The Department of Construction Management and Engineering offers three separate and distinct graduate programs as listed below..

Master of Science (M.S.) in Construction Management

The Master of Science in Construction Management program is an on-campus, research-focused degree. Students are expected to significantly contribute to the development and delivery of scholarly publications and to the development and submission of research grant proposals as determined by the major adviser.

Master of Construction Management

The Master of Construction Management program is an online professional program consisting of 30 credits of course work and the Associate Constructor (AC) Exam.

Graduate Certificate in Construction Management

The Graduate Certificate in Construction Management program provides an online course learning experience constituting a distinct knowledge-base and a specific set of associated skills within the areas of estimating, scheduling, and project management at the graduate level. These three areas constitute a body of knowledge that represents the fundamental core of construction management.

Master of Science (M.S.) in Construction Management

In addition to the Graduate School requirements, to be admitted into the Master of Science in Construction Management applicants must:

- Have earned a baccalaureate degree in construction, engineering, architecture, or other related discipline with a minimum CGPA of 3.0 or equivalent to attain full standing.
- Submit an official transcript for each college/university attended.
- Submit Graduate Record Examination (GRE) score.
- Submit a one-page “Statement of Purpose” outlining reasons for pursuing the Master of Science in Construction Management, emphasizing on research objectives and qualifications that directly relate to one of the “Research Interests” of the CM&E faculty.
- Submit a two-page resume.
- Submit three (3) letters of recommendation.

Prospective students must submit application materials directly to the NDSU Graduate School via the online application process.

Financial Assistance

For exceptional applicants, the CM&E Department may offer a graduate assistantship, which consists of a monetary stipend and a possible tuition waiver; however, student activity fees and program fees are not waived. There is no separate application process for graduate assistantships. Applicants are evaluated based on their credentials and/or experience.

*Master of Construction Management (*MCONSM)

In addition to the Graduate School requirements, to be admitted into the Master of Construction Management, applicants must:

- Have earned a baccalaureate degree in construction, engineering, architecture, or other related discipline with a minimum CGPA of 3.0 or equivalent to attain full standing.
- Submit an official transcript for each college/university attended.
- Submit a two-page resume.
- Submit a one-page "Statement of Purpose" outlining reasons for pursuing the Master of Construction Management.
- Submit three (3) letters of recommendation.

Prospective students must submit application materials directly to the NDSU Graduate School via the online application process. Applicants who are deficient in the CGPA requirement are encouraged to apply for the Graduate Certificate in Construction Management. Although successful completion of the Graduate Certificate does not guarantee acceptance into the Master of Construction Management, the Graduate Certificate will be seriously considered in application decisions related to the Master of Construction Management Program.

Financial Assistance

Graduate assistantships, tuition waivers, and financial aid offered by the CM&E Department, the Graduate School, or NDSU are not available to students in the Master of Construction Management program.

Graduate Certificate in Construction Management

In addition to the Graduate School requirements, to be admitted into the Graduate Certificate in Construction Management applicants must:

- Have earned a baccalaureate degree in construction, engineering, architecture, or other related discipline with a minimum CGPA of 3.0 or equivalent to attain full standing.
- Submit of an official transcript for each college/university attended.
- Submit a two-page resume.
- Submit a one-page "Statement of Purpose" outlining reasons for pursuing the Graduate Certificate in Construction Management.
- Submit three (3) letters of recommendation.

Prospective students must submit application materials directly to the NDSU Graduate School via the online application process.

Financial Assistance

Graduate Certificate in Construction Management Program students are not eligible for assistantships, tuition waivers, and financial aid offered by the CM&E Department, the Graduate School, or NDSU.

Master of Science in Construction Management

The Master of Science in Construction Management requires a total of 31 graduate-level credits (24 credits of course work, 6 credits of research/thesis, and 1 credit of seminar) and a thesis. The thesis requires the creation and presentation of new knowledge in providing a solution to a problem. Prior to submitting a thesis to the graduate student's supervisory committee, the thesis must be reviewed by a departmentally approved external editor. All costs associated with external review are the responsibility of the graduate student.

An example of the Plan of Study for the Master of Science in Construction Management is shown below:

Code	Title	Credits
CM&E 790	Graduate Seminar	1
CM&E 603	Scheduling and Project Control	3
CM&E 605	Construction Support Operations	3
CM&E 701	Construction Technology and Equipment	3
CM&E 711	Construction Cost Estimating	3
CM&E 712	Construction Management	3
600, 700 or 800-level electives *		9
CM&E 798	Master's Thesis	6
Total Credits		31

* Electives may be any 600, 700, or 800-level courses offered at NDSU determined by the student and the major faculty adviser. A minimum cumulative grade point average (CGPA) of 3.0 must be achieved in order to complete the M.S. degree.

Master of Construction Management

The Master of Construction Management degree consists of thirty (30) credits of course work and AC Exam. The following ten (10) courses constitute the thirty (30) credits of course work required for the degree.

Code	Title	Credits
CM&E 603	Scheduling and Project Control	3
CM&E 605	Construction Support Operations	3
CM&E 660	Infrastructure Management	3
CM&E 701	Construction Technology and Equipment	3
CM&E 703	Advanced Project Planning and Control	3
CM&E 711	Construction Cost Estimating	3
CM&E 712	Construction Management	3
CM&E 715	Construction Specifications and Contracts	3
CM&E 725	Decision Making and Risk Analysis	3
CM&E 740	Financial and Economic Concepts for Construction Managers	3
CM&E 793	Individual Study/Tutorial (ACExam)	
Total Credits		30

Schedule of Courses

Summer Semester
CM&E 603 Scheduling and Project Control
CM&E 660 Infrastructure Management

Fall Semester
CM&E 703 Advanced Project Planning and Control
CM&E 712 Construction Management
CM&E 715 Construction Specifications and Contracts
CM&E 740 Financial and Economic Concepts for Construction Managers

Spring Semester

CM&E 605 Construction Support Operations
CM&E 701 Construction Technology and Equipment
CM&E 711 Construction Cost Estimating
CM&E 725 Decision Making and Risk Analysis

Associate Constructor (AC) Exam

The Associate Constructor (AC) Exam is administered by the American Institute of Constructors & Constructor Certification Commission. All students in the Master of Construction Management Program must take the AC Exam before their graduation. There is no requirement that a student has to earn a pass score in order to receive the Master of Construction Management Degree from NDSU. However, students are encouraged to prepare for the AC Exam and earn a pass score or better established by the testing agency. The exam may be taken multiple times. The AC exam is the first level in reaching the designation of a "Certified Professional Constructor" (CPC), which is a three-stage process consisting of the AC exam (Level I), 4-5 years of relevant construction management work experience, and the CPC exam (Level II). The AC Exam is offered twice a year, typically in March and November. International applicants should note that the AC Exam is not offered online and is only offered in the United States. If a student has the AC designation, he/she may take the CPC Exam before the graduation. A pass score also is not required for the CPC Exam..

Graduate Certificate in Construction Management

The certificate program consists of nine credits encompassing the following three (3) courses:

Code	Title	Credits
CM&E 603	Scheduling and Project Control	3
CM&E 711	Construction Cost Estimating	3
CM&E 712	Construction Management	3

Only grades of C or higher will satisfy requirements for certificate completion with a CGPA of 3.0 or greater. The Dean of the Graduate School, using official NDSU transcripts, will verify course completion and issue the certificate. Courses used to satisfy the Graduate Certificate requirements cannot be older than three years at the time the certificate completion is verified.

Eric Asa, Ph.D.
Associate Professor and Accreditation Assessment Coordinator
University of Alberta, 2002
Research Interests: Infrastructure and Assets Management, Construction Materials, Engineering Education, Computational Modeling

Zhili (Jerry) Gao, Ph.D., P.E.
Associate Professor and Interim Department Chair
Iowa State University, 2004
Research Interests: Virtual Design and Construction (Visualization, BIM Development And Implantation), Advanced Concrete Techniques (Sustainable Concrete, New Concrete Materials And Structures)

Todd L. Sirotiak, MBA, Ph.D., P.E., C.P.C.
Associate Professor
Iowa State University, 2008
Research Areas: Cost Control, Sustainability, and Engineering Education

Gary R. Smith, Ph.D., P.E.
Professor and Graduate Coordinator
Purdue University, 1986
Research Areas: Quality Control and System Applications, Decision Analysis and Modeling Techniques, Safety Performance Measurement and Improvements, and Process and Productivity Improvement

Matthew L. Stone, Ph.D.
Assistant Professor
University of Alabama, 2013
Research Areas: Cost Estimating, Life Cycle Analysis, and Infrastructure Construction

Huojun Yang, Ph.D.
Assistant Professor
University of Nebraska-Lincoln, 2012
Research Interest: Built Environmental Systems and Building Energy

Yao Yu, Ph.D.
Assistant Professor
North Carolina A&T State University, 2014
Research Areas: Building Energy Conservation Technology, Computational Airflow Modeling, and HVAC System Design and Simulation

Counseling (Counselor Education)

Department Information

- **School of Education Head:**
  Chris Ray, Ph.D.
- **Graduate Coordinator:**
  Brenda Hall, Ed.D.
- **Department Location:**
  SGC Building, 1919 N. University Drive
- **Department Phone:**
  (701) 231-7202
- **Department Web Site:**
  www.ndsu.edu/ceduc/
- **Application Deadline:**
  February 1 for summer start
- **Degrees Offered:**
  M.Ed., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Counselor Educational program, accredited by the Council for Accreditation of Counseling and Related Programs (CACREP), within the School of Education prepares counselors to work professionally with persons from diverse cultural backgrounds and in a variety of settings. Program specializations are available in school counseling and in clinical mental health counseling at the master's degree level.

Review of application for master's degree programs is once each year beginning after the application deadline of February 1. Students who are accepted into the school counseling degree program are required to start classes the following summer; Students who are accepted into the clinical mental health degree program have the option to begin classes in the following summer or the following fall.

Qualified students may apply for admission to graduate programs in the School of Education leading to Master of Education (M.Ed.), or Master of Science (M.S.) degrees. In addition to the Graduate School's required application materials, the M.Ed. and the M.S. programs require an essay discussing professional philosophy and professional goals, as well as an entrance interview.

Admission is considered only after all required application materials have been received and reviewed. Where appropriate, all international student requirements must be met. If a program has a cohort group with enrollment limitations, an entrance interview will be required. The School of Education reserves the right to obtain additional information about the student's professional competence from qualified professionals. Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data.

A student must meet all requirements for full admission. A cumulative baccalaureate GPA of 3.0 or better on a 4.0 scale serves as a guideline for full acceptance. After being accepted for graduate study in the School of Education, the student should contact an adviser assigned to her/him for assistance in filing a plan of study for consideration by the School of Education.

Financial Assistance

Graduate assistantships are available in the School of Education. Applications are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. Students must be accepted into the Graduate School before they are eligible for an assistantship.

All enrollments in Education courses before the student files a graduate plan of study must be approved by the adviser. The School of Education will evaluate graduate courses taken prior to filing the graduate plan of study when the student's plan of study is being considered. Only those courses approved by the School of Education may be included on the final plan of study leading to the degree.

Master's programs within the School of Education require a minimum of 30 semester credits (minimums vary by academic program). The Master of Science (M.S.) degree requires a disquisition. The Master of Education (M.Ed.) degree is a non-disquisition, practitioner-oriented degree. Programs vary on requiring a written comprehensive exam or a portfolio/oral.

NOTE: Earning an academic/professional degree does not necessarily lead to state credential or licensure. People seeking licensure must provide evidence of the required number of years of teaching or counseling, and, in the case of school administration, administrative experience. Potential and current students should consult with the appropriate academic program coordinator for advice about licensure, certification, or credentialing after communicating with the appropriate state official.

Master of Education (M.Ed.)

Code	Title	Credits
Required Courses		
EDUC 703	Research, Measurement and Program Evaluation	3
CNED 710	Counseling Techniques	3
CNED 711	Counseling Theory	3
CNED 712	Human and Family Development 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 730	Crisis and Trauma in Counseling Practice	3
CNED 732	Family Counseling	3
CNED 734	Dynamics of Addiction	3
CNED 794	Practicum/Internship (Practicum)	3
CNED 794	Practicum/Internship (Internship)	4-6
Specialization Courses		

Clinical Mental Health Counseling		
CNED 723	Psychopathology and Diagnosis for Counselors	3
CNED 735	Clinical Mental Health Counseling	3
CNED 863	Advanced Clinical Assessment, Report Writing, & Treatment Planning	3
Electives		6
School Counseling		
Clinical Mental Health Counseling Total Credits		60
CNED 728	Guidance Administration and Consulting	3
CNED 729	Professional K-12 School Counseling	3
School Counseling Total Credits		48

Master of Science

School Counseling Specialization

Code	Title	Credits
I. Human Growth and Development		
CNED 712	Human and Family Development Across the Lifespan	3
CNED 734	Dynamics of Addiction	3
II. Social and Cultural Foundations		
CNED 716	Social and Cultural Foundtions of Counseling	3
III. Helping Relationships		
CNED 710	Counseling Techniques	3
CNED 711	Counseling Theory	3
CNED 732	Family Counseling	3
IV. Groups		
CNED 720	Group Counseling	3
V. Career & Lifestyle Development		
CNED 714	Career Counseling and Testing	3
VI. Appraisal		
CNED 713	Assessment Techniques	3
VII. Research & Program Evaluation		
EDUC 703	Research, Measurement and Program Evaluation	3
CNED 797	Master's Paper (OR)	3
CNED 798	Master's Thesis	6
VIII. Professional Orientation		
CNED 715	Professional Orientation and Ethics	3
CNED 728	Guidance Administration and Consulting	3
CNED 729	Professional K-12 School Counseling	3
IX. Practicum		
CNED 794	Practicum/Internship	3
X. Internship		
CNED 794	Practicum/Internship	4
XI. Electives (approved by adviser)		
Total Required Credits		48

Clinical Mental Health Counseling

Code	Title	Credits
I. Human Growth and Development		
CNED 712	Human and Family Development Across the Lifespan	3
CNED 734	Dynamics of Addiction	3
II. Social and Cultural Foundations		
CNED 716	Social and Cultural Foundtions of Counseling	3

III. Helping Relationships		
CNED 710	Counseling Techniques	3
CNED 711	Counseling Theory	3
CNED 732	Family Counseling	3
IV. Groups		
CNED 720	Group Counseling	3
V. Career & Lifestyle Development		
CNED 714	Career Counseling and Testing	3
VI. Appraisal		
CNED 713	Assessment Techniques	3
CNED 723	Psychopathology and Diagnosis for Counselors	3
CNED 863	Advanced Clinical Assessment, Report Writing, & Treatment Planning	3
VII. Research & Program Evaluation		
EDUC 703	Research, Measurement and Program Evaluation	3
CNED 797	Master's Paper (OR)	3
CNED 798	Master's Thesis	6
VIII. Professional Orientation		
CNED 715	Professional Orientation and Ethics	3
CNED 730	Crisis and Trauma in Counseling Practice	3
CNED 735	Clinical Mental Health Counseling	3
IX. Practicum		
CNED 794	Practicum/Internship	3
X. Internship		
CNED 794	Practicum/Internship	4
XI. Electives (approved by adviser)		
Total Required Credits		48

Carol E. Buchholz Holland, Ph.D.
Kansas State University, 2005
Research Interests: School Counseling; Career Education, Crisis Management Preparation, Trauma

Brenda Hall, Ed.D., NCC
Virginia Polytechnic Institute and State University, 1993
Research Interests: Relational Cultural Theory, Counselor Education Pedagogy, Intimate Partner Violence and Trauma

James Korcuska, Ph.D.
Kent State University, 2000
Research Interests: Counseling Research Methodology, Counselor Education, Men's and Gender Studies & Substance Abuse Counseling

Todd F. Lewis, Ph.D., LPC, NCC
Kent State University, 2002
Research interests: Risk Factors for Drinking during Emerging Adulthood, Theoretical Explanations for College Drinking and Substance Abuse, Substance Abuse Interventions, Motivational Interviewing, Process Addictions, and Quantitative Methods for Investigating These Issues.

Jill Nelson, Ph.D.
Kent State University, 2005
Research Interests: Community Counseling, Counselor Education Counselor Supervision, Brief and Solution-Focused Approaches

Jodi L. Tangen, Ph.D., NCC
University of North Carolina at Greensboro, 2015
Research Interests: Clinical Supervision, Counselor Education, Relational Depth, Spirituality

Counselor Education and Supervision

Department Information

- **Head, School of Education:**
  Chris Ray, Ph.D.
- **Graduate Coordinator:**

Jill Nelson, Ph.D.

- **Department Location:**
SGC Building, 1919 N. University Drive
- **Department Phone:**
(701) 231-7202
- **Department Web Site:**
www.ndsu.edu/ceduc/doctorate_in_counselor_education_and_supervision/
- **Application Deadline:**
October 1 for spring; May for fall
- **Degrees Offered:**
Ph.D.

Program Description

The Counselor Education Program offers graduate study leading to the Master of Education (M.Ed.), Master of Science (M.S.), and Doctor of Philosophy (Ph.D.) degrees. The doctorate is in Counselor Education and Supervision.

The doctoral program (Ph.D.) in Counselor Education and Supervision upholds the highest national standards as demonstrated by accreditation from the Council for Accreditation of Counseling and Related educational Programs (CACREP). The program is accredited until October 30, 2020. Graduates of our program are trained to be leaders in recognizing and respecting the needs of individuals and groups and demonstrate an increased awareness of multicultural and diversity issues. The culture of the doctoral program is highly relational, and focuses on high expectations while providing individual attention and support from faculty so that students are able to develop a plan of study that best suits their individual needs and professional interests. There are a small number of students admitted each year so that faculty may build strong relationships with their advisees, as well as students in their classes. The counselor education faculty members mentor students in counseling, research, teaching, leadership and supervision.

The application deadline if February 1st each year for admission the following fall semester.

- Meet graduate school admissions requirements, including a Bachelor's Degree with a minimum grade average of 3.0;
- Possess a Master's degree in counseling or a related field. Graduates of CACREP accredited programs receive preference. If individuals do not have a master's degree, they may be considered, but must meet all CACREP requirements for a master's degree prior to taking core courses in counseling;
- Demonstrate an interest in counseling, teaching, research, leadership and professional service;
- Express counselor education and supervision career goals;
- Arrange for in-depth interview with the Counselor Education faculty at a date and time specified by the faculty;
- Complete all international student requirements, where appropriate;
- Discuss, as appropriate, relevant personal and professional history, research interests, and goals within the interview process;
- Sign a disclosure statement regarding activities, which may be deemed inappropriate by professional and/or ethical standards.

Financial Assistance

Limited graduate assistantships are available in the School of Education and on campus. We do not guarantee students an assistantship, but will alert students when we are aware of opportunities and support them in securing an appropriate assistantship. Students must be accepted into the Graduate School before they are eligible for an assistantship.

The doctoral degree in counselor education and supervision requires a minimum of 71 semester credits beyond the master's degree. Students must successfully complete required courses, electives, a 600 hour doctoral internship, comprehensive exams and a disquisition.

Code	Title	Credits
Required Courses		
EDUC 703	Research, Measurement and Program Evaluation	3
CNED 863	Advanced Clinical Assessment, Report Writing, & Treatment Planning	3
CNED 867	Advanced Group Counseling	3
CNED 869	Instructional Theory and Practice in Counselor Education and Supervision	3
CNED 870	Counselor Supervision	3
CNED 871	Advanced Multicultural Practice in Counselor Education and Supervision	3
CNED 872	Advanced Counseling Theories	3
CNED 876	Qualitative Research and Program Evaluation	3
CNED 879	Quantitative and Survey Research	3

CNED 887	Professional Issues: Professional Development, Consultation and Publishing	3
CNED 880	Ethical and Legal Issues in Counselor Education and Supervision	3
CNED 890	Graduate Seminar	1-5
CNED 894	Practicum/Internship	1-8
CNED 899	Doctoral Dissertation	1-15
Statistics		
STAT 725	Applied Statistics	3
Additional Statistics Course		3

Additional Electives are also required, a minimum of 71 credits is required to graduate.

Carol E. Buchholz Holland, Ph.D.
Kansas State University, 2005
Research Interests: School Counseling; Career Education, Crisis Management Preparation, Trauma

Brenda Hall, Ed.D.
Virginia Polytechnic Institute and State University, 1993
Research Interests: Intimate Partner Violence, Relational Cultural Theory, and Collaborative Group Practices Studies

James Korcuska, Ph.D.
Kent State University, 2000
Research Interests: Counseling Research Methodology, Counselor Education, Men's and Gender Studies & Substance Abuse Counseling

Todd F. Lewis, Ph.D., LPC, NCC
Kent State University, 2002
Research interests: Risk Factors for Drinking during Emerging Adulthood, Theoretical Explanations for College Drinking and Substance Abuse, Substance Abuse Interventions, Motivational Interviewing, Process Addictions, and Quantitative Methods for Investigating These Issues.

Jill Nelson, Ph.D.
Kent State University, 2005
Research Interests: Shame and shame resilience, mentoring, and women's issues in higher education.

Jodi L. Tangen, Ph.D.
The University of North Carolina at Greensboro, 2015
Research Interests: Clinical Supervision, Counselor Education, Relational Depth, Spirituality

Criminal Justice

Department Information

- **Department Head:**
  Jeffrey Bumgarner, Ph.D.
- **Graduate Coordinator:**
  Steve Briggs, Ph.D.
- **Department Location:**
  104 Putnam Hall
- **Department Phone:**
  (701) 231-8567
- **Department Web Site:**
  www.ndsu.edu/cjps/criminal_justice/graduate_program/
- **Application Deadline:**
  April 1 for Ph.D. applicants, Master's applications accepted for fall and spring enrollments on a rolling basis.
- **Degrees Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL ibT 100, IELTS 7; to qualify for assistantship TOEFL ibT 114, IELTS 8

Program Description

The Department of Criminal Justice offers graduate study leading to both a MS and a Ph.D. degree in Criminal Justice. The MS degree has two tracks; Applied Criminal Justice and Criminology. The program in Criminal Justice is designed to enhance student's skills in understanding, gathering, processing, and analyzing research in the areas of criminology and criminal justice. The topical curriculum is geared to understanding, critiquing, and analyzing the criminal justice system with an orientation toward urban issues as they impact crime and criminal justice. The curriculum consists of foundation courses in theory, policy, and research methods, plus three substantive areas: 1) criminology, 2) policing, and 3) corrections. Students have their choice of specializing in one of the three. Students also will be afforded course work in learning how to teach a college course.

Graduates will find an expanding and terrific academic job market available as well as professional employment in the criminal justice policy and research sector. There are currently fewer than 40 Criminal Justice Ph.D. programs operating on a national level, so students graduating with a Criminal Justice Ph.D. will be competitive for the 350 positions available annually in academic units.

Ph.D. in Criminal Justice

Students should enter the program with an approved master's degree. Students will be required to have had one course in research methods and one course in statistics. Plus, students should have adequate background preparation or demonstrated potential in the field of Criminology or Criminal Justice.

Students will be required to take the Graduate Record Examination (GRE) and submit their undergraduate and graduate transcripts. For admission to full standing, students are required to attain a combined minimum score on the GRE of 1,000 (verbal and quantitative) (old scoring) or 300 (new scoring) and achieve a minimum grade point average of 3.0 over their last 60 credit hours. Students not meeting these standards will be evaluated and possibly admitted on conditional status.

A student entering the program with a master's degree would take a minimum of 60 credit hours. Students entering the program with a master's degree should submit their research thesis to the graduate committee for review. This committee would be charged with determining whether the research project is sufficient in scope and depth to warrant further supervised research.

MS Degree in Criminal Justice

Students will need to enter the program with a baccalaureate degree. Students will be required to have had one course in research methods, one course in statistics, and should document adequate background preparation or demonstrated potential in the field of Criminology or Criminal Justice. For admission to full-standing, students are required to achieve a minimum grade point average of 3.0 over their last 60 credit hours. Students will be required to take the Graduate Record Examination (GRE) and submit all scores to the Graduate School.

Ph.D. in Criminal Justice

Students admitted to the doctoral program who have earned a master's degree in criminal justice/criminology will be given credit for their master's degree (up to 30 credits) and must take a minimum of 60 credits at NDSU. The amount of credit for the master's degree will be determined by the graduate coordinator.

Students entering with a master's degree that is not related to criminal justice/criminology must have a total must complete 90 credits post-baccalaureate.

Code	Title	Credits
Required Courses		
Theory/Policy		9
CJ 703	Advanced Criminology	
CJ 709	Criminal Justice Policy	
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences	
Research Skills (at least 9 of these credits must be completed at NDSU)		15
CJ 702	Program Evaluation	
CJ 734	Advanced Criminal Justice Methods	
CJ 759	Advanced Research Design in Criminal Justice	
STAT 725	Applied Statistics	
STAT 726	Applied Regression and Analysis of Variance	
Substantive Areas (Students must complete four courses in a substantive area of choice. Additionally, students must complete one course in each of their non-substantive areas.		18
Criminology		
CJ 721	Individual Theories of Crime	
CJ 722	Structural Theories of Crime	

CJ 750	Violence	
CJ 752	Crime and the Life Course	
Corrections		
CJ 707	Juvenile Corrections	
CJ 733	Issues in Institutional Corrections	
CJ 762	Community Corrections	
CJ 763	Correctional Rehabilitation	
CJ 764	Punishment and Society	
Policing		
CJ 754	Police and Society	
CJ 755	Administrative Policing	
CJ 760	Police and Race Issues	
CJ 761	Police Effectiveness	
CJ 765	Classics in Policing	
****Electives/Independent Study (Students should consult with their advisor as to other potentially appropriate electives. Below are example courses.)**		15
CJ 768	Gender and Justice	
CJ 793	Individual Study	
PSYC 640	Experimental Methods	
PSYC 670	Experimental Social Psychology	
SOC 700	Qualitative Methods	
STAT 660	Applied Survey Sampling	
STAT 665	Meta-Analysis Methods	
CJ 899	Doctoral Dissertation	12
Total Credits		60-90

** 36 credits for for students entering the program with a master's degree that is not related to criminal justice/criminology

MS Degree in Criminal Justice

Students will need to declare their choice of a Track by the end of their first semester in the program.

Code	Title	Credits
Foundation Courses (Required for both tracks.)		18
CJ 702	Program Evaluation	
CJ 703	Advanced Criminology	
CJ 709	Criminal Justice Policy	
CJ 734	Advanced Criminal Justice Methods	
CJ 759	Advanced Research Design in Criminal Justice	
STAT 725	Applied Statistics	
Applied Track (in addition to the foundation courses students must complete one course from these areas.		6
Corrections		
CJ 707	Juvenile Corrections	
CJ 733	Issues in Institutional Corrections	
CJ 762	Community Corrections	
CJ 763	Correctional Rehabilitation	
CJ 764	Punishment and Society	
Policing		
CJ 754	Police and Society	
CJ 755	Administrative Policing	
CJ 760	Police and Race Issues	
CJ 761	Police Effectiveness	
CJ 765	Classics in Policing	

Criminology Track (in addition to the foundation courses students must complete one course from the Theory area and Elective area		6
Theory		
CJ 721	Individual Theories of Crime	
CJ 722	Structural Theories of Crime	
Electives		
CJ 606	Crime and Delinquency	
CJ 607	Deviant Behavior	
CJ 752	Crime and the Life Course	
CJ 768	Gender and Justice	
CJ 750	Violence	
Thesis or Policy Paper/Indep. Studies		6
CJ 798	Master's Thesis (or CJ 797 or CJ 793)	
Total Credits		30

Carol Archbold, Ph.D.
University of Nebraska-Omaha, 2002
Research Interests: Policing, Race and Gender in the Criminal Justice System, Qualitative Research Methods

Sarah Boonstoppel, Ph.D.
University of Maryland, College Park, 2014
Research Interests: Crime and the Life Course, Criminological Theory, Qualitative and Mixed Research Methods

Steven J. Briggs, Ph.D.
University of Nebraska-Omaha, 2007
Research Interests: Police Effectiveness, Police Discretion, Social Ecology of Crime

Jeffrey Bumgarner, Ph.D.
University of Minnesota, 2000
Research Interests: Policing, Federal Law Enforcement, Federal Crime Policy, and Criminal Justice Administration

Andrew Myer, Ph.D.
University of Cincinnati, 2010
Research Interests: Effective Correctional Interventions, Evidence Based Program Evaluation, Actuarial Offender Risk Assessment Practices, and Macro-Social Research Methods

Amy J. Stichman, Ph.D.
University of Cincinnati, 2003
Research Interests: Corrections, Institutional Life, Inmate and Correctional Officer Attitudes, Treatment Program Evaluation, Gender Issues

Kevin M. Thompson, Ph.D.
University of Arizona, 1986
Research Interests: Delinquency, Quantitative Methods, Alcohol and Drugs, Juvenile Drug Courts

Cybersecurity Certificate

The Graduate Certificate Program in Cyber Security delivered cooperatively among North Dakota State University (NDSU), the University of North Dakota (UND), and Minot State University (MSU).

In addition to the Graduate School admission requirements, applicants must submit:

Code	Title	Credits
Core Courses		9
EE 590 Emerging Threats and Defenses (University of North Dakota)		
CSCI 773	Foundations of the Digital Enterprise	
CSCI 558 Applied Cryptography (Minot State University)		
Elective		3
CSCI 774	Topics of theDigital Enterprise	
CSCI 783	Topics In Software Systems	
CSCI 796	Special Topics (special topics project course in cyber security with a faculty mentor (available at NDSU, UND, and MiSU))	

EE 590 Information Security and Security Practices (University of North Dakota)	
Total Credits	12

Developmental Science

Department Information

- **Department Head:**
  Joel Hektner, Ph.D.
- **Graduate Coordinator:**
  Elizabeth Blodgett Salafia, Ph.D.
- **Email:**
  elizabeth.salafia@ndsu.edu
- **Department Location:**
  Evelyn Morrow Lebedeff Hall
- **Department Phone:**
  (701) 231-8268
- **Department Web Site:**
  www.ndsu.edu/hdfs/graduate_studies/ds/
- **Application Deadline:**
  February 1
- **Degrees Offered:**
  Ph.D.
- **Test Requirement:**
  GRE - General
- **English Proficiency Requirements:**
  TOEFL ibT 100 (subscores of at least 24 for speaking and 21 for writing); IELTS 7

Program Description

Developmental Science is an emerging approach to the study of human development that combines elements of more traditional approaches from the fields of Developmental Psychology and Human Development. Developmental Science entails the study of human development across the lifespan, integrating the biological, cognitive, and socioemotional underpinnings of development, and incorporating the familial, social, institutional and cultural contexts in which development occurs.

- Cumulative GPA of 3.0 or higher
- GRE
- Statement of purpose should be 500 words or less and address the following:
  - How your interest in this field developed
  - Why you chose our program at NDSU
  - The experiences you have had (e.g. informal, academic, employment, volunteer) that you see as related to this graduate program or your professional goals
  - What your research interests are and how they might fit with the current research emphases in the department. If you have questions about this, the HDFS faculty research interests are described on the HDFS website (http://www.ndsu.edu/hdfs).
  - What your professional goals are and how this graduate program will help you accomplish your professional goals
- Curriculum vitae or resume
- Thesis or writing sample
- For non-native English speakers, TOEFL ibT score of at least 100 or IELTS score of at least 7
- Subscores on the TOEFL ibT are at least 24 for speaking and 21 for writing

For those entering with a Master's degree:

- Master's degree from accredited educational institution in child development, developmental psychology, human development, developmental science, or related area
- At least one course in statistics and one course in research methods, with a grade of B or higher
- Completion of an empirical Master's thesis

For those entering with a Bachelor's degree:

- Bachelor's degree from accredited educational institution in child development, developmental psychology, human development, developmental science, or related area

Financial Assistance

All admitted students are awarded graduate assistantships, which provide a full tuition waiver plus a stipend.

Curriculum for students entering with a Bachelor's degree (90 credits total)

- Students earn a Master's degree after completing 30 credits, master's oral examination and the master's thesis.
- All courses 3 credits unless otherwise noted.

Code	Title	Credits
Development Core		12
HDFS 811	Developmental Concepts and Theories	
HDFS 813	Social and Emotional Development Across the Lifespan	
HDFS 815	Physical and Cognitive Development Across the Lifespan	
HDFS 817	Prevention Science	
Teaching Core		6
HDFS 802	Teaching Developmental Science	
HDFS 892	Graduate Teaching Experience	
Methodology and Statistics Core		12
HDFS 705	Quantitative Methods in Developmental Science (4 credits)	
HDFS 854	Advanced Quantitative Methods in Developmental Science	
HDFS 856	Longitudinal Research Methods and Analysis	
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 15 required))	
HDFS 894	Practicum/Internship (focus on teaching or non-academic role)	
Non-Didactic Courses		8
HDFS 801	Graduate Orientation Seminar (1 credit)	
HDFS 805	Professional Development in Developmental Science (1 credit)	
HDFS 890	Graduate Seminar (Qualifying Exam/Career, 6 credits total)	
2 credits during spring before doing qualifying exam; 2 credits in summer during qualifying exam; 2 credits during final year to focus on career development		
Independent Research		39
HDFS 893	Individual Study/Tutorial (18 credits)	
HDFS 798	Master's Thesis (6 credits)	
HDFS 899	Doctoral Dissertation (15 credits)	

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 Developmental Science	
HDFS 892	Graduate Teaching Experience	
Methodology and Statistics Core		12
HDFS 854	Advanced Quantitative Methods in Developmental Science	
HDFS 856	Longitudinal Research Methods and Analysis	
Didactic Electives		3
could include HDFS 824, HDFS 825, HDFS 893, HDFS 894, or 700- or 800-level course in HDFS or other department.		
Non-Didactic Courses		8
HDFS 801	Graduate Orientation Seminar (1 credit)	
HDFS 805	Professional Development in Developmental Science (1 credit)	
HDFS 890	Graduate Seminar (Qualifying Exam/Career, 6 credits total)	
2 credits during spring before doing qualifying exam; 2 credits in summer during qualifying exam; 2 credits during final year to focus on career development		
Independent Research		39
HDFS 893	Individual Study/Tutorial (10 credits)	
HDFS 899	Doctoral Dissertation (15 credits)	

Other Requirements

- Teach one undergraduate course, with supervision (as part of assistantship or for course credit in HDFS 894Practicum/Internship). Must have first taken HDFS 802 Teaching Developmental Science.
- Submit at least four proposal/abstracts for presentations or posters at national conferences, including as a co-presenter (2 submissions if enter with MS)
- Present (in person) at least twice at national conferences (once if enter with MS), unless a waiver is granted by the student's committee.
- Submit at least two peer-reviewed articles for publication (including as co-author). Note: Although these presentation and publication requirements do not carry course credit per se, they are projects that would be worked on as part of HDFS 893 Individual Study/Tutorial, and/or HDFS 899 Doctoral Dissertation.
- Qualifying examination
- Dissertation

Core Faculty

Sean Brotherson, Ph.D.
Oregon State University, 2000
Research Interests: Parenting and Fatherhood; Healthy Marriages; Family Stress; Rural Families; Grief and Bereavement; Family Life Education; Family Policy

James E. Deal, Ph.D.
University of Georgia, 1987
Research Interests: Personality Development in Children; Relationship Between Individual Development and Family Relationships

Heather Fuller, Ph.D.
University of Michigan, 2009
Research Interests: Social Relationships Across the Lifespan (E.G. Intergenerational Relationships); Psychological Well-Being in Old Age; Culture and Aging; Migration, Transnationalism and Acculturation; Biculturalism

Joel Hektner, Ph.D.
University of Chicago, 1996
Research Interests: Aggressive Children; Research Methods; Prevention Programs For High-Risk Aggressive Children; Peer Affiliation Patterns and Peer Influences on Children's Behaviors; Family and School Conditions That Facilitate Optimal Experiences (Flow) and Optimal Development; The Experience Sampling Method

Melissa Lunsman O'Connor, Ph.D.
University of South Florida, 2010
Research Interests: Cognitive and Functional Aging in Healthy and Clinical Populations; Older Drivers; Research Methods; Attitudes toward Dementia

Brandy A. Randall, Ph.D.

University of Nebraska-Lincoln, 2002
Research Interests: Relational and Contextual Influences on Adolescents' and Young Adults' Positive and Problem Behaviors

Elizabeth Blodgett Salafia, Ph.D.
University of Notre Dame, 2008
Research Interests: Family and Peer Influences on Adolescents' Disordered Eating Attitudes and Behaviors

Gregory F. Sanders, Ph.D.
University of Georgia, 1983
Research Interests: Later Life Families; Family Strengths

Rebecca Woods, Ph.D.
Texas A&M University, 2006
Research Interests: Perception and Cognition In Infancy; Object Processing; Multimodal Processing; Early Gender Differences

Affiliated Faculty within HDFS

Carrie Johnson, Ph.D.
Iowa State University, 2012
Research Interests: Personal Finance for Low-Income and Under-served Populations; Financial Education Impact; Student Loan Debt; Program Delivery Methods and Evaluation; Behavioral Finance across the Lifespan

Christie McGeorge, Ph.D.
University of Minnesota, 2005
Research Interests: Heterosexism and Homophobia; Single Parenting; Women's History; Gender Socialization From a Feminist Perspective

Meagan Scott, Ph.D.
Oklahoma State University, 2016
Research Interests: Understanding How Changing Trends in Society Influence Youth; Afterschool Training; Positive Youth Development; Professional Development Methods to Better Meet the Needs of 4-H Staff

Thomas Stone Carlson, Ph.D.
Iowa State University, 2000
Research Interests: Narrative Pedagogy; Relational Accountability Approach to Couples Therapy, LGBT Affirmative Therapy Competence Among Therapists, and Influence of Spirituality on Clinical Practice and Training

Affiliated Faculty outside of HDFS

Ben Balas, Ph.D.,
Psychology

Ardith Brunt, Ph.D.,
Health, Nutrition and Exercise Science

Erin Conwell, Ph.D.,
Psychology

Donna Grandbois, Ph.D.,
Nursing

Linda Langley, Ph.D.,
Psychology

Susan Ray-Degges, Ph.D.,
Apparel, Design and Hospitality Management

Molly Secor-Turner, Ph.D.,
Nursing

Kevin Thompson, Ph.D.,
Criminal Justice and Political Science

Kim Vonnahme, Ph.D.,
Animal Sciences

Rachelle Vettern, Ph.D.,

Center for 4-H Youth Development

Dietetics

Department Information

- **Graduate Coordinator:**
  Ardith Brunt, Ph.D.
- **Interim Department Chair:**
  Yeong Rhee, Ph.D.
- **Department Location:**
  Bentson Bunker Fieldhouse Room 1
- **Department Phone:**
  (701) 231-7474
- **Department Web Site:**
  https://www.ndsu.edu/hnes/
- **Degrees Offered:**
  M.S.

Students will be required to complete thirty-six credit hours and the following requirements:

- All core courses (9 credits)
- An additional 21 credits selected from the list of electives
- A thesis (6 credits) or 3 credits of additional electives + a comprehensive paper (plan B) or 6 credits of additional electives (Plan C).
- The student's schedule of courses must be approved by his/her faculty adviser and graduate committee and the Graduate School.

Code	Title	Credits
Core Courses		9
HNES 710	Introduction to Research Design and Methods in HNES	
HNES 728	Current Issues in Dietetics	
STAT 725	Applied Statistics	
Electives		21
ADHM 635	Cost Controls in Hospitality and Food Service Systems	
ADHM 736	Entrepreneurship in Dietetics	
HNES 642	Community Health and Nutrition Education	
HNES 652	Nutrition, Health and Aging	
HNES 655	Sports Nutrition	
HNES 658	Advanced Medical Nutrition Therapy	
HNES 719	Public Health Nutrition	
HNES 724	Nutrition Education	
HNES 726	Nutrition in Wellness	
HNES 729	Grant Writing for the Health Professional	
HNES 730	Fundamentals of Leadership	
HNES 732	Foodservice Operation Management	
HNES 733	Food Writing for Professionals	
HNES 734	Foodservice Systems within Healthcare	
HNES 740	Maternal and Child Nutrition	
HNES 741	International Nutrition	
HNES 742	Nutrition: A Focus on Life Stages	
HNES 743	Obesity Across the Lifespan	
HNES 744	Dietary and Herbal Supplements	
HNES 746	Nutrition and Health Disparities	
HNES 747	Understanding Food Culture	
HNES 750	Advanced Human Nutrition: Macronutrients	
HNES 751	Metabolism of Micronutrients	
HNES 752	Phytochemicals	

HNES 753	Nutrigenomics and Advanced Lipid Metabolism in Human Nutrition	
HNES 756	Pediatric Clinical Nutrition	
HNES 757	Nutritional Aspects of Oncology	
HNES 758	Clinical Aspects of Nutrition Support	
HNES 759	Nutrition and Immunology	
Research		6
HNES 798	Master's Thesis	

Ardith Brunt, Ph.D.
Iowa State University, 1999
Research Interests: Nutrition, Gerontology

Yeong Rhee, Ph.D.
Oklahoma State University, 1999
Research Interests: Chronic Disease Prevention, Immune Function, Functional Foods, Microbiome

Education - Doctoral

Department Information

- **School of Education Head:**
  Chris Ray, Ph.D.
- **Doctoral Graduate Coordinator:**
  Nate Wood, Ph.D.
- **Department Location:**
  School of Education, FLC 210
- **Department Phone:**
  (701) 231-7921
- **Department Web Site:**
  www.ndsu.edu/edp
- **Application Deadline:**
  February 1
- **Degrees Offered:**
  Ph.D., Ed.D.
- **English Proficiency Requirements:**
  TOEFL iBT 88, IELTS 6.5, PTE Academic 59

Program Description

The Education Doctoral Programs prepare scholars who will advance education research and practice and maintain the integrity and vitality of the profession. Our graduates will be stewards of the discipline, individuals entrusted with preserving, creating, and applying knowledge in education and with communicating educational knowledge to others. North Dakota State University offers both the Ed.D. and Ph.D. degrees in Education, with an emphasis in either **Institutional Analysis** or **Occupational and Adult Education**.

The ***Institutional Analysis*** curriculum was designed to provide the knowledge, skills and experiences necessary for understanding institutional performance both inside and outside of formal education settings. This option area focuses on the role of assessment, evaluation, and other research and analysis techniques in supporting institutional planning, policy formation, and decision-making.

The ***Occupational and Adult Education*** curriculum was designed to provide the knowledge, skills and experiences necessary for understanding the nature, function, and scope of adult learning both inside and outside of formal educational settings. This option area focuses on preparing individuals to engage in lifelong learning, working with adults of all ages and in all settings.

Qualified students may apply for admission through the Graduate School online application. In addition to the standard Graduate School application materials, applicants must submit an essay stating how their career goals align with the mission and goals of the Education Doctoral Programs as described on the program website. Admission is only considered after all required application materials are received by the Graduate School and reviewed by the program's faculty. An interview may be required. Admission is a selective process and decisions are based on the congruency of the applicant's professional goals with the program goals, predicted success of the applicant as a student and professional in the chosen field, and are made only after considering all available data. A student must meet all requirements for unconditional admission. Application deadline is February 1.

Financial Assistance

Graduate assistantships may be available in the School of Education. Applications are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. Students must be accepted into the Graduate School before they are eligible for an assistantship.

All registrations in Education Doctoral courses must be approved by the student's adviser. Only those courses approved by the student's supervisory committee may be included on the final plan of study leading to the degree.

The Education Doctoral Programs require a minimum of 90 semester hours beyond the bachelor's degree (a minimum of 60 semester hours beyond the master's degree). The advisory committee has authority to approve up to a maximum of 30 credit hours from a Masters degree or equivalent. An additional ten (10) hours may be allowable if candidate has multiple graduate degrees or coursework after the first graduate degree. The determination will be based upon review of the candidate's official transcript(s). The candidate's major adviser and committee are responsible for approving the program of study and for certifying that the candidate has met the academic requirements for the doctoral degree. The doctoral degree is awarded for expertise and excellence in the candidate's chosen field of study as recognized and approved by the adviser and committee, not just for an accumulation of credits.

Code	Title	Credits
Core Courses		
EDUC 801	Foundations of Doctoral Scholarship	3
EDUC 802	Foundations of Educational Research	3
EDUC 803	Philosophical Foundations of Education	3
EDUC 890	Graduate Seminar (Capstone Seminar)	3
EDUC 890	Graduate Seminar (1 credit per semester)	1
Select One:		3
EDUC 806	International and Comparative Education	
EDUC 807	Diversity and Educational Policy	
EDUC 808	Empowerment & Transformative Education	
Discipline Inquiry Core (Note: Required and Optional courses vary by degree and option area)		
EDUC 871	Planning and Conducting Needs Assessment	3
EDUC 872	Qualitative Research Methods	3
EDUC 873	Case-Based Educational Research and Statistics	3
EDUC 881	Computer Data Management and Decision Making	2
EDUC 882	Institutional Analysis Techniques	3
EDUC 883	Survey Research	3
EDUC 884	Program Evaluation Research	3
EDUC 885	Structural Equation Modeling Fundamentals	3
EDUC 886	Advanced Qualitative Research	3
HDFS 856	Longitudinal Research Methods and Analysis	3
Option Core Courses		9
Institutional Analysis		
EDUC 831	Institutional Quality Control	
EDUC 832	Assessment Techniques for Educational Institutions	
EDUC 833	Strategic Planning for Institutional Improvement	
Occupational and Adult Education		
EDUC 851	Adult Learning	
EDUC 852	Foundations of Occupational & Adult Education	
EDUC 853	Instructional Methods for Adult Learners	
Professional Emphasis Area		9-12
EDUC 899	Doctoral Dissertation	12
Total Credits		60-90

Myron Eighmy, Ed.D.
University of Minnesota, 1995
Research Interests: Higher Education Policy, Training and Human Resources Development, State and Federal Policy for Workforce Education and Training

Brent D. Hill, Ph.D.

Oklahoma State University, 2011
Research interests: Monte Carlo Simulations; Educational and Psychological Measurement; Learning Theory; Structural Equation Modeling; Q Methodology; Time Series Analysis

Claudette Peterson, Ed.D.
Oklahoma State University, 2006
Research Interests: Adult Learning; Non-formal Learning; Learning Strategies; Instrumented Learning

Christopher Ray, Ph.D.
Oklahoma State University, 2007
Research Interests: Institutional Effectiveness; Learning Outcomes Assessment; Instrument Development; Moral Development and Education; College Student Development

Nathan Wood, Ph.D.
University of Minnesota, 2006
Research Interests: Sociocultural Issues in Education; Identity Development; Preparation of Educational Researchers

Educational Leadership

Department Information

- **Program Coordinator:**
  Thomas Hall, Ph.D.
- **Department Location:**
  School of Education, FLC 210
- **Department Phone:**
  (701) 231-7202
- **Department Email:**
  c.nelson@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/education/educational_leadership/
- **Application Deadline:**
  Domestic application materials are due two months prior to the start of classes. International application materials must be received before May 1 for the fall semester and before August 1 for spring and summer semesters.
- **Degrees Offered:**
  Ed.S., M.S., M.Ed.
- **English Proficiency Requirements:**
  TOEFL iBT 88, IELTS 6.5

Program Description

The principal purpose of the Educational Leadership program is to provide professional/academic education for individuals preparing for leadership roles in Pk-12 and higher education settings. These roles include teacher leadership, mid-level administrative positions (elementary school principal, secondary school principal or higher education administrator), and upper-level administrative positions such as superintendent of schools. Degrees offered include a 30-credit Master of Education (M.Ed.) in Educational Leadership-Teacher Leadership, a 36-credit Master of Education (M.Ed.) or Master of Science (M.S.) in Educational Leadership, and an Education Specialist (Ed.S.) degree. Programs meet certification requirements in the various areas appropriate to the North Dakota requirements for K-12 administration positions.

The program is accredited by the Council for the Accreditation of Educator Preparation and approved by the North Dakota Education Standards and Practices Board. Changes in national and state legislation, standards, or rules can affect academic program requirements.

Required application materials for the

Education Specialist (Ed.S.) degree in Educational Leadership

- Official transcripts of all previous collegiate work, including one verifying graduation with a master's degree from an accredited institution;
- A cumulative GPA of 3.25 or higher in all graduate-level courses;
- Resume including credentials, licenses and certificates;
- Two references that evaluate the applicant's potential for success as a graduate student and as an educational leader; and
- A leadership essay.

Master of Education (M.Ed.) or the Master of Science (M.S.)

- Official transcripts of all previous collegiate work, including one verifying graduation with a bachelor's degree from an accredited institution;
- A cumulative baccalaureate GPA of 3.0 on a 4.0 scale;
- Resume including credentials, licenses and certificates;
- Two references that evaluate the applicant's potential for success as a graduate student in the chosen master's degree program and as an educational leader; and
- A leadership essay.

Admission is considered only after all required application materials have been received and reviewed. Where appropriate, all international student requirements must be met.

Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data. A student must meet all requirements for full admission.

After being accepted for graduate study in the School of Education, the student should contact an adviser assigned to her/him for assistance in filing a plan of study for consideration by the program.

The Master of Science (M.S.) and the Education Specialist (Ed.S.) degrees require a disquisition. The Master of Education (M.Ed.) degree is a non-disquisition, practitioner-oriented degree. Programs vary in their requirements for a written comprehensive exam or a portfolio/oral.

Thomas Hall, Ed.D.
University of South Dakota, 2005
Research Interests: Teacher Leadership, School Community Relations, Professional Development, Adult Learning & Education

Denise K. Lajimodiere, Ed.D.
University of North Dakota, 2006
Research Interests/Area of Expertise: Native American Female Leadership; Horizontal Violence/Relational Aggression; Native American Boarding Schools

Ann Trousdale Clapper, Ed.D.
Drake University, 1991
Research Interests/Areas of Expertise: Teacher Leadership, Educational Change, Implementation Science, & Student Assessment

Dennis Van Berkum, Ed.D.
University of South Dakota, 1990
Research Interests: School Law, Organizational Behavior, Leadership, the Principalship

Electrical and Computer Engineering

Department Information

- **Department Chair:**
  Benjamin Braaten, Ph.D.
- **Graduate Coordinator:**
  Rajesh Kavasseri, Ph.D.
- **Department Location:**
  101 Electrical Engineering Building
- **Department Phone:**
  (701) 231-7019
- **Department Web Site:**
  www.ndsu.edu/ece/
- **Application Deadline:**
  February 28 for fall and October 15 for spring (openings may be very limited for spring)
- **Degrees Offered:**
  Ph.D., M.S., M.Engr.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL ibT 71, IELTS 6; To qualify for teaching assistantship TOEFL ibT 100, IELTS 7

Program Description

The Department of Electrical and Computer Engineering offers graduate programs in selected specialty areas leading to the M.Engr., M.S. and Ph.D. in Electrical and Computer Engineering. Current departmental research expertise falls into one of the following areas: Biomedical Engineering, Communications/Signal Processing, Computer Architecture, Cyber Physical and Embedded Systems, Electromagnetics/Optics, Power/Power Electronics, and VLSI. The ECE Department is also a key contributor to NDSU's Research and Technology Park.

Research Facilities and Equipment

The department is housed in a modern, well-equipped building. Graduate students have access to laboratories, instrument rooms, and computer services ranging from the university computer system to departmental computers. Research facilities include cardiovascular engineering lab, computer architecture lab, digital systems lab, EMI shield room, power and power electronics lab, signal processing and systems lab, and printed circuit lab.

Admission Requirements

The preferred avenue is to contact and work with an NDSU ECE Professor before coming to NDSU, such that the professor recommends you for admittance into the program. Each professor will have different expectations for the amount and type of work he/she will require you to do in order for him/her to recommend you for admittance into the NDSU ECE graduate program. Please look at each faculty's website (https://www.ndsu.edu/ece/people/faculty)and contact a faculty member working in a research area in which you are interested in pursuing your graduate studies. A secondary avenue is to have a GRE score of at least 145 Verbal and 155 Quantitative and a minimum GPA of 3.0 on your latest Electrical Engineering or Computer Engineering degree, either B.S. or M.S. The GRE subject area test is not required. To be admitted as an ECE M.E. student, you must have a GRE score of at least 145 Verbal and 155 Quantitative and a minimum GPA of 3.0 on your Electrical Engineering or Computer Engineering B.S. degree.

The 3.0 minimum GPA admission requirement may be waived for M.E. students with substantial ECE industry experience. The GRE subject area test is not required.

Financial Assistance

The department has a limited number of both teaching and research assistantships available. These assistantships provide a monthly salary during the academic year, a waiver of graduate tuition during the academic year and summer, but do not cover the minimal activity fee. In addition, there are opportunities, both in the department and on the campus, to perform part-time work as graders, teachers, tutors, and consultants. These assistantships are awarded on a competitive basis -- typically at the time of admission for fall semester.

Master of Engineering and Master of Science

The Master of Engineering and the Master of Science degrees require a minimum of 30 semester credits beyond the B.S. degree. The Master of Engineering is a course-work only program requiring a capstone consisting of a portfolio or written exam. For the Master of Science, 6 hours of the 30 must be assigned to the thesis. All students must pass a final oral examination covering both course work, and the thesis.

Ph.D. Program

The Doctor of Philosophy degree requires a minimum of 90 credits beyond the baccalaureate with an overall GPA of 3.0 or higher. Of these 90 credits, a minimum of 36 credits of graduate-level coursework and a minimum of 30 credits of dissertation are required, including ECE 702: Advanced Research Topics, 1 credit.

Academic Good Standing

All graduate students must maintain a 3.00 GPA or better and make significant progress towards their degree to remain in good standing. Failing to do either may hinder the student's financial assistance and/or ability to register for courses in the ECE graduate program.

Benjamin Braaten, Ph.D.
North Dakota State University, 2009
Research Interests: Applied Electromagnetics, Electromagnetic Compatibility and Signal Integrity

Dong Cao, Ph.D.
Michigan State University, 2012
Research Interests: Power Electronics and High Power Electrical Motor Drives, Renewable Energy Systems Grid-Integration and Standalone Operation, Power Management For Smart Grid, Transportation Electrification/Hybrid Electric Vehicle, Microgrid/Distributed Generation Source, Wide-Band Gap Device

Nilanjan Ray Chaudhuri, Ph.D.
Imperial College, 2011
Research Interests: Power System Dynamics and Control, Wide-Area Monitoring Systems, Application Of Power Electronics In Power Systems, Online System Identification, FACTS, HVDC, Renewable Energy Systems, Distributed Energy, Demand Side Response

Debasis Dawn, Ph.D.
Tohoku University, 1993
Research Interests: Microelectronics/Microsystems, Radio Frequency Integrated Circuits (RFIC) Silicob (CMOS/SiGe), Ics for radar, sensors

Daniel L. Ewert, Ph.D.
University of North Dakota, 1989
Research Interests: Biomedical Engineering

Jacob Glower, Ph.D.
The Ohio State University, 1988
Research Interests: Control Systems, Digital Systems

Na Gong, Ph.D.
University of Buffalo, SUNY, 2013
Research Interests: VLSI, Computer Architecture, and EDA

Roger Green, Ph.D.
University of Wyoming, 1998
Research Interests: Signal Processing, Array Processing, Time-frequency Analysis

Sanjay Karmakar, Ph.D.
University of Colorado, Boulder 2012
Research Interests: Wireless Communications, Information Theory, Coding for MIMO Systems

Rajesh G. Kavasseri, Ph.D.
Washington State University, 2002
Research Interests: Power Systems, Nonlinear Dynamics, Renewable Energy resources

Samee U. Khan, Ph.D.
University of Texas-Arlington, 2007
Research Interests: Optimization, Robustness, and Security Of: Cloud, Grid, Cluster and Big Data Computing, Social Networks, Wired and Wireless Networks, Power Systems, Smart Grids, and Optical Networks.

Ivan T. Lima Jr., Ph.D.
University of Maryland, Baltimore County, 2003
Research Interests: Photonics

Dharmakeerthi Nawarathna, Ph.D.
University of Houston, 2005
Research Interests: Lab-on-a-chip Technologies, Single-cell Genomics, Nanobio-engineering, Tissue Engineering, Novel Imaging Techniques for Biology and Computational Simulations.

David A. Rogers, Ph.D.
University of Washington, 1971
Research Interests: Microwave Engineering, Electromagnetics, Fiber Optics

Mark Schroeder, Ph.D.
University of Texas, Austin, 1999
Research Interests: Biomedical Engineering

Scott C. Smith, Ph.D.
University of Central Florida, 2001
Research Interests: Asynchronous Logic, VLSI, Computer Architecture, Embedded Systems

Sudarshan Srinivasan, Ph.D.
Georgia Institute of Technology, 2007
Research Interests: Computer Engineering

Danling Wang, Ph.D.
University of Washington, 2013
Research Interest: Development of Sensor Devices Based on Novel Nanostructured Materials and Advanced Techniques. Focusing on Sensor Design, Fabrication, and Application of Early-Stage Human Disease Monitoring and Diagnosis, Such as Breath Analyzer for Diabetes; Industrial, and Military Safety, Such as Environmental Explosive or Toxic Gas Detection

Jinhui Wang, Ph.D.
University of Rochester and Bejing University of Technology, 2006

Research Interests: VLSI, Power Management for SoC and Microprossor, Novel Memory Design, CAD Methodologies in VLSI

Qifeng Zhang, Ph.D.
Peking University, 2001
Research Interests Electric Materials and Devices for Energy Conversion and Storage, involving Solar Cells, Lithium Batteries, and Solid State Electrolytes; Nanomaterials for Sensor and Biomedical Applications; and Nanotechnology

Emergency Management

Department Information

- **Department Chair:**
  Jessica Jensen, Ph.D.
- **Department Location:**
  Minard Hall
- **Department Phone:**
  (701) 231-5595
- **Department Web Site:**
  www.ndsu.edu/emgt/
- **Application Deadline:**
  Applications are reviewed on a rolling schedule.
- **Degrees Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE (All applications who have not completed a master's degree)
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The mission of NDSU's Emergency Management Program is to create a cadre of graduates with extensive theoretical and applied knowledge in emergency management who can advance the field and discipline of emergency management. The program is built on a core of emergency management and methods/theory courses to help students approach the study of disasters and emergency management from the emergency management disciplinary perspective. Additionally, the program draws from other disciplines that enhance the development of processes and techniques to deal with emergencies and disasters.

The master's and doctoral degree programs in emergency management at NDSU are campus-based. Potential students are encouraged to visit the campus and meet faculty and current graduate students.

Master of Science Degree

The comprehensive and challenging Master's degree program in Emergency Management is intended to explore the academic research literature related to emergency management as well as provide students with opportunities to apply their knowledge through research and/or practicum. The program is built on a core of emergency management courses to help students learn how human beings create, interact, and cope with hazards, vulnerability, and associated events. The program emphasizes the study of how human beings cope with hazard events through activities related to preparedness, response, recovery, and mitigation.

The Department of Emergency Management offers two tracks in its master's degree program. The first option - the thesis track - is a research-focused degree track that entails a combination of emergency management course work and research methods. This option is ideal for graduate students who intend to pursue a doctoral degree in Emergency Management or a related discipline and for those students who want to complete a traditional master's degree. The second option - the comprehensive study option - is a more practice-based track with course work in emergency management and a significant practicum requirement.

Doctoral Degree

North Dakota State University offers a Doctor of Philosophy in Emergency Management designed to prepare graduates for careers teaching future generations of emergency management students in higher education programs, conducting research that describes and explains patterns, processes, change, and effectiveness/efficiency related to emergency management, and/or policy development and analysis related to emergency management.

The degree program is built on a core of emergency management courses to help students learn how human beings create, interact, and cope with hazards, vulnerability, and associated events. All courses students take (outside of methods) involve study of scholarship related to these topics that has been generated by many academic disciplines.

This comprehensive and challenging program is committed both to extensive research and its practical application in the areas of emergency management. Students select two of the four functional areas of emergency management in which they want to specialize. They work one-on-one with faculty in two different specialization courses to develop themselves as scholars in these areas. Students also take a minimum of 3 research practicum credits while pursuing their degree. These credits, not part of the dissertation, allow students to explore (alone or in conjunction with a faculty member) a topic of the student's interest through empirical research. Students must submit a manuscript from this work to a scholarly journal prior to being allowed to schedule their dissertation defense. Students also take applied practicum credits while pursuing their doctoral degree. These credits ensure that our students understand the on-the-ground-realities of emergency management. Finally, students also have the option to participate in the Department's Teaching Mentoring Program to develop both subject matter expertise and expertise in instruction, pedagogy, and assessment.

The Ph.D. is awarded in recognition of significant depth of understanding and scholarly achievement in emergency management. The recipient must complete all of the required course work, pass two written comprehensive exams with oral defenses (one on emergency management theory and one on research methods), complete a novel and significant research project for the dissertation; and successfully defend this research in an oral examination. The student's progress will be reviewed by a supervisory committee that is responsible for reviewing the student's plan of study, comprehensive examinations, dissertation proposal, and dissertation defense.

The Department of Emergency Management at NDSU is selective in choosing graduate applicants for entry into the master's and doctoral programs. Admission is competitive reflecting the department's commitment to small, high quality, student cohorts that match the mentoring capacity of the faculty.

Applicants will be evaluated in a two-stage process. In the first stage, the applicant's Graduate School application, letters of reference, GRE scores (if applicable), and academic writing paper samples will be reviewed by the Department of Emergency Management faculty. Applicants demonstrating goodness-of-fit with the Department of Emergency Management's mission and goals and an aptitude for graduate study will be invited to complete the second stage of the admissions process.

Admissions Process

The two-stage admissions process for graduate studies in the Department of Emergency Management is as follows:

STAGE ONE

1. Applicants must first complete the Graduate School's online application form (https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=ndusndsugr) and submit the required materials.
2. Applicants must submit transcripts from the higher education institutions they have attended to the Graduate School.
3. Applicants must submit three letters of reference through the Online Application tool. Academic references are preferred.
4. All applicants who have not completed a master's degree in the United States must submit GRE scores. If an applicant has completed a master's degree in the United States, then GRE scores are not required but still strongly recommended. It is helpful to have as much data as possible about applicants and their aptitude for graduate work in our program. In no case are specific GRE discipline tests required. At this time, however, no specific score totals are used as a cutoff. Applications are evaluated holistically using all indicators of student aptitude for successful completion of graduate study in this program. Applicants must submit GRE scores by requesting that ETS-GRE (http://www.ets.org/gre) send the NDSU Graduate School their score.
5. Applicants must submit electronic copies of two writing samples through the Online Application tool. The samples may be a publication, material from prior course work, or specifically written for this application. The samples do not have to focus on emergency management or disasters. The samples must be written in English. Writing samples are used to gain information on the applicant's writing style and ability to write research-based papers. Samples submitted in support of an application would ideally be eight or more pages in length. In addition, to meet the objective of the admission criteria, the paper must employ formal citations. Writing samples will most typically be library-based research papers but papers based on original data gathering are also encouraged. The latter might be more likely to come from an applicant with a master's degree.

STAGE TWO

1. Applicants invited to participate in the second stage of the admissions process will take part in a conference call interview with two or more of the program faculty. Applicant interviews are designed to provide two-way communication between the faculty and prospective applicant. Faculty will ask questions but will also want the applicant to pose questions about the program and departmental educational objectives. The interview should assist the applicant and faculty to further assess the goodness-of-fit between the program and the applicant. Interviews will also evaluate the applicant's ability to engage in evidence-based reasoning.

We are most likely to accept doctoral applicants who demonstrate their understanding of the concepts included in the following list of books:

- Mileti, D. (ed) (1999). Disasters by design: A reassessment of natural hazards in the United States. Washington, DC: John Henry Press.
- Rubin, C. (ed) (2007). Emergency Management: The American experience 1900-2006. PERI.

- Sylves, R. (2008). Disaster policy & politics. Washington, DC: CQ Press.
- Tierney, K., Lindell, M., & Perry, R. (2001). Facing the unexpected: Disaster preparedness and response in the United States. Washington, DC: John Henry Press.
- Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2004). At risk: Natural hazards, people's vulnerability and disasters. New York: Routledge.

The emergency management faculty at NDSU believe that the best doctoral degree program in emergency management will be made up of a diverse student body. We welcome applicants to the doctoral degree program with master's degrees from a variety of disciplines; applicants from all countries; applicants with different professional backgrounds; and applicants with varying goals and interests. We want to ensure, however, that applicants entering the program are knowledgeable about emergency management and some of the literature that provides the foundation for the discipline. Therefore, when applicants are interviewed during the application process, the faculty expects that the best candidates will demonstrate their familiarity with the major concepts presented in the books listed above.

By asking potential doctoral students to enter the program with foundational knowledge of the emergency management literature, the department hopes to accomplish several goals. First, in reading the books on the reading list, prospective students will be able to confirm their desire to pursue a doctoral education in the discipline of emergency management. Second, the department assumes that students who undertake this reading in preparation for their application interview will be bright, motivated, and passionate about the study of emergency management. Third, and finally, a basic understanding of the emergency management literature will help students coming into the program from a variety of backgrounds succeed once they begin their studies at NDSU.

Financial Assistance

Both teaching and research assistantships are available, contingent on departmental and faculty research funds. All students are automatically considered for graduate assistantships, unless they request otherwise, so no separate application process is required for such consideration. Awards are based on past academic and professional performance. The review process is highly competitive.

Emergency Management Master's Thesis Track

Code	Title	Credits
Core		
SOC 700	Qualitative Methods	3
or COMM 704	Qualitative Research Methods in Communication	
SOC 701	Quantitative Methods	3
or COMM 707	Quantitative Research Methods in Communication	
EMGT 720	Theory, Research and Practice	3
Disaster Phases		
EMGT 761	Preparedness Theory and Practice	3
EMGT 762	Mitigation Theory and Practice	3
EMGT 763	Response Theory and Practice	3
EMGT 764	Recovery Theory and Practice	3
Electives		
Select 3 of the following:		9
EMGT 610	Comprehensive Emergency Management Planning	
EMGT 614	Spatial Analysis in Emergency Management	
EMGT 620	Hazard, Risk, and Vulnerability Assessments	
EMGT 625	International Emergency Management	
EMGT 645	Vulnerability and Functional Needs in Emergency Management	
EMGT 661	Business Continuity & Crisis Management	
EMGT 663	Voluntary Agency Disaster Services	
ANTH 664	Disaster and Culture	
EMGT 681	Disaster Analysis	
EMGT 696	Special Topics	
EMGT 730	Advanced Research Methods	
Practicum		
EMGT 795	Field Experience	3
Thesis		

EMGT 798	Master's Thesis (minimum 6 - maximum 10 credits, only 6 count toward degree)	6
Total Credits		39

Emergency Management Master's Comprehensive Study Track

Code	Title	Credits
Core		
EMGT 720	Theory, Research and Practice	3
EMGT 761	Preparedness Theory and Practice	3
EMGT 762	Mitigation Theory and Practice	3
EMGT 763	Response Theory and Practice	3
EMGT 764	Recovery Theory and Practice	3
Electives		
Group A: Emergency Management Elective Courses		
Select four of the following:		12
EMGT 610	Comprehensive Emergency Management Planning	
EMGT 620	Hazard, Risk, and Vulnerability Assessments	
EMGT 625	International Emergency Management	
EMGT 635	Issues in Homeland Security and Emergency Management	
EMGT 645	Vulnerability and Functional Needs in Emergency Management	
EMGT 661	Business Continuity & Crisis Management	
EMGT 663	Voluntary Agency Disaster Services	
ANTH 664	Disaster and Culture	
EMGT 681	Disaster Analysis	
EMGT 696	Special Topics	
Group B: Critical Thinking and Analysis Elective Courses		
Select two of the following:		6
EMGT 614	Spatial Analysis in Emergency Management	
SOC 700	Qualitative Methods [1]	
SOC 701	Quantitative Methods [1,2]	
STAT 725	Applied Statistics	
EMGT 730	Advanced Research Methods	
Practicum		
EMGT 795	Field Experience	6
Total Credits		39

1 Students must have completed an undergraduate research methods course prior to enrolling in Quantitative and Qualitative Methods.

2 Students must complete a statistics course as a prerequisite for Quantitative Methods.

* Those students lacking in field experience will be expected to complete an applied, field-based emergency management practicum; however, students with ample field experience in emergency management will be expected to complete a research practicum to fulfill the practicum credits. The research practicum can be fulfilled by participating in a member of the faculty's research or by the student conducting his/her own research under the supervision of a faculty member. The student and his /her adviser will determine the type of practicum a student ought to take.

Doctorate in Emergency Management

Code	Title	Credits
Core		
Theory and Methods		
SOC 700	Qualitative Methods [1]	3
SOC 701	Quantitative Methods [1,2]	3
EMGT 720	Theory, Research and Practice	3

STAT 725	Applied Statistics	3
EMGT 730	Advanced Research Methods	3
Emergency Management Functional Areas		
EMGT 761	Preparedness Theory and Practice	3
EMGT 762	Mitigation Theory and Practice	3
EMGT 763	Response Theory and Practice	3
EMGT 764	Recovery Theory and Practice	3
Functional Area Specialization (complete two courses)		
EMGT 861	Preparedness Theory II	
EMGT 862	Mitigation Theory II	
EMGT 863	Response Theory II	
EMGT 864	Recovery Theory II	
Electives		
Group A: Emergency Management Elective Courses (complete six courses)		18
EMGT 610	Comprehensive Emergency Management Planning	
EMGT 614	Spatial Analysis in Emergency Management	
EMGT 620	Hazard, Risk, and Vulnerability Assessments	
EMGT 625	International Emergency Management	
EMGT 635	Issues in Homeland Security and Emergency Management	
EMGT 645	Vulnerability and Functional Needs in Emergency Management	
EMGT 661	Business Continuity & Crisis Management	
EMGT 663	Voluntary Agency Disaster Services	
EMGT 681	Disaster Analysis	
EMGT 696	Special Topics	
Group B: Other Elective Course (complete five courses) [3]		15
Practicum		
EMGT 794	Practicum/Internship [4]	6
EMGT 895	Field Experience	9
Dissertation		
Dissertation		15
Total Credits		90

1 Students must have taken an undergraduate or graduate research methods course prior to enrolling in both Quantitative and Qualitative Methods.

2 Students must have taken a statistics course prior to enrolling in Quantitative Methods.

3 Courses in this section of electives are for transfer credits, prior thesis, comprehensive study, or technical papers completed as part of a master's degree program or additional electives of the students choice such as didactic courses, seminars, independent study, and/or field research. Students may also take an additional 6 credits from Emergency Management Electives above

4 All doctoral students must take a minimum of 3 credits of research practicum. The research practicum can be fulfilled by participating in a member of the faculty's research or by the student conducting his/her own research under the supervision of a faculty member. For every 3 credits of research practicum a student takes the student must submit a manuscript to a scholarly, peer-reviewed emergency management journal by the time they defend their dissertation. Students also must take 3-6 credits of an applied, field-based emergency management practicum; however, students with ample field experience in emergency management may complete additional research practicum credits to fulfill the 9 required practicum credits. The student and his/her advisor will determine how the credits will be fulfilled in this category.

Sarah Bundy, Ph.D.
North Dakota State University, 2013
Research Interests**:** Comprehensive Emergency Management, Planning, and Development of Emergency Management as an Academic Discipline

Carol Cwiak, J.D., Ph.D.
Western State University, 1995
North Dakota State University, 2009
Research Interests: Preparedness and Mitigation, Business Continuity, Law and Emergency Management

Yue (Gurt) Ge, Ph.D.
Texas A&M, 2013

Research Interests: Land Use Planning & Emergency Planning, Hazard Mitigation & Disaster Recovery, Environmental Hazards Management, Spatial Analysis

Jessica Jensen, Ph.D.
North Dakota State University, 2010
Research Interests: Response, Recovery, and Preparedness, Voluntary Agencies in Disasters, Development of Emergency Management Academic Discipline

Daniel J. Klenow, Ph.D.
University of Notre Dame, 1977
Research Interests: Special Populations, International Disasters, Emergency Management Theory and Methodology

English

Department Information

- **Department Chair:**
  Rebecca Weaver-Hightower, Ph.D.
- **Graduate Coordinator:**
  Verena Thiele, Ph.D.
- **Email:**
  verena.theile@ndsu.edu
- **Department Location:**
  318 Minard Hall
- **Department Phone:**
  (701) 231-7143
- **Department Web Site:**
  www.ndsu.edu/english/
- **Application Deadline:**
  February 1
- **Degrees Offered:**
  M.A., Ph.D.
- **English Proficiency Requirements:**
  TOEFL ibT 100; IELTS 7; PTE Academic 68

Master of Arts

Our program encourages individuality and collaboration as it prepares candidates for academic and non-academic careers. Graduates have gone on to top-tier Ph.D. programs or opted to work in industry or for national and local nonprofits.

Admissions Requirements

Graduate studies in English is open to all qualified applicants who hold a BA or a BS in English or a related field from an accredited college or university.

Financial Assistance

Teaching assistantships are available and are awarded on the basis of the applicant's scholastic record, letters of recommendation, and the student's letter of interest. All applicants that are accepted by the Graduate School in good standing are eligible for an assistantship in the Department of English. Letters of interest (if applicable) for teaching assistantships should be submitted at the same time as the application to the program is submitted to the Graduate School and should address prior experience and qualifications.

Graduate students are awarded teaching assistantships for the academic year only. University graduate tuition charges (not fees) are waived for all TAs. Teaching Fellowships are available to selected TAs after completing course work. Moreover, the Department of English annually awards the Rooney Scholarship and the Madeline S. Giddings Scholarship.

The Master of Arts program consists of 27 credit hours of letter-graded course work with an overall GPA of 3.0 or better, and (at least) a 3 credit Master's Paper. Note that ENGL 764 Classroom Strategies For TA'Sis required of all GTAs who have not taken a similar class elsewhere.

Code	Title	Credits
MA Core		9
ENGL 755	Composition Theory	
ENGL 760	Graduate Scholarship	
ENGL 762	Critical Theory	
Rhetoric/Writing/Linguistics		6
Literature		6
Other/Electives		6
ENGL 797	Master's Paper	3
Total Credits		30

Ph.D. Rhetoric, Writing and Culture

Code	Title	Credits
Plan of Study		
Core Courses		12
ENGL 755	Composition Theory	
ENGL 756	Composition Research	
ENGL 760	Graduate Scholarship	
ENGL 762	Critical Theory	
Other Research Methods		3
Students select, in consultation with their adviser, at least one of the following methods courses.		
COMM 704	Qualitative Research Methods in Communication	
COMM 767	Rhetorical Criticism	
HIST 701	Methods of Historical Research	
SOC 700	Qualitative Methods	
SOC 701	Quantitative Methods	
Pedagogy		
Students select, in consultation with their adviser, at least one of the following pedagogy courses.		
COMM 704	Qualitative Research Methods in Communication	
ENGL 764	Classroom Strategies For TA'S	
ENGL 765	Upper Division Writing: Pedagogy, Practice, and Technology	
ENGL 766	Teaching Literature	
Addition Courses		21-51
Students must take English courses that match their research goals and deepen their understanding of the field. Three additional methods, theory, or pedagogy courses may be taken from outside the English department, as approved by adviser and graduate director. Courses in the category may be at the 600-,700-, or 800-level.		
ENGL 649	Usability and User Experience	
ENGL 655	International Technical Writing	
ENGL 656	Literacy, Culture and Identity	
ENGL 659	Researching and Writing Grants and Proposal	
ENGL 753	Rhetorics, Poetics Of New Media	
ENGL 754	Rhetorics of Science and Technology	
ENGL 758	Topics in Rhetoric, Writing, and Culture	
ENGL 759	History of Writing Instruction	
ENGL 761	Writing: Invention to Innovation	
COMM 700	Research Methods in Communication	
COMM 707	Quantitative Research Methods in Communication	
COMM 782	Theories of Persuasion	
Additional English options: Students with no background in English studies must include courses in literature and linguistics in their plan of study and that topics/studies courses may be repeated.		
ENGL 652	History of the English Language	

ENGL 653	Social and Regional Varieties of English	
ENGL 654	Language Bias	
ENGL 671	American Realistic Literature	
ENGL 672	20th Century American Writers	
ENGL 674	Native American Literature	
ENGL 676	Topics in American Literature	
ENGL 680	Medieval Literature	
ENGL 682	Renaissance Literature	
ENGL 683	Topics in British Literature	
ENGL 685	18th Century Literature	
ENGL 686	Romantic Literature	
ENGL 770	Studies in American Literature	
ENGL 780	Studies in British Literature	
Experiential Learning		6
Flexible credits for English 795: Experiential Learning may be earned in the following ways:		
1) Teaching Mentorship (0-6 credits), may be taken twice. Students work with faculty to read theory and co-teach 200-, 300-, or 400-level class.		
2) Internship (0-6 credits), may be taken twice. Students work outside or inside academia in administrative, editing, or consulting roles.		
3) Life-Experience Credit (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.		
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 depart¬¬ment. The exams consist of two timed, written exams and conclude with the defense of the dissertation proposal.		
Language Requirement		
Students are required to demonstrate foreign language competency by the time they begin to write the dissertation.		
ENGL 899	Doctoral Dissertation (The dissertation proposal concludes the comprehensive exams and 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.)	15
Total: 90 credits		

Anastassiya Andrianova, Ph.D.
City University of New York, 2011
Field: British Romantic and Victorian Literature, Drama, Translation, Pedagogy, Postcolonial Literature, Slavic Literature, Animal Studies

Lisa R. Arnold, Ph.D.
University of Louisville, 2011
Field: Rhetoric and Composition, Writing Program Administration, History of Writing Instruction

Elizabeth Birmingham, Ph.D.
Iowa State University, 2000
Field: Rhetoric and Professional Communication, Gender Studies, Architectural History, Theory, and Criticism

Kevin Brooks, Ph.D.
Iowa State University, 1997
Field: Rhetoric and Professional Communication, Computers and Composition, Writing Program Administration

Muriel Brown, Ph.D., Emerita
University of Nebraska, 1971
Field: Medieval Literature, Modern Drama, Women's Studies

Sean Burt, Ph.D.
Duke University, 2009
Field: Ancient Jewish Literature, Genre Theory, Ancient Hebrew Poetry, Poetics, Horror Literature & Theory

Gordon Fraser, Ph.D.
University of Connecticut, 2015
Field: Nineteenth-Century and Early American Literature; American Studies; Nationalism and Revolution

Adam Goldwyn, Ph.D.
City University of New York, 2010

Field: Medieval Studies, Medieval Greek World, Influence of Ancient Greek Culture in the Middle Ages

Alison Graham Bertolini, Ph.D.
Louisiana State University, 2009
Field: Contemporary American Literature, Literature of the Southern United States, Women's Literature, Contemporary Ethnic and Postcolonial Literature

Linda L. Helstern, Ph.D., Emerita
Southern Illinois University-Carbondale, 2001
Field: Native American Literature, Modernism, Contemporary Poetry, Literature and the Environment

R.S. Krishnan, Ph.D., Emeritus
University of Nebraska, 1981
Field: Restoration and 18th-Century British Literature, Postmodern Theories, British Novel, Postcolonial Literature

Bruce Maylath, Ph.D.
University of Minnesota, 1994
Field: International Technical Communication, Rhetoric and Composition, Linguistics

Robert O'Connor, Ph.D., Emeritus
Bowling Green State University, 1979
Field: Romantic Literature, Science Fiction and Fantasy

Kelly Sassi, Ph.D.
University of Michigan, Ann Arbor, 2008
Field: English Education, Composition and Rhetoric, Native American Literatures, Culturally Responsive Pedagogy

Dale Sullivan, Ph.D., Emeritus
Rensselaer Polytechnic Institute, 1988
Field: Rhetoric Theory and History, Rhetoric of Science, Rhetoric of Religion, Technical Communication

Verena Theile, Ph.D.
Washington State University, Pullman, 2006
Field: 16th/17th Century Literature, Shakespeare, Early Modern Drama, European Literature, Literary Theory, Science Fiction and Fantasy, Film and Adaptation Studies

Emily D. Wicktor, Ph.D.
Kansas, 2010
Field: 19th Century British Literature and Culture, particularly Victorian Sexuality and Sexual History; Rhetoric, Composition, and Pedagogy; Literary Theory; Modern British and American Drama; Research Methods and Methodology

Entomology

Department Information

- **Director, School of Natural Resource Sciences:**
  Frances Casey, Ph.D.
- **Program Leader:**
  Jason Harmon, Ph.D.
- **Email:**
  jason.harmon@ndsu.edu
- **Department Location:**
  202 Hultz Hall
- **Department Phone:**
  (701) 231-7582
- **Department Web Site:**
  www.ndsu.edu/entomology
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  Ph.D., M.S.

- **Test Requirement:**
  TOEFL ibt 79; IELTS 6.5

Program Description

The Department of Entomology in the School of Natural Resource Sciences offers graduate study leading to the M.S. and Ph.D. degrees. Advanced work involves specialized training in the following areas: behavior, biochemistry, biodiversity, biological control, chemical ecology, ecology, host plant resistance, insect pathology, pest management, molecular genetics, physiology, and systematics. The Department also participates in interdisciplinary programs in Environmental and Conservation Sciences and Natural Resources Management. The close working relationship between the department and the USDA Red River Valley Agricultural Research Center, located on campus also provides students many opportunities for research and consultation.

Student research and academic programs are tailored to individual needs and interests. Interdisciplinary approaches to entomological programs are fostered. Prospective students are encouraged to check the Department of Entomology website (http://www.ndsu.edu/entomology) for the latest descriptions of the graduate program.

The Department of Entomology graduate program is open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full status to the program, the applicant must have adequate preparation in entomology and should be in contact with potential faculty advisors about opportunities for new students. More information is found on the Department website (https://www.ndsu.edu/entomology/prospective_students/).

Applications should be submitted directly to the Graduate School and will include a letter stating reasons for pursuing an advanced degree in entomology and expressing the applicant's research interests.

Financial Assistance

All specified application materials must be submitted to the Graduate School, and the student must be admitted in full or conditional standing to be considered for financial assistance. Graduate research assistantships are awarded on the basis of scholarship, potential for advanced study and research, and availability. Graduate research assistantships provide a monthly stipend and a waiver of graduate tuition.

For M.S. candidates, a minimum of 30 semester credits beyond the B.S. and an oral defense of a research-based thesis and academic subject matter is required.

See information in Graduate Bulletin

The Ph.D. requires a minimum of 90 semester credits beyond the B.S., (or 60 beyond the M.S. degree), preliminary written and oral examinations directed toward academic subject matter, and a final oral defense of a research-based dissertation.

Mark A. Boetel, Ph.D.
South Dakota State University, 1996
Research Interests: Integrated Pest Management of Sugarbeet and Corn Insects, Microbial Control

Stephen P. Foster, Ph.D.
University of Waikato, 1983
Research Interests: Insect Chemical Ecology, Pheromone Biochemistry, Reproductive Behavior

Jason P. Harmon, Ph.D.
University of Minnesota, 2003
Research Interests: Environmental Change and Ecological Interactions, Biological Control, Insect Ecology

Marion O. Harris, Ph.D.
Michigan State University, 1986
Research Interests: Insect Behavior, Insect-Plant Interactions, Resistance of Plants to Insects

Janet J. Knodel, Ph.D.
North Dakota State University, 2005
Research Interests: Extension Entomology, IPM of Field Crop Insects, Insect-Disease Surveys, Emerging Insects, Chemical Control

Deirdre Prischmann-Voldseth, Ph.D.
Washington State University, 2005
Research interests: Agricultural Integrated Pest Management and Arthropod Ecology

David A. Rider, Ph.D.
Louisiana State University, 1988

Research Interests: Systematics of the Pentatomoidea, Molecular Genetics, Ecology of the Northern Tall Grass Prairie Arthropods

Environmental and Conservation Sciences

Department Information

- **Program Director:**
  Craig Stockwell, Ph.D.
- **Department Location:**
  Biological Sciences, Stevens 119
- **Department Phone:**
  (701) 231-7717
- **Department Web Site:**
  www.ndsu.edu/ecs/
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring semester. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5

Program Description

The graduate program leading to an M.S. or a Ph.D. in Environmental and Conservation Sciences (ECS) rests on an integrative curriculum and a multidisciplinary team approach. The program emphasizes the common ground shared by all sciences, and seeks to bridge methodological and philosophical boundaries that might hinder interdisciplinary communication and cooperation. The program offers three tracks: Environmental Science, Conservation Biology and Environmental Social Sciences. The Environmental Science track focuses on abiotic environmental issues, such as water, air, and land pollution. The Conservation Biology track focuses on biotic issues, such as the preservation of biodiversity and ecosystem function. The Environmental Social Sciences track emphasizes relationships between humans and the natural environment with a focus on environmental economics and policy.

The interdisciplinary nature of this program is reflected by the participation of faculty from across the campus, including the Colleges of Agriculture, Food Systems, and Natural Resources; Arts, Humanities, and Social Sciences; Engineering; and Science and Mathematics.

Environmental Science

Areas of Environmental Science, such as climate change, groundwater, hazardous waste, and water chemistry, require broad training across discipline lines for successful application. To better predict anthropogenic environmental impacts, the engineering, earth material, chemical, and biological data must be considered in an integrated manner.

Conservation Biology

Conservation Biology offers a new philosophy of looking at complex problems. This discipline focuses on the loss of regional and global biodiversity, but considers the human element as well in its approach to resource issues. As an example, landscape ecology, sustainable development, and conflict resolution are themes promoted by the field of Conservation Biology.

Environmental Social Sciences

Environmental Social Sciences discipline looks at interactions between humans and the environment which tend to be complex and often require interdisciplinary efforts to understand and manage. Environmental policy and economics are examples of the fields of study.

Admissions Requirements

To be admitted to the Environmental and Conservation Sciences program, the applicant must meet the Graduate School requirements. Further, applicants are only considered after an ECS affiliated faculty member has agreed to to admit the student to her/his lab and make arrangements of stipend and research funding. Thus, applicants should contact ECS faculty members who share their research interests. https://www.ndsu.edu/ecs/index.php/people/faculty

Financial Assistance

The applicant should contact a prospective mentor to identify sources of financial aid. Teaching and research assistantships may be available through funded research or participating departments. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research. Contact the office of Financial Aid and Scholarships for information and applications regarding scholarships.

Program Administration

The graduate program is administered by the ECS Steering Committee. The committee is composed of ECS graduate faculty members representing the participating colleges: Agriculture, Food Systems, and Natural Resources; Engineering; and Science and Mathematics. The committee also includes a student member which is nominated annually by the ECS Graduate Student Association.

The ECS Program Director presides over ECS Steering Committee meetings. The duties of the ECS Steering Committee include:

1. review of requests to join the ECS faculty and
2. program review and administration.

By the end of the second semester, the student and academic adviser will arrange for the appointment of a Graduate Supervisory Committee. For Ph.D. study, the Graduate Supervisory Committee will consist of at least four members of the NDSU graduate faculty. The committee must include the student's adviser, two additional ECS faculty members, and a Graduate School representative. One committee member must be from outside the student's home college.

For M.S. study, the Graduate Supervisory Committee will consist of at least three members of the NDSU graduate faculty and will include the student's adviser, an ECS faculty member and a faculty from outside the student's home college. The plan of study will be prepared by the student, in consultation with the major adviser, by the end of the first year in residence.

Master of Science in Environmental and Conservation Sciences

The total credits will be not less than 30 graduate credits, with at least 16 credits of graduate courses numbered 601-689, 691; 700-789, 791 or 800-889, 891 plus the ECS graduate seminar for 1 credit, and research credits (798) not fewer than 6 nor more than 10 thesis credits. The didactic credits must include at least 1 ECS core course; 1 ECS track course and UNIV 720 Scientific Integrity. All M.S. students must complete a thesis and pass a final examination as described in The Graduate School Policies section of the Graduate Bulletin. An overall GPA of 3.0 or better must be maintained.

Doctor of Philosophy in Environmental and Conservation Sciences

Each Ph.D. student will complete at least 27 credits of didactic courses plus the ECS graduate seminar for 1 credit. The didactic courses will include: 3 core courses (9 credits), UNIV 720 Scientific Integrity, a minimum of 14-15 credits from a chosen track, and 2-3 credits of electives from another track or other NDSU courses numbered 601-689, 691; 700-789, 791 or 800-889, 891. The 15 track credits must be from at least 2 course categories. Two of the three courses must come from outside of the student's chosen track. Of the 27 didactic course credits, a total of 15 must be at the 700-800 level. A total of 90 credits are required.

For students entering the program with a Master's Degree or previous graduate coursework, up to 12 credits of previous graduate work can transfer and be counted toward the 27 credits. Such transferred credits must be approved by the student's supervisory committee, the program director and the Graduate Dean. The student must earn no fewer than 60 graduate credits at NDSU. Of these, no fewer than 15 credits must be at the 700 or 800 level (700-789, 791; 800-889 and 891).

Code	Title	Credits
Environmental Social Sciences Track		
ECON 681	Natural Resource Economics	3
ECS 770	Environmental Law and Policy	3
HIST 634	Environmental History	3
or HIST 710	Research Seminar in North American History	
or HIST 780	Readings in World History	
NRM 631	National Environmental Policy Act & Environental Impact Assessment	3
NRM 702	Natural Resources Management Planning	3
SOC 631	Environmental Sociology	3
Environmental Sciences Track		
CE 770	Hazardous Waste Site Remediation	3
GEOL 614	Hydrogeology	3
MICR 652	Microbial Ecology	3
PH 720	Environmental Health	3

Conservation Biology Track		
BOT 862	Environment and Adaptation	3
BOT 864	Ecological Processes	3
ZOO 675	Conservation Biology	3
ZOO 850	Advanced Conservation Biology	3

CONSERVATIVE BIOLOGY TRACK - TOTAL 18 CREDITS

Code	Title	Credits
Biodiversity		
Select 3-9 credits of the following:		
BIOL 681	Wetland Science	
BOT 717	Aquatic Vascular Plants	
ENT 750	Systematic Entomology	
RNG 716	Agrostology	
ZOO 650	Invertebrate Zoology	
ZOO 652	Ichthyology	
ZOO 654	Herpetology	
ZOO 658	Mammalogy	
Ecology and Evolution		
Select 3-9 credits of the following:		
BIOL 850	Advanced Ecology	
BIOL 859	Evolution	
BOT 660	Plant Ecology	
BOT 862	Environment and Adaptation	
BOT 864	Ecological Processes	
ENT 765	Biological Control of Insects and Weeds	
ENT 770	Writing a Scientific Literature Review	
GEOL 640	Quaternary Biology	
MICR 652	Microbial Ecology	
PLSC 631	Intermediate Genetics	
PLSC 751	Advanced Plant Genetics	
PLSC 781	Quantitative Genetics	
RNG 765	Analysis Of Ecosystems	
SOIL 610	Soils and Land Use	
SOIL 647	Microclimatology	
ZOO 662	Physiological Ecology	
ZOO 670	Limnology	
ZOO 850	Advanced Conservation Biology	
ZOO 860	Evolutionary Ecology	
ZOO 870	Aquatic Community Ecology	
Human Dimensions and Management		
Select 3-9 credits of the following:		
ANTH 662	Anthropology and the Environment	
COMM 783	Advanced Organizational Communication I	
CE 678	Water Quality Management	
ECON 682	Environmental Economics	
POLS 642	Global Policy Issues	
POLS 650	Politics of the Developing Countries	
RNG 656	Range Habitat Management	
ZOO 675	Conservation Biology	
ZOO 676	Wildlife Ecology and Management	
ZOO 677	Wildlife and Fisheries Management Techniques	

ZOO 850	Advanced Conservation Biology
Research Tools	
Select 3-9 credits of the following:	
CE 677	Applied Hydrology
GEOG 655	Introduction to Geographic Information Systems
GEOG 656	Advanced Geographic Information Systems
GEOL 660	Biogeochemistry
GEOL 760	Advanced Biogeochemistry
PLSC 724	Field Design I
PSYC 640	Experimental Methods
RNG 650	Range Plants
SOC 701	Quantitative Methods
SOIL 784	Advanced Soil Genesis, Morphology and Classification
STAT 661	Applied Regression Models
STAT 662	Introduction to Experimental Design
STAT 663	Nonparametric Statistics
STAT 665	Meta-Analysis Methods
STAT 670	Statistical SAS Programming
STAT 730	Biostatistics
STAT 761	Advanced Regression
STAT 770	Survival Analysis

ENVIRONMENTAL SCIENCES TRACK-TOTAL 17 CREDITS

Code	Title	Credits
Water Sciences		
Select 3-9 credits of the following:		
ABEN 664	Resource Conservation and Irrigation Engineering	
ABEN 765	Small Watershed Hydrology and Modeling	
CE 610	Water & Wastewater Engineering	
CE 677	Applied Hydrology	
CE 676	Watershed Modeling	
CE 678	Water Quality Management	
CE 679	Advanced Water and Wastewater Treatment	
CE 776	Ground Water and Seepage	
CE 779	Watershed Water Quality Modeling	
CE 796	Special Topics	
GEOL 640	Quaternary Biology	
ZOO 670	Limnology	
Soil and Solid Waste		
Select 3-9 credits of the following:		
ABEN 696	Special Topics	
CE 672	Solid Waste Management	
CE 770	Hazardous Waste Site Remediation	
SOIL 610	Soils and Land Use	
SOIL 633	Soil Physics	
SOIL 733	Advanced Soil Nutrient Cycling	
Environmental Management		
Select 3-9 credits of the following:		
CE 672	Solid Waste Management	
CE 678	Water Quality Management	
COMM 783	Advanced Organizational Communication I	
RNG 656	Range Habitat Management	

ZOO 675	Conservation Biology
ZOO 676	Wildlife Ecology and Management
ZOO 677	Wildlife and Fisheries Management Techniques
Research Tools	
Select 3-9 credits of the following:	
ABEN 682	Instrumentation & Measurements
ABEN 696	Special Topics
CE 677	Applied Hydrology
GEOG 655	Introduction to Geographic Information Systems
GEOG 656	Advanced Geographic Information Systems
GEOL 660	Biogeochemistry
GEOL 760	Advanced Biogeochemistry
IME 660	Evaluation of Engineering Data
RNG 650	Range Plants
STAT 662	Introduction to Experimental Design
STAT 725	Applied Statistics
STAT 761	Advanced Regression

ENVIRONMENTAL AND SOCIAL SCIENCES TRACK-TOTAL 17 CREDITS

Code	Title	Credits
Social Science Theory		
Select 3-9 credits of the following:		
AGEC 741	Advanced Microeconomics	
ANTH 680	Development of Anthropological Theory	
COMM 711	Communication Theory	
ECON 640	Game Theory and Strategy	
POLS 720	Theoretical Perspectives to the Study of Political Science	
SOC 622	Development Of Social Theory	
SOC 723	Social Theory	
Cultural and Behavioral Aspects		
Select 3-9 credits of the following:		
AGEC 711	Applied Risk Analysis I	
ANTH 662	Anthropology and the Environment	
ANTH 664	Disaster and Culture	
ECON 656	History of Economic Thought	
ECON 681	Natural Resource Economics	
ECON 682	Environmental Economics	
HIST 634	Environmental History	
POLS 642	Global Policy Issues	
POLS 653	Environmental Policy and Politics	
SOC 631	Environmental Sociology	
SOC 639	Social Change	
SOC 643	International Disasters	
Management Techniques		
Select 3-9 credits of the following:		
COMM 783	Advanced Organizational Communication I	
GEOL 660	Biogeochemistry	
NRM 631	National Environmental Policy Act & Environental Impact Assessment	
NRM 632	Environmental Impact Statement	
NRM 653	Rangeland Resource/Watershed Management	
NRM 701	Terrestrial Resources Management	
NRM 702	Natural Resources Management Planning	

RNG 654	Wetland Resources Management
RNG 656	Range Habitat Management
SOC 604	Community Assessment
TL 755	Context Sensitive Solutions
ZOO 675	Conservation Biology
ZOO 676	Wildlife Ecology and Management
ZOO 850	Advanced Conservation Biology
Research Tools	
Select 3-9 credits of the following:	
AGEC 701	Research Philosophy
AGEC 739	Analytical Methods for Applied Economics
BIOL 850	Advanced Ecology
COMM 700	Research Methods in Communication
COMM 701	Advanced Research Methods in Communication I
COMM 704	Qualitative Research Methods in Communication
COMM 707	Quantitative Research Methods in Communication
ECON 610	Econometrics
ECON 710	Advanced Econometrics
EMGT 614	Spatial Analysis in Emergency Management
ENGL 656	Literacy, Culture and Identity
ENGL 758	Topics in Rhetoric, Writing, and Culture
GEOG 655	Introduction to Geographic Information Systems
GEOG 656	Advanced Geographic Information Systems
PSYC 640	Experimental Methods
RNG 652	Geographic Information Systems in Range Survey
RNG 765	Analysis Of Ecosystems
SOC 700	Qualitative Methods
SOC 701	Quantitative Methods
STAT 660	Applied Survey Sampling
STAT 661	Applied Regression Models
STAT 662	Introduction to Experimental Design
STAT 663	Nonparametric Statistics
STAT 665	Meta-Analysis Methods
STAT 670	Statistical SAS Programming
STAT 725	Applied Statistics
STAT 726	Applied Regression and Analysis of Variance
STAT 730	Biostatistics
STAT 761	Advanced Regression
STAT 770	Survival Analysis

Preliminary Examinations for Doctoral Students

The written preliminary examination will cover the core areas for ECS and each of the core topic areas for the appropriate track. The preliminary examination will typically be taken in the middle of the third year. The written exam must be passed before the comprehensive oral examination can be scheduled.

The comprehensive oral examination will be taken no later than the end of the third year in residence. The examination will cover the topic areas for the appropriate track.

Dissertation Research

A proposal describing research suitable for preparation of a dissertation in Environmental and Conservation Sciences will be prepared in the format of a NSF Dissertation Improvement Grant. Alternative formats must be agreed to by the Graduate Supervisory Committee. The proposal will be submitted

to the student's Graduate Supervisory Committee for review and approval. The dissertation must show originality and demonstrate the student's capacity for independent research.

F. Adnan Akyuz, Ph.D.
University of Missouri-Columbia, 1994
Research Interests: Applied Climatology and Microclimatology/Climate Based Agriculture

Allan C. Ashworth, Ph.D.
University of Birmingham, 1969
Research Interests: Quaternary Paleoecology, Paleoclimatology

Peter Bergholz, Ph.D.
Michigan State University, 2007
Research Interests: Food Safety and Environmental Microbiology, Landscape Genomics

Achintya Bezbaruah, Ph.D.
University of Nebraska-Lincoln, 2002
Research Interests: Nanomaterials for Pollution Control, Recalcitrant and Micro Pollutants, Contaminant Fate and Transport, Small Community Water and Wastewater Treatment, Environmental Sensors, Environmental Management

Julia Bowsher, Ph.D.
Duke University, 2007
Research Interests: Evolutionary and Developmental Biology

Malcolm G. Butler, Ph.D.
University of Michigan, 1980
Research Interests: Aquatic Invertebrate Biology, Limnology, Wetland Ecology

Igathinathane Cannayen, Ph.D.
Indian Institute of Technology, 1997
Research Interests: Biomass Harvest, Storage, Collection and Pre-Processing

Frank X.M. Casey, Ph.D.
Iowa State University, 2000
Research Interests: Field and Laboratory Studies of Water Flow and Chemical Transport Processes

Amitava Chatterjee, Ph.D.
University of Wyoming, 2007
Research Area/Activity: Soil Fertility Management, Greenhouse Gas Emissions

Xuefeng (Michael) Chu, Ph. D.
University of California, Davis, 2002
Research Interests: Watershed Hydrologic and Environmental Modeling, Overland Flow and Infiltration, Integrated Modeling of Flow and Contaminant Transport

Larry Cihacek, Ph.D.
Iowa State University, 1979
Research Interests: Carbon Sequestration in Soils, Soil Physical Properties, Soil Management for Waste Disposal

Gary K. Clambey, Ph.D.
Iowa State University, 1975
Research Interests: Ecology and Biogeography, Environmental Analysis and Planning, Structure Function Relations in the Midwestern Ecosystems

Mark E. Clark, Ph.D.
University of Tennessee, 1996
Research Interests: Population Ecology, Landscape Ecology, Fish and Wildlife Ecology, Ecological Modeling, Spatial Modeling, Species Interactions

Dennis Cooley, Ph.D.
University of Rochester, 1995
Research Interests: Ethics of Science

Aaron Daigh, Ph.D.
Iowa State University, 2013
Research Interests: Soil Physics, Transport in Soils, Soil Residue and Water Management, Crop Rotations, and Nutrient/Agrochemical/Industrial Byproduct Soil Amendment Impacts on Soil Physical Properties

Stephanie Day, Ph.D.
University of Minnesota, 2012
Research Interests: Fluvial Geomorphology, Slope Stability, Geospatial Sciences

Edward (Shawn) DeKeyser, Ph.D.
North Dakota State University, 2000
Research Interests: Wetland Ecology, Wetland Assessment and Monitoring, Invasive Species Ecology and Management, Native Prairie Restoration

Anne Denton, Ph.D.
University of Mainz, 1996
Research Interests: Data Mining, Bioinformatics, Scientific Informatics, Educational Technology, Model Building, Databases

Thomas M. DeSutter, Ph.D.
Kansas State University, 2004
Research Interest: Trace Gas Fluxes, Inorganic Soil Chemistry, Soil Environmental Conditions

Ned Dochtermann, Ph.D.
University of Nevada, Reno, 2009
Research Interests: Ecological and Evolutionary Causes and Consequences of Phenotypic Variation

Nathan Fisher, Ph.D.
University of Michigan, 2006
Research Interests: Ecological and Evolutionary of Bacterial Virulence

Ann-Marie Fortuna, Ph.D.
Michigan State University, 2001
Research Interests: Microbial and Soil Process Regulating Nutrient Cycling, Soil Health and Global Climate Change, Soil Health Indicators

Erin Gillam, Ph.D.
University of Tennessee, 2007
Research Interests: Behavioral ecology of bats, ecological and evolutionary basis of behavior in all animal groups, behavioral, ecological, and evolutionary factors influence the structure of animal communication signals and wildlife ecology and conservation.

Gary A. Goreham, Ph.D.
South Dakota State University, 1985
Research Interests: Rural Sociology, Community, Family Research Methods, Sociology of Religion, Sociology of Agriculture

Kendra Greenlee, Ph.D.
Arizona State University-Tempe, 2004
Research interests: Environmental and respiratory physiology of insects; insect immunology.

Timothy Greives, Ph.D.
Indiana University, 2009
Research Interests: Physiology and Behavior of Animals in Response to Environmental Signals

James W. Grier, Ph.D.
Cornell University, 1975
Research Interests: Animal Behavior and Ecology, Animal Population Dynamics, Applied Biostatistics, Philosophy of Research

Jill Hamilton, Ph.D.
University of British Columbia, 2012
Research Interests: Plant Evolutionary Genomics

Jason Harmon, Ph.D.
University of Minnesota, 2003
Research Interests: Environmental change; ecosystem services; population and community ecology

Marion O. Harris, Ph.D.
Michigan State University, 1986
Research Interests: Insect-Pest Management, Host-Plant Relationships

Mark Harvey, Ph.D.
University of Wyoming, 1986
Research Interests: American West, Environmental History, Public History

Harlene Hatterman-Valenti, Ph.D.

Iowa state University, 1993
Research Interests: High-Value Crop Production

Robert R. Hearne, Ph.D.
University of Minnesota, 1995
Research Interests: Economic Analysis of Emerging Environmental and Resource Issues in the Northern Great Plains

Britt Heidinger, Ph.D.
Indiana University, 2007
Research Interests: Physiological Ecology, Senescence, Stress Physiology

Linda Helstern, Ph.D.
Southern Illinois University-Carbondale, 2001
Research Interests: Writing, Literature and the Environment, Multicultural Literature

David Hopkins, Ph.D.
North Dakota State University, 1997
Research Interests: Soil Formation and Chemistry

Tom Isern, Ph.D.
Oklahoma State University, 1977
Research Interests: History of Agriculture, History of Great Plains

Donna Jacob, Ph.D.
University College, 2004
Research Interests: Wetland ecology, biogeochemistry, ecophysiology and ecotoxicology

Sivaguru Jayaraman, Ph.D.
Tulane University, 2003
Research Interests: Photocatalysis, Photochemistry, Green Chemistry

Xinhua Jia, Ph.D.
University of Arizona, 2004
Research Interests: Evapotranspiration, Subsurface drainage and Water quality

Dinesh Katti, Ph.D.
University of Arizona, 1991
Research Interests: Geotechnical Engineering, Constitutive Modeling of Geologic Materials, Expansive Soils, Multiscale Modeling, Steered Molecular Dynamics, Computational Mechanics, Nanocomposite, and Bio-nanocomposites. Computational Biophysics

Eakalak Khan, Ph.D.
University of California Los Angeles, 1997
Research Interests: Water Quality, Biological Process Development for Water and Wastewater Treatment, Storm water and Non-Point Source Pollution Control

Kenneth E. Lepper, Ph.D.
Oklahoma State University, 2001
Research Interests: Quaternary Geology and Age Dating

Wei Lin, Ph.D.
SUNY at Buffalo, 1992
Research Interests: Water and Wastewater Treatment, Hazardous Waste Management

Zhulu Lin, Ph.D.
University of Georgia, 2003
Research Interests: Surface and Subsurface Hydrology and Modeling, Soil and Water Resources Management, Environmental Systems Analysis, Risk Identifications and Assessment, Geostatistics and Spatial Statistics

Guodong Liu, Ph.D.
Hunan University, 2001
Research Interests: Synthesis of Novel Nanomaterials, Biosensors, Bioassays

John McEvoy, Ph.D.
University of Ulster Northern Ireland, 2002
Research Interests: Cryptosporidium Virulence Factors and Mechanisms of Pathogenesis

Mark Meister, Ph.D.
University of Nebraska, 1997
Research Interests: Rhetorical and Critical Theory, Environmental Communication

Jennifer Momsen, Ph.D.
Rutgers, 2007
Research Interests: Biology Education, Systems Thinking in Introductory Biology, Visualization, Assessing the Cognitive Level of STEM Courses

Bakr Mourad Aly Ahmed, Ph.D.
Virginia Tech., 2001
Research Interests: Sustainability Indicators and Implementation, Carrying Capacity Measurements, Coastal Development, Built Environment and Natural Resources Conservation

Jack Norland, Ph.D.
North Dakota State University, 2008
Research Interests: Restoration Ecology, Application of Remote Sensing to Natural Resource Management, Study of Natural Resources Management Problems in a Socio-ecological Setting

Peter Oduor, Ph.D.
University of Missouri - Rolla, 2004
Research Interests: Geographic Information Systems, Groundwater Flow Modeling, Groundwater Contamination

Marinus Otte, Ph.D.
Vrije Universiteit, 1991
Research Interests: Wetland ecology, Biogeochemistry, Ecophysiology and Ecotoxicology

G. Padmanabhan, Ph.D.
Purdue University, 1980
Research Interests: Hydrology, Water Resources, Hydraulic Engineering

Birgit Pruess, Ph.D.
Ruhr- Universitat Bochum, 1991
Research Interest: Microbial Physiology and Gene Regulation

Scott Pryor, Ph.D.
Cornell University, 2005
Research Interests: Biofuel Production from Cellulosic Feedstocks, Biobased Chemicals and Materials, Bioprocess Engineering, Process Optimization, Solid State and Liquid Fermentation Systems

Shafiqur Rahman, Ph.D.
University of Manitoba, 2004
Research Interests: Animal Waste Management, Biosolids Management, Air Quality, Water Quality, Composting

Wendy L. Reed, Ph.D.
Iowa State University, 2000
Research Interests: Physiological Ecology, Wetland and Bird Ecology, Environmental Endocrinology

David A. Rider, Ph.D.
Louisiana State University, 1988
Research Interests: Insect Systematics, Biodiversity

David C. Roberts, Ph.D.
Oklahoma State University, 2009
Research Interests: Evaluation and Design of Economically Efficient Tools and Policies for Pollution Control, Economic Valuation of Environmental and Ecological Attributes Through Revealed and Stated Preference Methods, Valuation of Environmental Risk, and Low-Impact and Precision Agriculture

Bernhardt Saini-Eidukat, Ph.D.
University of Minnesota, 1991
Research Interests: Environmental Geochemistry, Igneous Petrology, Economic Geology

Donald P. Schwert, Ph.D.
University of Waterloo, 1978
Research Interests: Quaternary Paleoecology, Analysis of Fossil Insects

Halis Simsek, Ph.D.
North Dakota State University, 2012

Research Interests: Bioenvironmental Engineering

Dean D. Steele, Ph.D.
University of Minnesota, 1991
Research Interests: Irrigation and Environmental Engineering

Craig A. Stockwell, Ph.D.
University of Nevada, 1995
Research Interests: Conservation Biology, Evolutionary Ecology of Native Fishes, Human-Wildlife Interactions

Jon Sweetman, Ph.D.
Queen's University, 2006
Research Interests: Aquatic Ecology and Environmental Change

Linda Tackett, Ph.D.
University of Southern California, 2014
Research Interests: Norian (and Mesozoic, generally) Paleoecological, Taxonomic, and Environmental Dynamics

Steve E. Travers, Ph.D.
University of California, 1998
Research Interests: Plant Evolutionary Ecology

Cheryl Wachenheim, Ph.D.
Michigan State University, 1994
Research Interests: Eliciting Perceptions and Valuations from Consumers, Firms, Students and Other Stakeholders and Decision Makers

Alexander Wagner, Ph.D.
Oxford University, 1997
Research Interests: Lattice Boltzmann, Spinodal Decomposition, Viscoelasticity, Drop Deformation and Break-up in a Shear Flow, Wetting, Non-equilibrium Thermodynamics, Complex systems

Dennis Wiesenborn, Ph.D.
Rice University, 1989
Research Interests: Refining, Fractionation and Conversion of Fats and Oils from Plants, Process Modeling for Biofuels and Renewable Products

Scott Wood, Ph.D.
Princeton University, 1985
Research Interests: Environmental Geochemistry, Radioactive Waste Disposal

Brian D. Wisenden, Ph.D.
University of Western Ontario, 1993
Research interests: Behavioral Ecology of Fishes, Chemical Ecology of Predator-Prey Interactions, Parental Care and Mating Systems

Environmental Engineering

Department Information

- **Interim Department Chair:**
  Xuefeng (Michael) Chu, Ph.D.
- **Graduate Program Coordinator:**
  Kalpana Katti, Ph.D.
- **Department Location:**
  201 Civil and Industrial Engineering Bldg.
- **Department Phone:**
  (701) 231-7244
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Civil and Environmental Engineering offers a graduate program leading to a Master of Science degree in environmental engineering. The M.S. degree in environmental engineering is offered through a program designed to advance the technical knowledge, competence, and interdisciplinary understanding of the students and to prepare them for entering or advancing within the environmental engineering profession.

The graduate curriculum in environmental engineering offers courses designed to prepare the student with engineering fundamentals as applied to the environment. To complement the major area of study, additional courses are often selected from other disciplines. Students without a B.S. degree in civil engineering will take remedial undergraduate courses to gain an appropriate background in civil engineering.

Admissions Requirements

To be admitted to the graduate Master of Science program in environmental engineering, the applicant must meet the Graduate School requirements (p. 1086).

Financial Assistance

Research and/or teaching assistantships may be available. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference (and TOEFL results for international applicants) must be submitted to The Graduate School. Additional eligibility requirements for teaching assistantships can be found on the Graduate School website.

The Master of Science degree thesis is a scholarly document prepared by the student which is based on research performed. The research topic is chosen by the student in consultation with his or her adviser. The student and adviser together prepare a plan of study to meet the needs of the individual student. The program contains a minimum of 30 credits of graduate-level material, of which the thesis can count 6 to 10 credits. An overall GPA of 3.0 or better must be maintained. An oral defense of the research-based thesis and comprehensive academic subject matter is required.

A student entering the environmental engineering Master of Science degree program without an undergraduate engineering degree will be required to satisfy the undergraduate requirements for mathematics, basic science, and engineering sciences in addition to the Master of Science requirements.

Achintya N. Bezbaruah, Ph.D.
University of Nebraska-Lincoln, 2002
Research Interests: Environmental sensors, Recalcitrant and micro pollutants, Contaminant fate and transport, Small community water and wastewater treatment, Environmental management

Xuefeng (Michael) Chu, Ph.D.
University of California, Davis, 2002
Research Interests: Watershed Hydrologic and Environmental Modeling, Overland Flow and Infiltration, Integrated Modeling of Flow and Contaminant Transport

Wei Lin, Ph.D.
State University of New York at Buffalo, 1992
Research Interests: Water and Wastewater Treatment, Hazardous Waste Management

G. Padmanabhan, Ph.D. (Emeritus)
Purdue University, 1980
Research Interests: Stochastic Hydrology, Water Resource Systems, and Hydrologic Modeling

Eakalak Khan, Ph.D. (adjunct)
University of California, Los Angeles, 1997
Research Interests: Water and Wastewater Quality, Water and Wastewater Treatment, and Storm Water and Non-point Source Pollution

Robert Zimmerman, Ph.D. (adjunct)
North Dakota State University, 1991
Research Interests: Water and Wastewater Treatment, Solid Waste

Exercise Science and Nutrition

Department Information

- **Program Director:**
  Kyle Hackney, Ph.D.
- **Department Location:**
  Bentson Bunker Fieldhouse
- **Department Phone:**

(701)231-6737

- **Department Web Site:**
  www.ndsu.edu/hnes/phd_in_exercise_science_and_nutrition/
- **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.
- **Degrees Offered:**
  Ph.D.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL ibt 79; IELTS 6.5

Program Description

The Department of Health, Nutrition and Exercise Sciences (HNES) offers a doctoral program in Exercise Science and Nutrition. Exercise Science and Nutrition are traditionally separate disciplines that strive to improve human health or human performance. Combined, the two form a strong and natural approach to improve well-being. Exercise Science and Nutrition includes the study of energy systems, nutrient intake, behavior motivation, and the physiology and mechanics of movement. Faculty are scholars in community nutrition, nutrition across the lifespan, clinical nutrition, exercise science, biomechanics, and physical activity and health. Prevention and treatment of obesity, improving physical activity, and building community-based health enhancements across the lifespan are strengths of the HNES faculty.

Program Objectives

The purpose of the program is to train doctoral students in Exercise Science and Nutrition. The program requires coursework and activities that will produce professionals with strong skills in research, teaching, grant writing, and service who will be competitive and productive in their careers. These professionals will have a strong understanding of both Exercise Science and Nutrition that will enable them to assume positions of leadership in research and teaching in community, government, university or other professional agencies and organizations.

Students will:

1. Acquire ability, knowledge, and research skills in Exercise Science and Nutrition
2. Conduct original research in Exercise Science and Nutrition
3. Gain experience with classroom teaching
4. Be prepared as professionals in Exercise Science and Nutrition

Career Opportunities

A doctorate in Exercise Science and Nutrition offers a wide array of career opportunities. Graduates of the program can expect to work for governmental and human service agencies, for-profit and not-for-profit research organizations, as well as in university-level education and research positions. A unique and attractive aspect to this degree is that it can prepare students to work in either nutrition or exercise science academic units upon graduation. Graduates of this program are equipped to meet the needs of changing regional, national, and global populations as related to their health and well-being.

Admission Requirements

Of the qualified PhD applicants we receive, we expect to admit up to five students per year, based on the capacity of our current faculty. In addition to the core faculty members in HNES who will advise students and participate in this program, there are faculty inside and outside of the department whose research interests mesh well with the program.

Applicants with a Master's degree:

- Completion of a Master's degree from an accredited university in a field closely related to Nutrition, Health, Dietetics, Kinesiology, or Exercise Science.
- Cumulative graduate GPA of 3.00 or higher.
- GRE exam scores in the upper 50th percentile for the Verbal, Quantitative, and Writing portions are given priority admission.
- At least one graduate course in statistics and one course in research methods, with grades of B or higher in each.
- A completed thesis or research paper.
- Agreement to be advised by current HNES graduate faculty member.

Applicants without an earned Master's degree:

- Completion of a Bachelor's degree from an accredited university in a field closely related to Nutrition, Health, Dietetics, Kinesiology, or Exercise Science.
- Cumulative undergraduate GPA of 3.0 or higher.
- GRE exam scores in the upper 50th percentile for the Verbal, Quantitative, and Writing portions are given priority admission.
- At least one statistics course or research methods course with grades of B or higher.
- Agreement to be advised by current HNES graduate faculty member.

Financial Assistance

Graduate Assistantships are available for up to 20 hours a week based on faculty need and available funding. Assistantships are renewable on a yearly basis dependent upon student performance. Assistantship awards also include full tuition remission regardless of residency. Students are typically provided shared offices, computers, and access to printers, and support staff. Assistantships typically begin the week before fall semester classes and continue through finals week of spring semester. Summer is not included in most assistantship awards.

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 727	Physical Activity Epidemiology	
Electives (up to 6 credits outside of HNES)		18
HNES 652	Nutrition, Health and Aging	
HNES 655	Sports Nutrition	
HNES 703	Graduate Biomechanics of Sport and Exercise	
HNES 704	Psychological Foundation of Sport & Physical Activity	
HNES 710	Introduction to Research Design and Methods in HNES	
HNES 721	Health Promotion Programming	
HNES 724	Nutrition Education	
HNES 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 777	Scholarly Writing and Presenting in HNES	
HNES 790	Graduate Seminar	
HNES 791	Temporary/Trial Topics	
Research Practicum (minimum of 3 credits, may be waived with significant evidence of research experience based on committee approval)		3-6
HNES 894	Practicum/Internship	
Teaching Experience (minimum of 3 credits, may be waived with significant evidence of teaching experience based on committee approval)		3-6
HNES 892	Graduate Teaching Experience	
Dissertation (must encompass at least two seperate semesters)		15
HNES 899	Doctoral Dissertation	
Total Credits (minimum)		60

Students Entering with a Bachelor's Degree

Code	Title	Credits
Research Core		21
STAT 725	Applied Statistics	
HNES 710	Introduction to Research Design and Methods in HNES	
HNES 777	Scholarly Writing and Presenting 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 727	Physical Activity Epidemiology	
Electives (up to 6 credits outside of HNES)		33
HNES 652	Nutrition, Health and Aging	
HNES 655	Sports Nutrition	
HNES 703	Graduate Biomechanics of Sport and Exercise	
HNES 704	Psychological Foundation of Sport & Physical Activity	
HNES 721	Health Promotion Programming	
HNES 724	Nutrition Education	
HNES 743	Obesity Across the Lifespan	
HNES 754	Assessment in Nutrition and Exercise Science	
HNES 760	Skeletal Muscle Physiology	
HNES 761	Physiological and Fitness Assessment in Exercise Science	
HNES 790	Graduate Seminar	
HNES 791	Temporary/Trial Topics	
Research Practicum (9-12 credits, may be waived with significant evidence of research experience based on committee approval)		9-12
HNES 894	Practicum/Internship	
Teaching Experience (3-6 credits, may be waived with significant evidence of teaching experience based on committee approval)		3-6
HNES 892	Graduate Teaching Experience	
Dissertation (must encaompass at least two semesters)		15
HNES 899	Doctoral Dissertation	
Total Credits (minimum)		90

Ardith Brunt, Ph.D.
Iowa State University, 1999
Research Interests: Nutrition, Gerontology

Bryan Christensen, Ph.D.
University of Kansas, 2000
Research Interests: Biomechanics, Sports Psychology, Strength and Conditioning

Shannon David, Ph.D.
Ohio University, 2013
Research Interests: Patient Clinician Relationship, Quantification of Intervention Outcomes

Joe Deutsch, Ph.D.
North Dakota State University, 2007
Research Interests: Physical Education Teacher Education, Coaching

Kara Gange, Ph.D.
North Dakota State University, 2010
Research Interests: Therapeutic Modalities, Diagnostic Ultrasound

Julie Garden-Robinson, Ph.D.
North Dakota State University, 1994
Research Interests: Nutrition, Food Safety

Nikki German, Ph.D.
North Dakota State University, 2008
Research Interests: Athletic Training

Kyle Hackney, Ph.D.
Syracuse University, 2013
Research Interests: Skeletal Muscle, Sarcopenia, Muscle Inactivity, Ergogenic Aids

Jenny Linker, Ph.D.
University of Illinois Urbana-Champaign, 2011

Research Interests: Comprehensive School Physical Activity Programs, Physical Education Teacher Preparation

Katie Lyman, Ph.D.
University of South Florida, 2014
Research interests: Kinesio Tape®, Manual Medicine, Emergency Medicine

Yeong Rhee, Ph.D.
Oklahoma State University, 1999
Research Interests: Chronic Disease Prevention, Immune Function, Functional Foods

Sherri Nordstrom Stastny, Ph.D.
North Dakota State University, 2007
Research Interests: Nutrition, Gerontology

Bradford N. Strand, Ph.D.
University of New Mexico, 1988
Research Interests: Physical Education Curriculum and Instruction, Fitness Education, Sport Sociology

Donna J. Terbizan, Ph.D.
The Ohio State University, 1982
Research Interests: Exercise Physiology, Fitness, Wellness, Exercise Science, Chronic Disease Change

Extension Education

Department Information

- **Program Coordinator:**
  Adam Marx, Ph.D.
- **Program Coordinator:**
  David Ripplinger, Ph.D.
- **Department Location:**
  School of Education, FLC 210
- **Department Phone:**
  (701) 231-7921
- **Application Deadline:**
  April 1 for fall semester and December 1 for spring semester.
- **Degrees Offered:**
  M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

Extension Education offers graduate study leading to the M.S. and M.Ed. degrees. Specialized training in an area of interest is required.

Admission Requirements

In addition to the Graduate School's required application materials, the program requires 1) a statement of purpose that addresses the question, "How will this degree help me achieve my professional goals?" 2) a letter from a faculty member/specialist expressing their willingness and ability to mentor the candidate in their area of interest.

Admission is only considered after all required application materials have been received and reviewed.

This program requires completion of a minimum of 31 credits.

Code	Title	Credits
Core Courses		13
H&CE 646	Extension Education	
H&CE 724	Program Development In Vocational Education	
H&CE 756	Program Development and Evaluation	
EDUC 750	Reflective Practice and Research in Education	

EDUC 851	Adult Learning (or EDUC 882 or EDUC 853)	
Research Methods		6
EDUC 702	Statistics In Educational Research	
or STAT 725	Applied Statistics	
EDUC 883	Survey Research (or similar)	
Major/Concentration*		6
Capstone		6
H&CE 798	Master's Thesis (M.S. degree students)	
H&CE 794	Practicum/Internship (Action Research/Creative Project - M.Ed. degree students)	
Total Credits		31

Adam A. Marx, Ph.D.
University of Missouri, 2014
Research Interests: Adolescent Career Decision-Making, Student Engagement, Teacher Development

David Ripplinger, Ph.D.
North Dakota State University, 2011
Research Interests: Production Economics and Marketing

Family and Consumer Science Education

Department Information

- **Department Chair:**
  Chris Ray, Ph.D.
- **Graduate Coordinator:**
  Mari Borr, Ph.D.
- **Department Location:**
  School of Education, FLC 210
- **Department Phone:**
  (701) 231-7921
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  M.S., M.Ed.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

Students have the option of pursuing a Master of Education (M.Ed.) or Master of Sciences (M.S.) degree in Family and Consumer Sciences Education. Advanced work may be taken in FCSE, Career and Technical Education, Extension, and curriculum design and development.

The NDSU programs in education are accredited by National Council for Accreditation of Teacher Education and are approved by the ND Education Standards and Practices Board. Changes in national and state legislation, standards, or rules can affect academic program requirements.

Option A

This program is designed for a person who already has a bachelor's degree in a Family and Consumer Sciences related area and would like to work toward obtaining a teaching license. Upon completion, the program provides the pedagogy requirements for a Family and Consumer Sciences teaching certificate. Depending on the individual's bachelor's degree, there will most likely be several content courses that will need to be taken as well to meet licensing requirements. Licensing also involves state mandated tests. Student teaching is included in this program. This program is offered through the Great Plains Interactive Distance Education Alliance. All courses in this master's degree are offered online and are taught by faculty at several different universities. For more information, please see:http://www.hsidea.org/programs/fcsed/.

NOTE: Earning an academic/professional degree does not necessarily lead to state credential or licensure. People seeking licensure may need to meet additional requirements such as tests and additional coursework. Potential and current students should consult with the appropriate academic program coordinator for advice about licensure, certification, or credentialing after communicating with the appropriate state official.

Option B

This program is designed to provide persons who currently hold a teaching degree in Family and Consumer Sciences with an expanded background in Family and Consumer Sciences Education and related content areas. It also examines the broader field of education, with a solid foundation in research methodology. Students are encouraged to complete additional course work in areas of interest. Internships can be incorporated into the program of study and provide an opportunity for students to examine current issues. Candidates should work closely with an adviser.

Qualified students may apply for admission to graduate programs in the School of Education leading to Master of Education (M.Ed.) or Master of Science (M.S.) degrees.

In addition to the Graduate School's required application materials, the program requires submission of a statement of career goals consistent with the five propositions of the National Board of Professional Teaching Standards (NBPTS), http://www.nbpts.org/ as well as reasons for applying to the program. The School of Education reserves the right to obtain additional information about the student's professional competence from qualified professionals.

Those applying to Option A will also need to 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.

Admission is considered only after all required application materials have been received and reviewed. Where appropriate, all international student requirements must be met.

Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data. A student must meet all requirements for full admission.

Financial Assistance

Graduate assistantships are available in the School of Education. Applications are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. Students must be accepted into the Graduate School before they are eligible for an assistantship.

All enrollments in Education courses before the student files a graduate plan of study must be approved by the adviser. The School of Education will evaluate graduate courses taken prior to filing the graduate plan of study when the student's plan of study is being considered. Only those courses approved by the School of Education may be included on the final plan of study leading to the degree.

Master's programs within the School of Education require a minimum of 30 semester credits (minimums vary by academic program). The Master of Science (M.S.) degree requires a disquisition. The Master of Education (M.Ed.) degree is a non-disquisition, practitioner-oriented degree. Programs vary on requiring a written comprehensive exam or a portfolio/oral.

Option A Program (Master of Education)

Code	Title	Credits
Education Courses		9
EDUC 751	Students and Their Learning	
EDUC 755	Exceptional Learners in the Secondary School Classroom	
EDUC 775	Content Area Reading	
Major Concentration		21
H&CE 668	Methods of Teaching Family and Consumer Sciences I: Techniques	
H&CE 682P	Methods of Teaching Family and Consumer Sciences II: Professional Practices	
H&CE 740	Vocational Philosophy and Policy	
H&CE 771	Human Relations for Educators	
H&CE 773	Occupational Programs in Family and Consumer Science	
H&CE 774	Teaching Family and Consumer Science with Technology	
H&CE 776	Research Design in Family and Consumer Sciences	
Field Experiences		11
H&CE 687P	Student Teaching	
H&CE 794	Practicum/Internship (with H&CE 668 & H&CE 682P)	
Total Credits		41

Option B Program (Master of Science or Master of Education)

Code	Title	Credits
Core Courses		15
EDUC 750	Reflective Practice and Research in Education	3

EDUC 751	Students and Their Learning	3
EDUC 752	Curriculum Design and Delivery	3
EDUC 753	Managing/ and Monitoring Learning	3
EDUC 702	Statistics In Educational Research	3
Major/Concentration		15-24
Choose from the following:		
H&CE 667	Advising Family, Career, and Community Leaders of America	
EDUC 775	Content Area Reading	
H&CE 724	Program Development In Vocational Education (non -GPIDEA only)	
H&CE 740	Vocational Philosophy and Policy	
H&CE 772	Curriculum Development in Family and Consumer Sciences	
H&CE 773	Occupational Programs in Family and Consumer Science (through GPIDEA only)	
H&CE 774	Teaching Family and Consumer Science with Technology	
H&CE 776	Research Design in Family and Consumer Sciences (through GPIDEA only)	
H&CE 777	Evaluation in Family and Consumer Sciences (through GPIDEA only)	
H&CE 778	Administration of Family and Consumer Sciences Programs (through GPIDEA only)	
H&CE 779	Techniques of Supervision in Family and Consumer Sciences (through GPIDEA only)	
H&CE 787	Issues In Education	
H&CE 790	Graduate Seminar	
H&CE 795	Field Experience	
Research Paper (as approved by adviser)		3-10
H&CE 794	Practicum/Internship (Action Research)	
H&CE 798	Master's Thesis	6-10
Total Credits		33-49

Mari Borr, Ph.D.
University of North Dakota, 2005
Research Interests: Qualitative Research, Family and Consumer Science Education, Adolescent Development, Experiential Learning, and Professional Development Evaluation

Food Safety

Program and Application Information

The program is currently undergoing reorganization into a Master of Public Health (MPH). Entry into the MPH program is anticipated for fall semester of 2019. Applications will not be accepted before February 2019. Additional information will be posted as it becomes available

Graduate School
Email: ndsu.grad.school@ndsu.edu
Phone: (701) 231-7033
Fax: (701) 231-6524

Master of Public Health Program Description

The Food Safety educational program at NDSU was founded in 2001 to help meet the increasing need for individuals with food safety expertise in government, business, and academia. NDSU graduate faculty who participate in the food safety programs are from multiple colleges, and cover several areas of expertise including microbiological sciences, communication, public health, food and nutrition, and plant sciences.

As our food system becomes more globalized and complex, it is increasingly important for public health professionals to engage consumers and members of the food industry including farmers, food processors, and food service workers. Monitoring and preventing the spread of foodborne disease, disseminating and enforcing key laws or regulations, and education the public on safe food handling practices are top priorities. These priorities can be achieved through utilization of innovative methods in the areas of molecular microbiology, biotechnology, science-based risk assessment and management, hygiene principles, food safety laws and regulations, and active surveillance programs. The NDSU MPH degree with a specialization in Food Safety will provide students with the necessary skills and knowledge to become vital frontline members working to keep our population and food systems safe and secure.

Students have the flexibility to focus assignments and choose at least two electives based on their interests and professional goals. Topics of potential interest include: disease diagnosis and detection, prevention of disease spread in food systems, public health policy, and emergency

responses to emerging food security threats. Application of these topics all build upon the food safety specialization curriculum and MPH foundational core course.

Students will take the required foundational Master of Public Health courses (https://www.ndsu.edu/publichealth/curriculum), including Biostatistics, Epidemiology, Public Health Management and Policy, Environmental Health, Community Health Leadership, and Social and Behavioral Sciences in Public Health. In addition, students will be required to complete the Master of Public Health practicum and a master's paper—each focused on Food Safety topics in Public Health. The 18-credit specialization curriculum is described below.

Genomics and Bioinformatics

Department Information

- **Program Director:**
  Phillip McClean, Ph.D.
- **Email:**
  Phillip.McClean@ndsu.edu
- **Department Location:**
  Plant Sciences, Loftsgard Hall
- **Department Phone:**
  (701) 231-8443
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

Genomics and Bioinformatics is an interdisciplinary graduate program that involves faculty from nine departments. Advanced research and study will focus on either functional or computation genomics. The program is designed to provide both M.S. and Ph.D. students the necessary skills and intellectual background to work cooperatively with others in a research area that takes a systems-wide approach to the study of the organization and expression of the many genes and their products expressed in an organism. Exposure to modern techniques and instrumentation will prepare the student for success in both industrial and academic careers.

Research

The student is required to perform original research in an area of genomics. This will be under the direction of the student's major adviser. To promote cross-disciplinary research, the student is encouraged to collaborate with a student in the other track. This does not apply to M.S. students pursuing the Comprehensive Study Option.

It is the intent of the program to admit students in either of two tracks. The Functional Genomics track will be for students interested in the generation and application of genomic information. The Computational Bioinformatics track is intended for students interested in using computer science and statistical approaches to analyze large amounts of genomic data.

The Genomics graduate program is open to qualified graduates of universities of recognized standing. The Graduate School minimum for the TOEFL examination applies. In addition, the following are the requirements to be admitted with full standing.

Functional Genomics track: a B.S. degree with courses in genetics, physiology, biochemistry; an upper-division statistics class; an introductory biology class emphasizing molecular biology; and minimum undergraduate GPA of 3.0.

Computational Bioinformatics track: a B.S. degree with courses in calculus, comparative computer languages, data structures, an upper-division statistics class, an introductory biology class emphasizing molecular biology, and minimum undergraduate GPA of 3.0.

Students can be accepted conditionally into either track without meeting the course or GPA requirements, but will be required to meet those requirements while in residency.

Adviser and Graduate Committee

During the first year, the student will form a graduate committee and submit the Plan of Study to the Graduate School. The committee must include the student's major adviser, at least one other faculty member of the Genomics and Bioinformatics program, and a third member from outside the student's home college. For Ph.D. students only, a fourth member of the committee serves as the Graduate School Representative (GSR). The GSR

must be a full member of the graduate faculty, AND be either a tenured faculty member outside the committee chair's/co-chairs' home department(s) OR a faculty member outside the primary college of the committee chair/co-chairs. For this interdisciplinary program, the GSR must ALSO be outside of the program. Additionally, the GSR must be clear of any conflicts of interest with either the student or the committee chair/co-chairs. Examples of possible conflicts of interest may include budgetary relationships, family or financial, personal relationships, or research and/or publication relationships between the GSR and either the student or the committee chair.

Ph.D. Program

FUNCTIONAL GENOMICS OPTION

- Ph.D. Core Courses 13 credits
- Support Courses (required unless on incoming transcript) BIOL 859 Evolution , PLSC 631 Intermediate Genetics, STAT 726 Applied Regression and Analysis of Variance
- Electives minimum of 15 credits from the Physiology, Gene Expression, Genetics and Computational Elective areas; one course from each of the Physiology, Gene Expression, Genetics elective areas is required
- Research to 90 credits total **(NOTE: a minimum of 15 didactic credits must be 700-level courses)**

BIOINFORMATICS OPTION

- Ph.D. Core Courses 13 credits
- Support Courses (required unless on incoming transcript) PLSC 731 Plant Molecular Genetics, STAT 661 Applied Regression Models, CSCI 796 Special Topics
- Electives - minimum of 15 credits; a minimum of three courses must be from the Computational area and a minimum of one course must be from either the Physiology, Gene Expression or Genetics Elective areas
- Research to 90 credits total **(NOTE: a minimum of 15 didactic credits must be 700-level courses)**

M.S. Program - Thesis Option

FUNCTIONAL GENOMICS OPTION

- M.S. Core Courses 11 credits
- Electives- minimum of 9 credits from the Physiology, Gene Expression, and Genetics areas; a minimum of one course must be selected from each of two of these areas
- Research to 30 credits total

BIOINFORMATICS OPTION

- M.S. Core Courses 11 credits
- Electives - minimum of 9 credits; a minimum of one course must be from the Physiology, Gene Expression or Genetics Elective areas; the remainder of the courses must be from the Computational area
- Research to 30 credits total

M.S.Program - Comprehensive Study Option

FUNCTIONAL GENOMICS OPTION

- M.S. Core Courses 11 credits
- Electives- minimum of 15 credits from the Physiology, Gene Expression, and Genetics areas; a minimum of one course must be selected from each of two of these areas
- Masters Paper to minimum of 30 credit total

BIOINFORMATICS OPTION

- M.S. Core Courses 11 credits
- Electives - minimum of 15 credits; a minimum of two courses must be from the Physiology, Gene Expression or Genetics Elective areas; the remainder of the courses must be from the Computational area

Masters Paper to minimum of 30 credit total

Examinations

1. **Qualifying Exam (Ph.D. only):** This exam consists of written and oral portions. The student will complete a written exam that emphasizes the application of materials presented in the core courses. The members of the genomics graduate program will submit these questions. The oral exam will be administered by the student's graduate committee and will focus on material beyond the core courses that are specific to the research of the student. Upon completion of the qualifying exam, the student will be accepted as a Ph.D. candidate.
2. **Final Exam (M.S. and Ph.D.):** The final exam will be an oral defense of the student's research results. The student's graduate committee will administer the exam.
3. **Comprehensive Study Option Paper (M.S. only):** M.S. students pursuing the Comprehensive Study Option will be required to complete an in-depth paper of a specific topic relevant to Genomics. The paper will be reviewed and accepted by the student's graduate committee.

Code	Title	Credits
Core Courses		11 (M.S.) - 13 (Ph.D.)
PLSC 611	Genomics	
CSCI/MATH/STAT 732	Introduction To Bioinformatics	
PLSC/BIOC 721	Genomics Techniques	
796 Current Topics in Genomics 2 (MS) or 3 cr. (Ph.D.)		
790 Graduate Seminar 1 (M.S.) or 2 (Ph.D.) cr		

Code	Title	Credits
Electives		
Physiology		
ANSC 828	Advanced Reproductive Biology	3
MICR 670	Basic Immunology	3
MICR 680	Bacterial Physiology	3
MICR 781	Advanced Bacterial Physiology	3
PPTH 751	Physiology Of Plant Disease	3
ZOO 660	Animal Physiology	3
ZOO 664	Endocrinology	3
ZOO 682	Developmental Biology	3
ZOO 866	Advanced Animal Behavior	3
Gene Expression		
BIOC 719	Molecular Biology of Gene Expression and Regulation	3
BOT 820	Advanced Cell Biology	3
MICR 775	Molecular Virology	3
PLSC 731	Plant Molecular Genetics	3
Genetics		
BIOL 859	Evolution	3
BIOL 796	Special Topics	3
MICR 682	Bacterial Genetics and Phage	3
MICR 783	Advanced Bacterial Genetics and Phage	3
PLSC 631	Intermediate Genetics (required for Functional Genomics Option)	3
PLSC 741	Cytogenetics	4
PLSC 751	Advanced Plant Genetics	3
PLSC 780	Population Genetics	2
PLSC 781	Quantitative Genetics	2
PPTH 759	Host-Parasite Genetics	3
Computational		
CSCI 724	Survey of Artificial Intelligence	3
CSCI 859	Computational Methods in Bioinformatics	3
CSCI 760	Dynamic Programming	3

CSCI 765	Introduction To Database Systems	3
CSCI 783	Topics In Software Systems	3
CSCI 796	Special Topics (Knowledge Discovery in Biological Data)	3
CSCI 796	Special Topics (Signal Processing and Analysis in Bioinformatics)	3
MATH 684	Mathematical Methods of Biological Processes	3
STAT 650	Stochastic Processes	3
STAT 661	Applied Regression Models (required for Bioinformatics Ph.D. option)	3
STAT 730	Biostatistics	3
STAT 764	Multivariate Methods	3
STAT 796	Special Topics (required for Bioinformatics Ph.D. option)	3

Peter Bergholz, Ph.D.
Michigan State University, 2007
Department: Veterinary and Microbiological Sciences
Research Interest: Bacterial Population and Landscape Genomics

Eugene Berry, Ph.D.
Northeastern University, 1983
Department: Veterinary and Microbiological Sciences
Research Interest: Animal Virology

Xiwen Cai, Ph.D.
Washington State University, 1998
Department: Plant Sciences
Research Interest: Cytogenetics

Michael J. Christoffers, Ph.D.
University of Missouri-Columbia, 1998
Department: Plant Sciences
Research Interest: Weed Molecular Genetics

Anne Denton, Ph.D.
University of Mainz, 1996
Department: Computer Science
Research Interest: Data Mining, Bioinformatics

Justin D. Faris, Ph.D.
Kansas State University, 1999
Department: Plant Sciences
Research Interest: Wheat Molecular Genetics

Nathan Fisher, Ph.D.
University of Michigan, 2006
Department: Veterinary and Microbiological Sciences
Research Interest:Functional Genomics and Gene Exaptation

Timothy Friesen, Ph.D.
North Dakota State University, 2001
Department: Plant Pathology
Research Interest: Host-Pathogen Interactions of Cereals

Jill Hamilton, Ph.D.
University of British Columbia, 2012
Department: Biological Sciences
Research Interest: Plant Evolutionary Genomics

David P. Horvath, Ph.D.
Michigan State University, 1993
Department: Plant Sciences
Research Interest: Perennial Weed Physiology

Rick Jansen, Ph.D.
University of Minnesota, 2009

Department: Public Health
Research Interest: Molecular and Genomic Epidemiology

Zhaohui Liu, Ph.D.
North Dakota State University, 2006
Department: Plant Pathology
Research Interest: Host-Parasite Interactions of Wheat

Phillip E. McClean, Ph.D.
Colorado State University, 1982
Department: Plant Sciences
Research Interest: Plant Molecular Genetics

Steven W. Meinhardt, Ph.D.
University of Illinois, Champaign-Urbana, 1984
Department: Biochemistry and Molecular Biology
Research Interest: Protein Structure/Function

Kendall Nygard, Ph.D.
Virginia Polytechnic Institute and State University, 1978
Department: Computer Science
Research Interest: Bioinformatics

William Perrizo, Ph.D.
University of Minnesota, 1972
Department: Computer Science and Operation Research
Research Interest: Distributed Database Systems, Centralized Database Systems

Birgit Pruess, Ph.D.
Ruhr-Universitat Bochum, 1991
Department: Veterinary and Microbiological Sciences
Research Interest: Microbial Physiology and Gene Regulation

Jack B. Rasmussen Ph.D.
Michigan State University, 1987
Department: Plant Pathology
Research Interest: Molecular Plant/Microbe Interactions

Katie Reindl, Ph.D.
North Dakota State University, 2006
Department: Biological Sciences
Research interest: Cancer cell biology

Saeed Salem, Ph.D.
Rensselaer Polytechnic Institute, 2009
Department: Computer Science
Research Interest: Bioinformatics Analysis of Biological Networks

Vasant A. Ubhaya, Ph.D.
University of California-Berkeley, 1971
Department: Computer Science and Operations Research
Research Interest: Algorithm Analysis, Operations Research

Changhui Yan, Ph.D.
Iowa State University, 2005
Department: Computer Science
Research interest: Computational Bioinformatics

Yarong Yang, Ph.D.
Northern Illinois University, 2010
Department: Statistics
Research interest: Bioinformatics

Gerontology

Department Information

- **Program Coordinator:**
  Susan Ray-Degges, Ph.D.
- **Department Phone:**
  (701) 231-7218
- **Application Deadline:**
  Based on first major requirements.
- **Degrees Offered:**
  Ph.D. Dual Major
- **English Proficiency Requirements:**
  Based on first major requirements.

Program Description

The Doctor of Philosophy (dual-major) option in Gerontology at North Dakota State University provides unique opportunities to study and conduct research in this growing and exciting field. The Gerontology Ph.D. at North Dakota State University (NDSU) is a dual-major linking a discipline based Plan of Study with an interdisciplinary perspective on aging. Depending on your specific area of interest, students will combine academic coursework in a primary major (Developmental Science, Exercise Science and Nutrition, or Occupational and Adult Education) with a secondary dual-major in Gerontology. The mission of the Gerontology Ph.D. is to promote aging-related research and education at North Dakota State University that uses a discipline based perspective that serves to enhance the length and quality of life.

Admission Requirements

Based on first major requirements.

In addition to meeting the requirements for the first major, the following Gerontology requirements must be completed.

Code	Title	Credits
ADHM 705	Environment and Aging	3
HDFS 723	Perspectives in Gerontology	3
HDFS 760	Aging Policy	3
HNES 652	Nutrition, Health and Aging	3
or HNES 726	Nutrition in Wellness	
EDUC 853	Instructional Methods for Adult Learners	3

Other Requirements:

- Dissertation on a Gerontology-related topic.
- Committee chair from the home department.
- At least two committee members from the approved Gerontology faculty list, one who must be from the home program area.

Health, Nutrition and Exercise Science

Department Information

- **Department Head:**
  Yeong Rhee, Ph.D.
- **Graduate Coordinator:**
  Kyle Hackney, Ph.D.
- **Department Location:**
  Bentson Bunker Fieldhouse
- **Department Phone:**
  (701) 231-7474
- **Department Web Site:**
  www.ndsu.edu/hnes/

- **Application Deadline:**
  Exercise/Nutrition Science option: Applications completed by March 15 will be given priority for fall. Leadership in Physical Education and Sport option: April 1; Enrollment is limited to 20 students. M.S. Dietetics (online), GPIDEA: March 1 for summer/ fall and October 15 for spring.
- **Degrees Offered:**
  M.S.
- **Test Requirement:**
  GRE required only Exercise/Nutrition Science option
- **English Proficiency Requirements:**
  TOEFL iBT 79; IELTS 6.5

Program Description

The Department of Health, Nutrition, and Exercise Sciences (HNES) offers graduate study leading to the Master of Science (M.S.) degree in HNES with options in Exercise/Nutrition Science and Leadership in Physical Education and Sport. The HNES department also offers a Master of Science (M.S.) in Dietetics (on line through the Great Plains Interactive Distance Education Alliance), Master of Science (M.S.) in Advanced Athletic Training (http://www.ndsu.edu/hnes/advanced_athletic_training_post_professional) and a Master of Athletic Training (MATrg) (http://www.ndsu.edu/hnes/athletic_training_professional) degree. A Ph.D. degree in Exercise Science and Nutrition (http://www.ndsu.edu/hnes/phd_in_exercise_science_and_nutrition) is also available.

M.S. in Health, Nutrition and Exercise Sciences

Option in Exercise/Nutrition Science

The Exercise/Nutrition Science option prepares the graduate for advanced positions with an emphasis in the areas of physical activity, exercise science, nutrition, and health promotion. The department is devoted to researching and understanding the long-term effects of physical activity and nutrition, and translating this research into effective exercise science and wellness programs for children, adolescents, and adults of all ages. This option is appropriate for athletic trainers, nutrition, and exercise science graduates.

Admission requirements are as follows:

1. Cumulative baccalaureate GPA of 3.0 or better on a 4.0 scale.
2. Graduate Record Examination (GRE).
3. Completion of a Bachelor's degree from an accredited university in field closely related to Nutrition, Dietetics, or Exercise Science.
4. A faculty has agreed to be the applicant's mentor.

Accelerated BS/MS in Dietetics and Nutrition

This is a combined program for undergraduate dietetics students. Students apply for the dietetics program in the spring of their second (sophomore) year and then apply for the accelerated M.S. program in the fall of their third (junior) year. Students in this option will earn a B.S. in Dietetics, an M.S. in Exercise/Nutrition Science, and complete the required 1200 hours of supervised practice to sit for the national Registration Exam for Dietitians. The program is designed to be completed in 5 years. Students who are interested should contact the College of Human Development and Education Academic Advisor located in EML 270 for more information.

Option in Leadership in Physical Education and Sport

The Leadership in Physical Education and Sport (LPES) option is an online program that prepares teachers and coaches to become actively engaged in leadership roles within school systems or professional organizations. This degree prepares students to be master teachers, head coaches, department heads, and activities directors at the interscholastic level; assistant coaches, lecturers, and assistant or lead directors at the intercollegiate level; and to become actively engaged in leadership roles within professional organizations.

Admission requirements are as follows:

1. Cumulative baccalaureate GPA of 3.0 or better on a 4.0 scale.
2. Undergraduate degree in the field of Kinesiology (physical education, coaching, etc.)

A 3.0 is needed to be considered for full acceptance into the LPES program. Applicants with a undergraduate GPA below 3.0 will be considered for conditional acceptance and will have to complete 9 graduate credit hours with grades of at least B to be considered for full standing. Meeting these criteria does not guarantee acceptance.

M.S. in Dietetics (On-line)

The Dietetics program prepares registered dietitians to practice at an advanced level or pursue doctoral study. The Great Plains Interactive Distance Education Alliance program in Dietetics provides opportunities for registered dietitians and registration-eligible dietetic graduates to integrate and

apply principles from the biomedical sciences, human behavior, and management to design and lead effective food and nutrition programs in a variety of settings. This program is fully online (http://www.ndsu.edu/hnes/dietetics_on_line).

In a multi-institution degree program, students (must be registered dietitians or registration-eligible dietetic graduates):

1. Apply and are admitted to one university;
2. Enroll in all courses at that university; and
3. Graduate or receive a certificate from that university.

Ph.D. in Exercise Science and Nutrition

The Department of Health, Nutrition and Exercise Sciences (HNES) offers a doctoral program in Exercise Science and Nutrition. Exercise Science and Nutrition includes the study of energy systems, nutrient intake, behavior motivation, and the physiology and mechanics of movement. Faculty are scholars in community nutrition, nutrition across the lifespan, clinical nutrition, exercise science, biomechanics, and physical activity and health. Prevention and treatment of obesity, improving physical activity, and building community-based health enhancements across the lifespan are strengths of the HNES faculty. Graduates of this program will have a strong understanding of both Exercise Science and Nutrition that will enable them to assume positions of leadership in research and teaching in community, government, university or other professional agencies and organizations.

Admission requirements are as follows:

1) Cumulative baccalaureate GPA of 3.0 or better on a 4.0 scale.

2) Graduate Record Examination (GRE).

3) Completion of a Bachelor's or Master's degree from an accredited university in field closely related to Nutrition, Health, Dietetics, Kinesiology, or Exercise Science.

4) A faculty has agreed to be the applicant's mentor.

In addition to Graduate School admission requirements, the following criteria will be considered at the time of application for admission into graduate study. Admission to a master's degree program is considered ONLY after all required application materials have been received and reviewed. In order to be considered, the applicant must have a Bachelor of Science degree in an HNES related field from an accredited institution, an overall undergraduate GPA of 3.0 on a 4.0 scale, and have submitted all required materials as listed. The GRE is required for the Ph.D. and the M.S. option in Exercise/ Nutrition Science.

During the application process, the applicant must submit an exhibit of his/her written competency through an essay discussing professional philosophy and professional goals.

The Department of Health, Nutrition, and Exercise Sciences reserves the right to obtain additional information about the applicant's professional competence from qualified professionals. Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data.

Financial Assistance

Both research and teaching assistantships may be available. Applications are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference must be received by the Graduate School by the program deadline. The department admits students for fall semester only in the Ph.D. program and the MS Exercise/Nutrition option. Graduate assistants receive a financial stipend for their work, and a full tuition waiver for fall, spring, and summer semesters. Assistantships are available contingent upon current funding and faculty need.

Exercise/Nutrition Science Option

Code	Title	Credits
Required Courses		
HNES 790	Graduate Seminar (Introduction to HNES)	1
HNES 710	Introduction to Research Design and Methods in HNES	3
HNES 777	Scholarly Writing and Presenting in HNES	3
STAT 725	Applied Statistics	3
HNES 713	Graduate Exercise Physiology (Restricted to students enrolled in the Exercise Science/Nutrition Option)	3
HNES 726	Nutrition in Wellness	3
Electives		9
HNES 798	Master's Thesis	6

Leadership in Physical Education and Sport Option

Code	Title	Credits
HNES 700	Research in Physical Education and Sport	3
HNES 701	Leadership and Supervision	3
HNES 704	Psychological Foundation of Sport & Physical Activity	3
HNES 705	Analysis of Sport Skill Instruction and Acquisition	3
HNES 707	Sport in American Society	3
HNES 711	Physical Education Curriculum	3
HNES 712	Principles of Management	3
HNES 714	Legal Liability in HPER	3
HNES 731	Governance in Sport	3
HNES 790	Graduate Seminar	3
HNES 794	Practicum/Internship	1
Total Credits		31

Dietetics Option

A Dietetics graduate candidate must complete a minimum of 36 credit hours to earn a Master of Science degree, 30 of which are didactic. The remaining 6-credits required to complete the degree must follow one of 3 plans.

Plan A – Thesis [if planning on a terminal degree or only recommended if the student is able to travel to NDSU to meet with the major professor].

Plan B – Comprehensive Study - After consulting with the major advisor and selecting a topic, students will carry out planning and completion of this research-based project in frequent interactions with a supervisory committee. The culmination of this project would be a comprehensive report or a manuscript that could be submitted to a journal.

Plan C – This plan would require 36 credits of coursework. Elective graduate courses totaling six credits will be taken from the electives.

Code	Title	Credits
Required Core Courses		9
HNES 710	Introduction to Research Design and Methods in HNES	
HNES 728	Current Issues in Dietetics	
STAT 725	Applied Statistics	
Electives		21
ADHM 635	Cost Controls in Hospitality and Food Service Systems	
ADHM 736	Entrepreneurship in Dietetics	
HNES 642	Community Health and Nutrition Education	
HNES 652	Nutrition, Health and Aging	
HNES 655	Sports Nutrition	
HNES 724	Nutrition Education	
HNES 726	Nutrition in Wellness	
HNES 729	Grant Writing for the Health Professional	
HNES 730	Fundamentals of Leadership	
HNES 732	Foodservice Operation Management	
HNES 733	Food Writing for Professionals	
HNES 734	Foodservice Systems within Healthcare	
HNES 740	Maternal and Child Nutrition	
HNES 741	International Nutrition	
HNES 742	Nutrition: A Focus on Life Stages	
HNES 743	Obesity Across the Lifespan	
HNES 745	Community Health Leadership	
HNES 746	Nutrition and Health Disparities	
HNES 747	Understanding Food Culture	
HNES 750	Advanced Human Nutrition: Macronutrients	

HNES 751	Metabolism of Micronutrients	
HNES 752	Phytochemicals	
HNES 755	Advanced Clinical Nutrition	
HNES 756	Pediatric Clinical Nutrition	
HNES 757	Nutritional Aspects of Oncology	
HNES 758	Clinical Aspects of Nutrition Support	
HNES 759	Nutrition and Immunology	
HNES 798	Master's Thesis	6
or HNES 797	Master's Paper	
Total Credits		36

Ardith Brunt, Ph.D.
Iowa State University, 1999
Research Interests: Nutrition, Gerontology

Bryan Christensen, Ph.D.
University of Kansas, 2000
Research Interests: Biomechanics, Sports Psychology, Strength and Conditioning

Shannon David, Ph.D.
Ohio University, 2013
Research Interests: Patient-Clinician Relationship, Patient Oriented Outcomes

Joe Deutsch, Ph.D.
North Dakota State University, 2007
Research Interests: Physical Education Teacher Education, Youth Sport Coaching

Marty Douglas, Ph.D.
Michigan State University, 2009
Research Interests: Adapted Physical Activity

Kara Gange, Ph.D.
North Dakota State University, 2010
Research Interests: Therapeutic Modalities, Diagnostic Ultrasound

Julie Garden-Robinson, Ph.D.
North Dakota State University, 1994
Research Interests: Nutrition Education, Chronic Disease Prevention, Food Safety/Science

Nikki German, Ph.D.
North Dakota State University, 2008
Research Interests: Athletic Training

Kyle Hackney, Ph.D.
Syracuse University, 2013
Research Interests: Skeletal Muscle, Sarcopenia, Muscle Inactivity, Ergogenic Aids

Jenny Linker, Ph.D.
University of Illinois Urbana-Champaign, 2011
Research Interests: Comprehensive School Physical Activity Programs, Physical Education Teacher Preparation

Katie Lyman, Ph.D.
University of South Florida, 2014
Research interests: Kinesio Tape®, Emergency Medicine, Electromyography

Ryan McGrath, Ph.D.
University of Idaho, 2015
Research Interests: Frailty and Health, Epidemiology of Aging, Physical Activity and Health for Aging Adults and Persons with Disabilities, Disability Prevention

Yeong Rhee, Ph.D.
Oklahoma State University, 1999
Research Interests: Chronic Disease Prevention, Functional Foods

Sherri Nordstrom Stastny, Ph.D.
North Dakota State University, 2007
Research Interests: Nutrition for Healthy Aging

Bradford N. Strand, Ph.D.
University of New Mexico, 1988
Research Interests: Physical Education Curriculum and Instruction, Fitness Education, Sport Sociology

Donna J. Terbizan, Ph.D.
The Ohio State University, 1982
Research Interests: Exercise Physiology, Fitness, Wellness, Exercise Science, Chronic Disease Change

History

Department Information

- **Department Head:**
  Mark Harvey, Ph.D.
- **Graduate Program Director:**
  Bradley Benton, Ph.D.
- **Department Location:**
  422 Minard
- **Department Phone:**
  (701) 231-8654
- **Department Email:**
  ndsu.history@ndsu.edu
- **Department Web Site:**
  ndsuhprs.org/ (http://ndsuhprs.org)
- **Application Deadline:**
  April 1 for assistantship consideration
- **Degrees Offered:**
  Ph.D., M.A., M.S.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL ibt 100; IELTS 7

Program Description

The graduate program in history at North Dakota State University has offered a master's degree program since the Graduate School was founded in 1954. In 2002, a joint program for a Ph.D. in History was instituted between NDSU and the University of North Dakota. A complete program description follows the M.S./M.A. requirements. The graduate faculty also provides instruction to non-history majors in other departments as well as the region's secondary education instructors who require continuing education credits for certification.

The department offers both the Master of Arts and Master of Science degrees in the areas of United States history, modern European history, or world history. Candidates with two years of foreign language study at the baccalaureate level or who have passed a standard foreign language examination meet the requirements for the Master of Arts. Students taking either degree may choose either the thesis or comprehensive study option.

The history graduate program provides a rigorous and highly personalized graduate experience. This experience produces confident people with a sense of achievement. They are ready to contribute as scholars and teachers.

Master's Degree

The Department of History graduate program is open to qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School admission requirements, the applicant must also

- provide a statement of intent that clearly outlines the applicant's interest and purpose for seeking a master's degree in history. The department uses this statement to assess the applicant's ability to organize thoughts, to formulate a plan of academic study, and to complete the graduate program. This statement also enables the department to determine whether North Dakota State University's graduate history program suits the applicant's needs and objectives.

- Submit a substantial paper submitted for an upper-division history class or for a class in the humanities and social sciences. The paper should provide evidence of an applicant's ability to synthesize information, to organize his/her thoughts logically, and to communicate clearly and effectively.
- Take the general Graduate Record Examinations (GRE) and submit these scores before admission to the program. Students admitted to the program generally score an average of 500 on the verbal and quantitative sections of the GRE's. Students scores on the new analytic writing section should be comparable, i.e. 3.5-4.0. The department requires students whose native language is not English to have a minimum TOEFL score of 600 (paper test) or 247 (computer test).

Ph.D.

Preference for admission into the Ph.D. program with full graduate standing will be given to applicants who have a GPA of at least 3.5 in history courses in an earned bachelor's or master's degree.

Applicants shall submit a statement of intent clearly outlining their research interests, potential major adviser, career goals, and purpose for seeking a Ph.D. in History.

Applicants will submit a substantial paper submitted for a class in History to provide evidence of ability to research thoroughly, to interpret and analyze primary and secondary sources, to synthesize information, to organize thoughts logically, and to communicate clearly and effectively.

The GRE examination is required, and preference for admission into the Ph.D. program with full graduate standing will be given to applicants who score a combined total of 1,000 points on the verbal and analytical sections of the GRE aptitude test.

The program requires a student for whom English is not a native language to have a minimum TOEFL score of 600.

Residency Requirements

Students enrolled in the Ph.D. program are required to complete at least one academic year (18 credits minimum) in residence at one campus.

Resident students may qualify for teaching assistantships. Students who have completed an M.A. degree may be assigned full responsibility for undergraduate courses or may be assigned to assist a faculty member in teaching courses.

Students will be required to take some courses from faculty at both campuses but will register at only one university. Some courses will be offered by interactive video network; some will be offered through Internet online systems; some courses will require students to travel to the other campus. Students not residing on one of the cooperating campuses will have to have access to a satisfactory research library for various courses and for dissertation research.

Financial Assistance

The graduate department has graduate assistantships for qualified students. Assistantships are 10-20 hours/week with graduate tuition waiver. Students wishing to apply for a teaching assistantship should express this in writing to the chair of the department. The deadline for assistantship applications is April 1.

The department awards and renews assistantships based on maintenance of good standing in the program and full-time registration during the appointment, demonstration of historical knowledge and good communication skills, progress towards completion of a degree, interest and potential in teaching as a career, financial need, and minority status in cases of equally qualified candidates.

The department awards assistantships for a one-year (10 month) contract period. It renews these assistantships for one additional year pending the availability of funds, progress toward the completion of a degree, and satisfactory job performance.

Master's Degree

Master of Arts

A student selecting the thesis option must complete at least 30 semester credits of graduate work with a minimum of 21 credits in history. Most graduate students in history choose this option. The thesis should reflect original thought and research using primary materials. The department recommends that students intending to continue to a Ph.D. program select this option. Students selecting this track must meet the following requirements:

Code	Title	Credits
HIST 702	Historiography	3
HIST 705	Directed Research (taken during second year)	1
HIST 710	Research Seminar in North American History	3
Select 6 credits of the following (one to be declared the student's major area and the other the minor area):		6
HIST 730	Readings in North American History	

HIST 760	Readings in European History	
HIST 780	Readings in World History	
History course work at 600 level or above		6-9
Course work in approved outside field, at 600 level or above		3
HIST 798	Master's Thesis	8
Total Credits		30

Master of Science Degree

Code	Title	Credits
HIST 702	Historiography	3
HIST 710	Research Seminar in North American History	3
Select 9 credits of the following (one to be declared the student's major area and the other the minor area):		9
HIST 730	Readings in North American History	3
HIST 760	Readings in European History	3
HIST 780	Readings in World History	3
6xx-level or above courses (Up to 3 credits may be taken from outside of the history department.)		12
HIST 797	Master's Paper	3

Ph.D. Degree

Students must satisfactorily complete 90 credits beyond the bachelor's degree. Students entering with an M.A. degree must complete at least 60 additional semester graduate credits. Core course requirements must be met, which include Methods of Historical Research, Historiography, Seminar in the Teaching of History, at least 2 research seminars, and at least 2 readings courses. Students must complete 36 credits with at least 27 credits in History. Students will earn at least 12 credits in one major field. Students must have at least nine hours each in two minor fields; one minor field must be in History.

Students must have a proficiency in two languages other than their native language, or one foreign language and one special research skill such as statistics or computer science.

The program will require at least one academic year in residence at either campus. Students will register at one of the universities that will be the student's academic "home". The student's adviser must be employed at the home university. At least one member of the student's committee must be employed at the other (not home) university. Students will have to take courses at both universities. Students will write three comprehensive examinations in their major and minor fields. The exams will be read and graded by the supervisory committee. Students will complete an oral examination based on the written exams. The oral examination is to be conducted by the supervisory committee.

Students will write a dissertation (up to 24 credits) on an approved topic in consultation with the faculty adviser and the supervisory committee of five faculty. The dissertation must be based on extensive research in primary and secondary sources, must argue an original thesis, and must be defended before the supervisory committee.

The committee will be composed of the faculty adviser who represents the student's field of study and will direct the research and writing of the dissertation. A second member of the committee (second reader) also represents the student's major field of study. A third member of the committee will represent the student's first minor field of study. The fourth member of the committee represents either the student's major field or second minor field. At least one of the four History faculty must be from the cooperating (non-home) university. The Graduate School will appoint the fifth member of the committee.

Code	Title	Credits
HIST 702	Historiography	3
HIST 705	Directed Research	1
HIST 710	Research Seminar in North American History (May be repeated for credit, provided the topics are different.)	3
Readings courses (Any of them may be repeated for credit, provided the topics are different.)		6
HIST 730	Readings in North American History	
HIST 760	Readings in European History	
HIST 780	Readings in World History	

6xx - level or higher courses (At least 3 and no more than 6 of these credits must come from non-HIST courses)		15
HIST 899	Doctoral Dissertation	29

Major Fields

Students will be required to write three comprehensive exams in their major and minor (or outside) fields. The exams will be read and graded by the student's supervisory committee. Students will complete an oral examination based on the written exams. The oral examination is to be conducted by the supervisory committee.

Major Fields:

- Great Plains History
- Rural History
- North American History
- Western European History

Minor Fields:

- Public History
- World History

Ashley Baggett, Ph. D.
Louisiana State University, 2014
Field: Women's History/Gender Studies, 19th century U.S., Southern History

Tracy Barrett, Ph.D.
Cornell University, 2007
Field: East and Southeast Asia, Overseas Chinese

Bradley Benton, Ph.D.
University of California, Los Angeles, 2012
Field: Latin American History, Colonial Mexico; Nahua (Aztec) politics, society, and culture; the early modern Atlantic world; cross-cultural contact and exchange.

John K. Cox, Ph.D.
Indiana University, 1995
Field: Eastern Europe, Russia, Germany, Ottoman Empire

Mark Harvey, Ph.D.
University of Wyoming, 1986
Field: American West, Environmental History, Public History

Thomas D. Isern, Ph.D.
Oklahoma State University, 1977
Field: History and Folklore of the North American Plains, History of Agriculture

Don Johnson, Ph.D.
Northwestern University, 2015
Field: Colonial and Revolutionary America History

Marcela Perett, Ph.D.
The Medieval Institute, University of Notre Dame, 2009
Field: Late Antiquity, Medieval Europe, Renaissance & Reformation

Angela Smith, Ph.D.
Middle Tennessee State University, 2011
Field: Public History, 20th Century American History, Cultural History, Digital History

Human Development and Family Science

Department Information

- **Department Head:**
  Joel Hektner, Ph.D.
- **Graduate Coordinator:**

Elizabeth Blodgett Salafia, Ph.D.

- **Department Location:**
  Evelyn Morrow Lebedeff Hall
- **Department Phone:**
  (701) 231-8268
- **Department Web Site:**
  www.ndsu.edu/hdfs/graduate_studies/hdfs_graduate_programs/
- **Application Deadline:**
  One month prior to the beginning of each term. Applications accepted for fall, spring, and summer.
- **Degrees Offered:**
  M.S., Certificate
- **English Proficiency Requirements:**
  TOEFL iBT 100 (subscores of at least 24 for speaking and 21 for writing); IELTS 7

Program Description

Programs of study leading to a Graduate Certificate or the Master of Science degree are offered in three options: Family Financial Planning, Youth Development, and Gerontology. All of these options are available via a collaborative, inter-institutional program offered through online distance education. Each program requires a capstone practicum experience to complete the M.S. degree. Students can complete the M.S. programs in two to three years and the certificate programs in one calendar year.

The **Family Financial Planning (FFP)** M.S. option is a 36-credit program with a specific curriculum approved by the Certified Financial Planner (CFP) Board of Standards. Graduate certificates (18 credits) are available in Financial Planning and in Financial and Housing Counseling.

The **Gerontology** M.S. option requires 36 credits, and the Graduate Certificate requires 15 credits. An advanced degree in the field of Gerontology can benefit the professional in social work, nursing, counseling, recreation, public policy, long-term care administration, medicine, architecture, interior design, psychology, adult education, and rehabilitation therapy.

The **Youth Development** M.S. option requires 36 credits. Graduate Certificates (13 credits) are available in Youth Development and in Youth Program Management and Evaluation. Youth development is an emerging professional field. It has a positive orientation, meaning its focus is on promoting the positive development of youth, and it is an applied field, with professionals who put developmental research and theory into practice in structuring and implementing programs and services for adolescents.

In addition to the Graduate School's required application requirements, submit the statement of purpose indicating reasons for pursuing graduate study, specifying your special interests within your chosen discipline and including your background preparation in that area. Mention any relevant skills or experience you have acquired. In addition, be sure to address the following, in 500 words or less:

1. How your interest in this field developed.
2. Why you chose our program at NDSU.
3. The experiences you have had (e.g. informal, academic, employment, volunteer) that you see as related to this graduate program or your professional goals.
4. What your professional goals are and how this graduate program will help you accomplish your professional goals.

Family Financial Planning

Code	Title	Credits
HDFS 677	Financial Counseling	3
HDFS 740	Theories & Research in Family Financial Planning I	3
HDFS 762	Retirement Planning, Employee Benefits and the Family	3
HDFS 763	Personal Income Taxation	3
HDFS 765	Insurance Planning for Families	3
HDFS 766	Estate Planning for Families	3
HDFS 769	Financial Planning Case Studies	3
HDFS 770	Fundamentals of Financial Planning	3
HDFS 771	Investing for the Family's Future	3
HDFS 794	Practicum/Internship	6
Choose one		3
HDFS 767	Professional Practices in Family Financial Planning	

HDFS 768	Housing/Real Estate	
Total Credits		36

Gerontology

Code	Title	Credits
ADHM 705	Environment and Aging	3
HNES 652	Nutrition, Health and Aging	3
HDFS 682	Family Dynamics of Aging	3
HDFS 721	Adult Development and Aging	3
HDFS 722	Methods and Theories in Gerontology	3
HDFS 723	Perspectives in Gerontology	3
HDFS 729	Professional Seminar in Gerontology	3
HDFS 760	Aging Policy	3
HDFS 794	Practicum/Internship	6
6 additional credits to be approved by the adviser and committee		6
Total Credits		36

Youth Development

Code	Title	Credits
HDFS 710	Foundations of Youth Development	1
HDFS 711	Youth Development	3
HDFS 712	Community Youth Development	3
HDFS 713	Adolescents and Their Families	3
HDFS 714	Contemporary Youth Issues (*)	3
HDFS 715	Youth in Cultural Contexts	3
HDFS 716	Youth Professionals as Consumers of Research	3
HDFS 717	Program Design, Implementation and Evaluation	3
HDFS 718	Administration and Program Management	3
HDFS 719	Youth Policy	3
HDFS 794	Practicum/Internship	5
3 additional credits to be approved by adviser and committee		3
Total Credits		36

Family Financial Planning

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

Code	Title	Credits

Gerontology

Code	Title	Credits
Required Courses		
HDFS 721	Adult Development and Aging	3
HDFS 723	Perspectives in Gerontology	3
Elective Courses- Select 3		9
ADHM 705	Environment and Aging	
HNES 652	Nutrition, Health and Aging	
HDFS 682	Family Dynamics of Aging	
HDFS 760	Aging Policy	
HDFS 790	Graduate Seminar (*)	
Total Credits		15

Youth Development

Code	Title	Credits
HDFS 710	Foundations of Youth Development	1
Select 4 courses from the following:		12
HDFS 711	Youth Development	
HDFS 712	Community Youth Development	
HDFS 713	Adolescents and Their Families	
HDFS 714	Contemporary Youth Issues	
HDFS 715	Youth in Cultural Contexts	
HDFS 719	Youth Policy	
Total Credits		13

Youth Program Management and Evaluation

Code	Title	Credits
HDFS 710	Foundations of Youth Development	1
Select 4 courses from the following:		12
HDFS 714	Contemporary Youth Issues	
HDFS 716	Youth Professionals as Consumers of Research	
HDFS 717	Program Design, Implementation and Evaluation	
HDFS 718	Administration and Program Management	
HDFS 719	Youth Policy	
Total Credits		13

Elizabeth Blodgett Salafia, Ph.D.
University of Notre Dame, 2008
Research Interests: Family and Peer Influences on Adolescents' Disordered Eating Attitudes and Behaviors

Sean Brotherson, Ph.D.
Oregon State University, 2000
Research Interests: Parenting and Fatherhood; Healthy Marriages; Family Stress; Rural Families; Grief and Bereavement; Family Life Education; Family Policy

Thomas Carlson, Ph.D.
Iowa State University, 2000
Research Interests: Narrative Pedagogy; Relational Accountability Approach to Couples Therapy, LGBT Affirmative Therapy Competence among Therapists, And Influence of Spirituality on Clinical Practice and Training

James E. Deal, Ph.D.
University of Georgia, 1987
Research Interests: Personality Development in Children; Relationship Between Individual Development and Family Relationships

Margaret Fitzgerald, Ph.D.
Iowa State University, 1997
Research Interests: Financial Counseling and Planning; Husbands and Wives Who Own and Operate Family Businesses Together; Family Business and Economically Vulnerable/Viable Communities; Gender and Management Issues in Family Business

Heather Fuller, Ph.D.
University of Michigan, 2009
Research Interests: Social Relationships across the Lifespan (E.G. Intergenerational Relationships); Psychological Well-Being in Old Age; Culture and Aging; Migration, Transnationalism and Acculturation; Biculturalism

Joel Hektner, Ph.D.
University of Chicago, 1996
Research Interests: Prevention Programs for Children with Adjustment Problems; Peer Affiliation Patterns and Peer Influences on Children's Behaviors; Family and School Conditions that Facilitate Optimal Experiences (Flow) and Optimal Development; The Experience Sampling Method

Carrie Johnson, Ph.D.
Iowa State University, 2012
Research Interests: Personal Finance for Low-Income and Underserved Populations; Financial Education Impact; Student Loan Debt; Program Delivery Methods and Evaluation; Behavioral Finance across the Lifespan

Christie McGeorge, Ph.D.
University of Minnesota, 2005
Research Interests: Influence of Heterosexism and Homophobia on Clinical Practice and Training, Gender Equity In Therapy, Gender Equity In Higher Education, Feminist Theories, And Societal Perceptions of Single Parents.

Melissa Lunsman O'Connor, Ph.D.
University of South Florida, 2010
Research Interests: Cognitive And Functional Aging In Healthy And Clinical Populations; Older Drivers; Research Methods; Attitudes Toward Dementia; Interventions For Improving Cognition, Health, And Everyday Functioning

Brandy A. Randall, Ph.D.
University of Nebraska-Lincoln, 2002
Research Interests: Relational and Contextual Influences on Adolescents' and Young Adults' Positive and Problem Behaviors

Gregory F. Sanders, Ph.D.
University of Georgia, 1983
Research Interests: Later Life Families; Family Strengths

Meagan Scott, Ph.D.
Oklahoma State University, 2016
Research Interests: Understanding How Changing Trends in Society Influence Youth; Afterschool Training; Positive Youth Development; Professional Development Methods to Better Meet the Needs of 4-H Staff

Rebecca Woods, Ph.D.
Texas A&M University, 2006
Research Interests: Perception and Cognition in Infancy; Object Processing; Multimodal Processing, Adults' Influence on Infant Learning

Industrial and Manufacturing Engineering

Department Information

- **Department Chair:**
  David Grewell, Ph.D.
- **Email:**
  david.grewell@ndsu.edu
- **Department Location:**
  202 Civil & Industrial Engineering Building
- **Department Phone:**
  (701) 231-9818
- **Department Web Site:**
  www.ndsu.edu/ime/
- **Application Deadline:**

International applications due March 1 for fall; August 15 for spring and summer. Domestic applications due one month prior to start of semester. For assistantship consideration, fall applications due March 1; limited spring openings.

- **Degrees Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE - General **
- **English Proficiency Requirements:**
  TOEFL ibT 81 (Speaking 23; Writing 21) IELTS 6.5 (Writing 5.5; Speaking 5.5)

** M.S. - 310 (Verbal + Quantitative) and 160 Quantitative minimum and Analytical Writing score of 4.0 or better

Ph.D. - 310 or better (Verbal + Quantitative) and 160 Quantitative minimum and Analytical Writing score of 4.5 or better

Program Description

The Department of Industrial and Manufacturing Engineering offers graduate studies at both the Master of Science and Doctor of Philosophy levels. A Master of Science degree may be earned in either Industrial Engineering and Management (IE&M) or Manufacturing Engineering (MfgE). The Master of Science degree can be completed through a thesis option or project option. The project option is available only to candidates who have been professionally employed in industrial engineering, manufacturing engineering or a related field and are working in their field at the time of application for admission to graduate study. The IE&M master's programs is designed to equip students with the ability to analyze, design, and manage industrial and business systems as well as to enable students to develop scholarly abilities to further pursue a Ph.D. degree in industrial and manufacturing engineering. Students have an opportunity to conduct research in the development of theoretical concepts and industrial systems.

For more information about our department and programs, please visit our department website at www.ndsu.edu/ime/.

Graduate study in the Department of Industrial and Manufacturing Engineering is open to all qualified baccalaureate graduates from universities and colleges of recognized standing. In addition to the Graduate School requirements, applicants must submit a GRE score.

Financial Assistance

There are a limited number of teaching assistantships available in Industrial and Manufacturing Engineering, which are normally assigned as support for classes with large enrollments and/or heavy laboratory content. Research assistantships are offered when student's capabilities and background experience match the needs of the project. While teaching assistantships are funded through the University, research assistantships are generally funded through externally-funded grants and contracts. In both cases, assistantships are considered as employment, and the graduate student should view these appointments as a job. The student's thesis or dissertation may or may not be in the area of their job duties for the assistantship.

Full assistantships are for half-time employment (20 hours per week). Tuition for all graduate credits, resident or nonresident, are waived for individuals officially appointed as research or teaching assistants. Student fees are not waived. When a student is offered an appointment as a Graduate Research Assistant, the faculty and the department will carry the expectation that the student has made a full commitment to fulfill both the degree requirements and the job responsibilities.

The Master of Science degree in Industrial Engineering and Management or Manufacturing Engineering requires 30 credits of graduate-level study. For the thesis option, of the required minimum 30 credits, at least 21 credits must be didactic courses numbered 601-689, 691, 700-789, and 791, while the research credits (798) must be at least 6, but not more than 10, credits. For the project option, of the required minimum 30 credits, at least 27 credits must be didactic courses numbered 601-689, 691, 700-789, and 791, while the research credits (797) must be at least 3, but not more than 4, credits.

The Doctor of Philosophy degree requires 60 credits beyond the M.S. requirement (90 credits total). Didactic course work must account for at least 27 credits, and of these, 15 credits must be earned in 700-level courses. It is customary for the remainder of the didactic credit requirement to be dedicated directly to the dissertation related topics, either through course preparation or focused research writing.

For either the M.S. or Ph.D., all courses taken outside of the IME Department must be approved in advance by the student's academic adviser. The total courses of study must be approved by the student's academic adviser, thesis committee, and department chair. Students completing graduate degrees within the IME Department are expected to exhibit demonstrable expertise in the core competencies of either industrial engineering or manufacturing engineering. Students whose undergraduate major is in another field may be required to include some or all of the core competencies in their graduate coursework. For further information in this regard, please consult the IME department.

Each new student must have an academic advisor and complete a preliminary thesis or project proposal within six months of beginning graduate studies, and it is recommended that this be completed during the first semester in residence. The proposal, if approved by the IME Graduate Studies Committee, will provide the direction for the remainder of the student's degree work. By the end of the first year in residency, the student must have selected a supervisory committee. This committee will be chaired by the faculty adviser and will provide direction, advice and examination of the student's work and achievement.

Canan Bilen-Green, Ph.D.
University of Wyoming, 1998

Research Interests: Statistical Process Control, Quality Management

Kambiz Farahmand, Ph.D., P.E.
University of Texas, 1992
Research Interests: Ergonomics Design, Layout Planning and Management

Bashir Khoda, Ph.D.
University at Buffalo, 2012
Research Interests: Bio-Manufacturing, Additive Manufacturing

Val R. Marinov, Ph.D.
Technical University of Sofia, 1992
Research Interests: Advanced Packaging for Flexible Microelectronics

Yiwen Xu, Ph.D.
University of Arizona, 2015
Research Interests: Network Reliability and System Reliability Models, Integer Programming, Network Models and Stochastic Programming, Queueing Models

Nita Yodo, Ph.D.
Wichita State University, 2017
Research Interests: Modeling and Optimization of Complex Systems, Predictive Analysis for Failures, Data Driven Decision Making Under Uncertainties

Om Prakash Yadav, Ph.D.
Wayne State University, 2002
Research Interests: Reliability Engineering, Robust Design

International Agribusiness

Department Information

- **Department Chair:**
  William Nganje, Ph.D.
- **Graduate Coordinator:**
  David Ripplinger, Ph.D.
- **Department Location:**
  500 Barry Hall
- **Department Phone:**
  (701) 231-7441
- **Department Web Site:**
  www.ag.ndsu.edu/agecon/
- **Application Deadline:**
  March 1 for fall semester, October 1 for spring semester
- **Degrees Offered:**
  M.S.
- **Test Requirement:**
  GRE or GMAT
- **English Proficiency Requirements:**
  TOEFL iBT 79; IELTS 6.5

Program Description

The International Agribusiness M.S. program offered by the Department of Agribusiness and Applied Economics at North Dakota State University provides both the academic training and the international experience required to excel in an international agribusiness career. The program of study includes course work in applied economics, quantitative methods, and international agribusiness strategy, management, finance, and marketing.

Students are required to have an international experience that may be satisfied by meeting one of three options::

1. The student may participate in an international internship. Both paid and unpaid opportunities exist with international agribusiness companies, with government agencies, or with nonprofit organizations. The semester-long or summer internship can be arranged by the student or in cooperation with NDSU's Office of International Student and Study Abroad Services. Internship programs will be defined by the student and his or her major adviser, and approved by the Graduate Program Committee (GPC) and the student's supervisory committee.

2. Students may participate in graduate courses in business or agribusiness at an international university during a semester-long or summer study abroad program. Study abroad programs will be defined by the student and his or her major adviser, and approved by the GPC and the student's supervisory committee.
3. Students may select at least six additional credits of coursework offered at NDSU related to international business or agribusiness. Courses must be approved by the student's supervisory committee as part of the student's program of study prior to enrollment in the courses.

Students complete the program by writing and defending their comprehensive study papers under the supervision of their graduate committee.

In addition to the Graduate School admission requirements (https://bulletin.ndsu.edu/graduate/admission-information), applicants must have earned a grade of B or higher in intermediate microeconomics and statistics including linear regression, and a grade of C or better in calculus.

Applicants must submit their complete application by March 1 for fall enrollment and October 1 for spring enrollment to guarantee admission and funding consideration. Admission will only be considered for candidates who submit a complete application.

It is desirable that students begin their program in the fall semester, although students may begin their program in the spring.

Financial Assistance

The Department offers assistantships on a competitive basis. Graduate Research Assistantships (GRAs) provide monthly stipends plus tuition waivers. Students must pay a minimal activity fee each semester. Assistantships do not begin until the first semester of full graduate standing when courses that apply for the Master of Science degree are taken.

Most assistantships are half-time (20 hours per week) or one-quarter-time (10 hours per week). Students on assistantship perform research or teaching duties in the Department in return for their stipend. Assistantships are typically limited to 16 months.

Granting assistantships depends on academic performance, departmental needs, and availability of assistantships.

Students pursuing a Master of Science in International Agribusiness must complete all core courses. Students select elective courses (with approval of their adviser and supervisory committee) to fulfill the remaining Graduate School credit requirements. The core requirements assure breadth and competence in key areas of knowledge and professional activity. Students participate in an international internship, a study aboard program, or select six additional credits of course work at NDSU related to international agribusiness. The following courses, or their equivalent, constitute the core of the Master of Science program:

Code	Title	Credits
Core Courses		
AGEC 701	Research Philosophy	1
AGEC 711	Applied Risk Analysis I	3
AGEC 712	Applied Risk Analysis II	3
AGEC 741	Advanced Microeconomics	3
AGEC 744	Agribusiness I: Agricultural Product Marketing and Agribusiness Strategy	3
AGEC 797	Master's Paper	1-10
or AGEC 798	Master's Thesis	
Select a minimum of 6 credits of the following:		6
ECON 610	Econometrics	
ECON 710	Advanced Econometrics	
AGEC 739	Analytical Methods for Applied Economics	
Or other approved quantitative coursework		
Approved Electives		1 - 9
Total Credits		30 (minimum)

A minimum of 30 credits is necessary to complete the M.S. in International Agribusiness. Credits beyond those required courses listed above may be met through a combination of internship credits, courses taken during an international study program, or NDSU international courses approved by the student's supervisory committee.

James Caton, Ph.D.
George Mason University, 2016
Research Interests:Entrepreneurship Agent-based Computational Economics, Market Process Theory, Monetary Economics

William Nganje, Ph.D.
University of Illniois at Urbana-Champaign, 1999

Research Interests: Agriculturel Finance, Food Safety Economics

Erik Hanson, Ph.D.
University of Minnesota, 2016
Research Interests: Agricultural Finance, Farm Management, Marketing and Production Economics

Robert Hearne, Ph.D.
University of Minnesota, 1995
Research Interests: Natural Resource and Environmental Economics

Jeremy Jackson, Ph.D.
Washington University in St. Louis, 2008
Research Interests: Microeconomics, Political Economy, Public Finance

Siew Hoon Lim, Ph.D.
University of Georgia, 2005
Research Interests: Production Economics, Transportation, Industrial Organization

Dragan Miljkovic, Ph.D.
University of Illinois, 1996
Research Interests: Agricultural Prices, International Trade, Agricultural and Food Marketing and Policy

Frayne Olson, Ph.D.
University of Missouri, 2007
Research Interests: Crop Marketing Strategies, Crop Supply Chain Management, Agricultural Contracting, Agricultural Risk Management

Timothy Petry, M.S.
North Dakota State University, 1973
Research interests: Livestock Marketing

David Ripplinger, Ph.D.
North Dakota State University, 2011
Research Interests: Production Economics and Marketing

David Roberts, Ph.D.
Oklahoma State University, 2009
Research Interests: Natural Resource and Environmental Economics, Econometrics, Production Agriculture

David M. Saxowsky, J.D.
The Ohio State University, 1979
Research Interests: Agricultural Law

Saleem Shaik, Ph.D.
University of Nebraska, 1998
Research Interests: Agriculture Policy and Risk Management, Agriculture Production Economics

Anupa Sharma, Ph.D.
Virginia Polytechnic Institute and State University, 2016
Research Interests: Economics, Agriculture Business and Management

Cheryl J. Wachenheim, Ph.D.
Michigan State University, 1994
Research Interests: Agribusiness

Tom Wahl, Ph.D.
Iowa State University, 1989
Research Interests: International Marketing and Trade, Agricultural Trade Policy, Marketing and Price Analysis

William W. Wilson, Ph.D.
University of Manitoba, 1980
Research Interests: Commodity Marketing, Agribusiness, Industrial Organization

Lei Zhang, Ph.D.
University of Texas at Dallas, 2011
Research Interests: Applied Econometrics, Macroeconomics and Monetary Economics, Regional and Urban Economics

Managerial Logistics

Department Information

- **Program Coordinator:**
  Denver Tolliver, Ph.D.
- **Department Chair:**
  Joseph Szmerekovsky, Ph.D.
- **Academic Coordinator:**
  Jody Bohn Baldock
- **Email:**
  jody.bohn.baldock@ndsu.edu
- **Department Location:**
  Upper Great Plains Transportation Institute, Quentin Burdick Building 448
- **Department Phone:**
  (701) 231-7767
- **Department Web Site:**
  www.ndsu.edu/business/departments/tl/
- **Application Deadline:**
  July 1 for fall semester; December 1 for spring semester
- **Degrees Offered:**
  M.M.L - Program online only
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Transportation, Logistics and Finance offers a Master's degree in Managerial Logistics (MML). The degree is awarded through the College of Business in collaboration with the Upper Great Plains Transportation Institute to provide high quality graduate programs for students. The program takes an interdisciplinary approach to transportation and logistics and attracts students with a multitude of backgrounds. The online MML program targets aspiring logisticians, industry professionals, military officers and DOD civilians who want to meet the logistical challenges of the 21st century. A wide range of career opportunities exists in the sectors of the logistics industry, including logistics and supply chain management, operations management, purchasing and demand management, emergency management, consulting, retail, and many more.

Core Competencies

The uniqueness of the Master of Managerial Logistics program is reflected in its core competencies, which are a direct derivative of the Army's National Logistics Curriculum and private industry needs. The following core competencies define a framework for expected outcomes and curricula:

- Supply chain management in the military and private sector
- Extending advanced supply chain planning across the enterprise
- Global supply chain management and the design of international logistics systems
- Change management in a turbulent global environment
- Enterprise resource planning within a global context
- Remote sensing and adaptive logistics planning
- Joint total asset management, logistics, and security through innovative technologies such as RFID, remote sensing, and asset tracking
- Transportation analysis and planning for logistics
- Crisis analysis and rapid logistical response
- Logistics support for homeland security
- Transportation systems security analysis and threats

Admission Requirements

The Master of Managerial Logistics program is open to qualified graduates of universities and colleges of recognized standing. To be admitted with full standing, the applicant must:

1. Hold a baccalaureate degree from an educational institution of recognized learning with a minimum grade point average (GPA) of 3.0 or equivalent. For those with GPAs of 2.99 or less, the applicant must also submit a GMAT/GRE score to be considered for acceptance.
2. Have shown the potential to undertake advanced study as evidenced by prior academic performance and has stated interest in logistics.
3. Submit official transcripts
4. Submit a two-page resume
5. Submit a one-page "Letter of Intent" outlying your reasons for pursuing the Master of Managerial Logistics degree
6. Submit three letters of recommendation
7. Submit online application through the NDSU Graduate School website
8. International applicants whose first language is not English and who do not possess a U.S. bachelor's degree or higher are subject to additional requirements when they apply for admission. They must meet the minimum requirements on measures of general English language proficiency. The accepted measures of language proficiency are the TOEFL ibT 71 and IELTS 6.

Students who do not meet all requirements for admission or have deficiencies in prerequisite course work, but show satisfactory potential for graduate study, may be admitted conditionally. The conditional status may be changed to full graduate standing after the first or second semester of study, based on the student's academic performance.

Apply for Admission

To apply for admission, please visit the Admission Information page (https://bulletin.ndsu.edu/graduate/admission-information).

Degree Requirements

The Master of Managerial Logistics (MML) is an online graduate program and is a non-thesis degree. A minimum of 35 credits is required for the MML. All 35 credits must be completed using the core Transportation & Logistics courses. Students will participate in a capstone experience, culminating all course material, applications, and research skills together in the Case Studies in Logistics course. An overall GPA of 3.0 or higher must be maintained.

Code	Title	Credits
Core Courses (≥ 35 credits)		
TL 711	Logistics Systems	4
TL 715	Introduction to ERP	3
TL 719	Crisis Analysis and Homeland Security	3
TL 721	International Logistics Management	4
TL 723	Advanced Supply-Chain Planning Across the Enterprise	3
TL 725	ERP Configuration	3
TL 727	Organizational Change Management	3
TL 729	Adaptive Planning in Logistics Systems	3
TL 731	Logistics Decision Analysis	3
TL 733	Case Studies in Logistics	3
TL 735	Practical Data Analytics	3

Access Fees

Access fees are designed to reduce out-of-pocket expenses for students and allow us to enhance our program to provide a high-quality education for students. Access fees support adjunct teaching, teaching assistants, instructor training, and course development and improvements. The fees also support students with professional membership fees, attendance at conferences, software and equipment, and other student-initiated activities.

A $350 per credit access fee is assessed to students taking any of the classes listed above. Financial aid can be used to pay for access fees.

Faculty

Raj Bridgelall, Ph.D.
North Dakota State University, 2015
Research Interests: Big Data Analytics, Internet-of-Things (IoT), Cloud Computing; Connected and Autonomous Vehicles (CAV), Shared Mobility, Intelligent Transportation Solutions; Signal processing and mathematical modeling of transportation systems; Remote Sensing with Unmanned Aircraft Systems; Hyperspectral Image Analysis; Radio-frequency identification (RFID); Real-time locating systems (RTLS); Energy Harvesting and massive scale autonomous wireless sensor networks
Department: Transportation and Logistics

Alan Dybing, Ph.D.
North Dakota State University, 2013
Research Interests: Asset management, Energy impacts, Freight transportation, Agricultural transportation, Supply chain management, Transportation economics, Spatial analysis, Transportation systems modeling
Department: Transportation and Logistics

Ranjit Godavarthy, Ph.D.
Kansas State University, 2012
Research Interests: Public transportation in small urban and rural areas, Demand response transit and paratransit research, Bike share research, Roundabouts research, Traffic engineering and operations, Transportation and highway safety
Department: Transportation and Logistics

Jill Hough, Ph.D.
University of California-Davis, 2007
Research Interests: Public transportation in rural and small urban locations, Workforce development, Mobility of the aging, Transportation planning and policy, Intelligent transportation systems
Department: Transportation and Logistics

Michal Jaroszynski, Ph.D.
Florida State University, 2014
Research Interests: Socioeconomic impacts of transportation investments and policies; Travel demand modeling; Transportation funding, finance, and equity; Multimodal transportation systems
Department: Transportation and Logistics

Pan Lu, Ph.D.
North Dakota State University, 2011
Research Interests: Transportation infrastructure management, Freight rail transportation, Multi-mode transportation efficiency, GIS application in transportation, Operations research in transportation, Commercial truck safety, Railway transportation safety, Data mining application in transportation, Transportation resiliency analysis
Department: Transportation and Logistics

Jeremy Mattson, Ph.D.
North Dakota State University, 2017
Research Interests: Public transportation, Transportation economics, Demand modeling, Travel behavior, Built environment
Department: Transportation and Logistics

Diomo Motuba, Ph.D.
North Dakota State University, 2009
Research Interests: Transportation and land use planning, Freight modeling, Transportation economics, Connected automated vehicles, Logistics and supply chain management, Transportation safety
Department: Transportation and Logistics

Joseph Szmerekovsky, Ph.D.
Case Western Reserve University, 2003
Research Interests: Project management and scheduling, Supply chain management and technology, Energy supply chain management, Healthcare logistics
Department: Transportation and Logistics

Denver Tolliver, Ph.D.
Virginia Polytechnic Institute and State University, 1989
Research Interests: Highway systems modeling, Multimodal transportation planning, Freight transportation, Energy and environmental analysis
Department: Transportation and Logistics

Kimberly Vachal, Ph.D.
George Mason University, 2005
Research Interests: Human factors in traffic safety, Healthy community transport, Agricultural and biofuels transportation, CMV safety & security, Containerized and identity preserved grain marketing, Regional economic development
Department: Transportation and Logistics

Master of Athletic Training (MATrg.)

Department Information

- **Department Head:**
  Yeong Rhee, Ph.D.
- **Program Coordinator:**
  Nikki German, Ph.D.
- **Department Location:**
  Bentson Bunker Fieldhouse
- **Department Phone:**
  (701) 231-7474
- **Department Web Site:**
  www.ndsu.edu/hnes/athletic_training_professional/
- **Application Deadline:**
  December 1 for summer admission
- **Degrees Offered:**
  MATrg.
- **English Proficiency Requirements:**
  TOEFL iBT 100; IELTS 7; PTE Academic 68

Program Description

The Master of Athletic Training (MATrg) is a professional program accredited by the Commission on Accreditation of Athletic Training Education (CAATE). The MATrg (41 credits) will prepare students to take the Board of Certification, Inc. (BOC) examination and earn the 'ATC' credential. Didactic courses and clinical experience courses focus on prevention, assessment, treatment and rehabilitation of injuries resulting from physical activity. This is a five-semester program starting in the second eight-week session of the summer term.

Option 1: Five-Year Program. This unique option allows the student to complete a Bachelor of Science in Exercise Science and Master of Athletic Training (MATrg) degree in five years.

- During *years 1-3* students follow the NDSU Exercise Science guidelines and curriculum**.
- Students apply to the MATrg program through the NDSU Graduate School spring semester of the third year (typically Junior standing).
- Accepted students begin the MATrg program in July.
- During *year 4* students complete both Exercise Science ***and*** MATrg courses.The Exercise Science degree is awarded in August.
- During *year 5* students complete MATrg courses. Upon successful completion of all program and Graduate School requirements, the MATrg degree is awarded in May.
- This program is recommended for entering freshmen, student-athletes and transfer students interested in earning an athletic training degree at NDSU.

** Transfer students and students who change majors must follow the Exercise Science policies and curriculum. This may extend the time line for program completion.

Option 2: Two-Year Program. Students who have a conferred Bachelor's degree in a related field will follow Option 2.

- Students apply to the MATrg program through the NDSU Graduate School.
- Accepted students begin the program in July.
- Years 1 and 2 students follow the MATrg Plan of Study for Option 2
- Upon success complete of all program and Graduate School requirements, the MATrg degree is be awarded in May.

Admission requirements are the same for both program options.

- Acceptance into the NDSU Graduate School
- Undergraduate overall GPA of 3.0 on a 4.0 scale
- Research Writing: Students are required to write a research-based position paper making an evidence-based argument for the use of prophylactic tape or bracing. A minimum of two (2) references must be included.
- Documentation of 50 hours of observation completed under the direct supervision of a BOC ATC® in an athletic training room setting. All 50 hours must be completed within one (1) calendar year of application.

- Minimum of “C” or higher in the following college courses:
  - Human Anatomy and Lab (1 semester)
  - Human Physiology and Lab (1 semester)
  - General Physics and Lab (1 semester)
  - General Chemistry and Lab (1 semester)
  - Exercise Physiology and Lab (1 semester)
  - Kinesiology/Biomechanics and Lab (1 semester)
  - Medical Terminology (1 semester)
  - Nutrition (1 semester)

After successful completion of this program (41 credits), the student will be eligible to take the Board of Certification, Inc. (BOC) exam. Certification by the BOC is the entry-level credential. See the **MATrg website** for all necessary information regarding the application process.

Code	Title	Credits
Summer I		
HNES 780	Athletic Training Techniques	3
Fall I		
HNES 775	Therapeutic Modalities	3
HNES 781	Orthopedic Assessment I	4
HNES 794	Practicum/Internship	2
Spring I		
HNES 770	Evidence Based Research and Practice	2
HNES 782	Orthopedic Assessment II	5
HNES 794	Practicum/Internship	2
Summer II		
HNES 794	Practicum/Internship	1
Fall II		
HNES 772	Prevention and Health Promotion in Athletic Training	2
HNES 774	Therapeutic Exercise	3
HNES 776	Non-Orthopedic Assessment	2
HNES 794	Practicum/Internship	2
Spring II		
HNES 773	Athletic Training Capstone	2
HNES 778	Athletic Training Administration and Professional Development	3
HNES 794	Practicum/Internship	2
Total Credits		38

Shannon David, Ph.D., ATC
Ohio University, 2013
Research Interests: Quantification of Intervention Outcomes, Patient- Clinician Relationship

Kara Gange, Ph.D., ATC
North Dakota State University, 2010
Research Interests: Therapeutic Modalities and Diagnostic Ultrasound

Nicole German, Ph.D., ATC
North Dakota State University, 2008
Research Interests: Graston Technique®, Clinical Practice

Katie Lyman, Ph.D., ATC
University of South Florida, 2014
Research Interests: Kinesio Tape®, EMG, Emergency Medicine

Materials and Nanotechnology

Department Information

- **Program Director:**
  Erik K. Hobbie, Ph.D.
- **Email:**
  Erik.Hobbie@ndsu.edu
- **Department Phone:**
  (701) 231-6103
- **Department Web Site:**
  www.ndsu.edu/materials_nanotechnology/
- **Application Deadline:**
  April 1 for fall semester
- **Degrees Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

North Dakota State University offers an interdisciplinary program leading to the Master of Science or Ph.D. degree in Materials and Nanotechnology (MNT). The program includes a series of required MNT core courses; additional elective courses; written and oral preliminary examinations; a doctoral dissertation based on independent, original research in the area of materials and nanotechnology; and a final oral examination of the dissertation.

The program in Nanotechnology and Nanomaterials is open to qualified graduates of universities and colleges of recognized standing. Students with a degree in the disciplines of chemistry, engineering, material science and engineering, physics, polymer science, polymer engineering, or related fields will be considered for admission. Applicants must meet the Graduate School requirements (p. 1086).

Financial Assistance

Students are routinely supported through research assistantships. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. All students who submit complete applications by the appropriate deadlines are considered for assistantships. Exceptional students are also eligible for university fellowships that are awarded on a competitive basis.

By the end of the first academic year, the student will select an academic adviser from among the MNT faculty and arrange for the appointment of a Graduate Advisory Committee. This committee will consist of at least four members of the graduate faculty. This includes the student's major adviser, at least one additional MNT faculty member, and an appointee of the Graduate School.

The plan of study will be prepared by the student, in consultation with the major adviser, by the end of the first year in residence. The plan shall be approved by the student's Graduate Supervisory Committee, the MNT Program Director, and the Graduate School dean. The plan of study must be filed in the Graduate School prior to scheduling the comprehensive written examination.

Master of Science

Materials & Nanotechnology students are able pursue a master's degree under either the Plan A - Master's Thesis or the Plan C - Culminating Experience option. Each option requires a minimum of 30 graduate credits with a cumulative grade point average of 3.0 or better.

The Plan A thesis option represents a more traditional Master of Science degree, with an independent research component in the form of an original thesis that can serve as a foundation for future doctoral work in science or engineering. For the Thesis Option, of the required minimum 30 graduate credits, at least 16 credits must be from approved graduate courses numbered from 601-689, 691, 700-789, and 791 while the research credits (798) must be not fewer than 6 nor more than 10.

The Plan C option is appropriate for working professional students or students who are certain that they do not wish to pursue future graduate work in any field of science or engineering to the level of doctorate. In the context of the MNT program, this option requires a 6-10 credit culminating experience (794) which replaces the research credits (798).

Ph.D.

The Graduate School requires the plan of study for the Ph.D. degree to include not less than 90 semester graduate credits. Of this total, not less than 27 credits must be in courses other than seminar or research credits. Of the 27 course credits, 15 must be at the 700-789 level. The MNT Ph.D. program requires students to complete a series of 7 core courses totaling 17 semester credits. The student will complete additional elective courses to fulfill the Graduate School requirement of 27 semester credits in academic courses. An overall GPA of 3.0 or better must be maintained.

Core Curriculum

Code	Title	Credits
MNT 729	Materials Characterization	3
MNT 730	Nanotechnology and Nanomaterials	3
MNT 732	Physical Properties of Materials	3
MNT 745	Preparing Future Researchers	1
MNT 756	Molecular Modeling	3
MNT 760	Materials Synthesis Processing	3
MNT 790	Graduate Seminar	1

Students must complete at least an additional 12 credits of graduate level coursework. The courses should be chosen by the students in consultation and with the approval of the student's committee.

Suggested courses include the following:

Code	Title	Credits
Microelectronics Focus		
ABEN 682	Instrumentation & Measurements	3
CPM 796	Special Topics	2
CHEM 766	Quantum Chemistry I	4
CHEM 767	Quantum Chemistry II	2
ENGR 780	Electromagnetic Theory	3
ECE 751	Electromagnetic Theory and Applictions	3
IME 627	Packaging for Electronics	3
IME 720	Surface Engineering	3
IME 635	Plastics and Injection Molding Manufacturing	3
MNT 735	Optoelectronics Materials and Processing	3
PHYS 771	Quantum Physics I	3
Biomaterials Focus		
ABEN 758	Applied Computer Imaging and Sensing for Biosystems	3
BIOC 716	Protein and Enzyme Biochemistry	3
BIOC 673	Methods of Biochemical Research	3
CE 725	Biomaterials-Materials in Biomedical Engineering	3
CPM 771	Modern Methods of Polymer Characterization	3
ME 668	Introduction to Biomechanics	3
ME 731	Mechanical Behavior of Materials	3
ME 743	Biomechanics Of Impact	3
ECE 685	Biomedical Engineering	3
ECE 687	Cardiovascular Engineering	3
PSCI 611	Principles of Pharmacokinetics and Pharmacodynamics	3
PSCI 701	Quantative Drug Design	2
Nanomaterials Focus		
CE 641	Finite Element Analysis	3
CE 793	Individual Study/Tutorial	3
CPM 673	Polymer Synthesis	3
CHEM 766	Quantum Chemistry I	4
CHEM 767	Quantum Chemistry II	2
CPM 686	Corrosion and Materials	3
CPM 773	Organic Chemistry Of Coatings	3
CPM 782	Physical Chemistry Of Coatings	3
CPM 796	Special Topics	3
IME 720	Surface Engineering	3
ME 682	Fuel Cell Science and Engineering	3

ME 712	Advanced Finite Element Analysis	3
ME 733	Polymer Nanocomposites	3
ME 734	Smart Materials and Structures	3
PHYS 758	Statistical Physics	3
PHYS 781	Solid State Physics	3
General Materials Science and Engineering Focus		
ABEN 658	Process Engineering for Food, Biofuels and Bioproducts	3
ABEN 644	Transport Processes	3
ME 673	Polymer Engineering	3
CE 641	Finite Element Analysis	3
CE 720	Continuum Mechanics	3
CHEM 732	Advanced Analytical Chemistry	4
CHEM 736	Mass Spectrometry	2
CPM 673	Polymer Synthesis	3
ME 633	Composite Materials Science and Engineering	3
ME 751	Advanced Thermodynamics	3
PHYS 611	Optics for Scientists & Engineers	3
PHYS 781	Solid State Physics	3

Affiliated Faculty

Iskander Akhatov, Ph.D.
Lomonosov University of Moscow, 1983
Research Interests: Fluid Dynamics, Multiphase Systems, Heat and Mass Transfer

Dilpreet Bajwa, Ph.D.
University of Illinois, 2000
Research Interests: Biobased Polymer Composites, Wood Composites, Processing and Characterization, Recycled Materials Utilization, Durability Engineering via Weathering and Degradation Mechanisms

Achintya N. Bezbaruah , Ph.D.
University of Nebraska-Lincoln, 2002
Research Interests: Environmental sensors, Recalcitrant and micro pollutants, Contaminant fate and transport, Small community water and wastewater treatment, Environmental management

Gordon P. Bierwagen, Ph.D.
Iowa State University, 1968
Research Interests: Surface chemistry of coatings materials, corrosion, electrochemistry of coatings, coating lifetime prediction, concentrated random composites

Bret Chisholm, Ph.D.
University of Southern Mississippi, 1993
Research Interests: Combinatorial chemistry methods for coatings, novel organic-inorganic coatings applications, new polyester nanocomposites

Dr. Yongki Choi, PhD
City University of New York, 2010
Research Interests: Nanoparticle based electronics and sensors.

Andrew Croll, Ph.D.
McMaster University, Ontario, 2009
Research Interests: Polymers, Diblock Copolymers, Thin Films, Pattern Formation, Mechanics

Stuart G. Croll, Ph.D.
University of Leeds, 1974
Postdoctoral: National Research Council, Canada
Research Interests: Weathering durability of coatings, physical chemistry and suspension stability, pigmentpolymer interactions, film formation processes, coating and polymer physics

Alan R. Denton, Ph.D.
Cornell University, 1991
Postdoctoral, University of Guelph,1991-94; Technical University of Vienna, 1994-95, Research Center Julich, 1996-98

Research Interests: Soft Condensed Matter Theory, Computational Physic

Daniel L. Ewert, Ph.D.
University of North Dakota, 1989
Research Interests: Biomedical Engineering

Thomas Ihle, Ph.D.
Technical University, 1996
Research Interests: Theory and Simulation of Complex Fluids (Colloids, miroemulsions and Biopolymers).

Long Jiang, Ph.D.
Nanyang Technological University, 2003
Research Interests: Polymer and Polymer Composite Processing, Polymer Processing Machinery and Design, Nanocomposites, Polymers and Composites Derived from Biomass, Functional Composites with Novel Microstructures.

Alan R. Kallmeyer, Ph.D.
University of Iowa, 1995
Research Interests: Theoretical, Computational, and Experimental Solid Mechanics, Fatigue and Fracture of Engineering Materials, Composite Materials

Dinesh Katti, Ph.D.
University of Arizona, 1991
Research Interests: Geotechnical Engineering, Constitutive Modeling of Geologic Materials, Expansive Soils, Multiscale Modeling, Steered Molecular Dynamics, Computational Mechanics,
Nanocomposite, and Bionanocomposites. Computational Biophysics

Kalpana Katti, Ph.D.
University of Washington, 1996
Research Interests: Advanced Composites, Nanomaterials, Biomaterials, Biomimetics, Materials Characterization and Modeling, Analytical Electron Microscopy, and Microspectroscopy, Bone Tissue engineering

Svetlana Kilina, Ph.D.
University of Washington, Seattle, 2007
Research Interests: Photoexcitation process on the organic-inorganic interfaces in hybrid nanostructures: functionalized carbon nanotubes and quantum dots; Non-adiabatic dynamics in hybrid nanostructures: electron-phonon interactions in ligated quantum dots and functionalized carbon nanotubes; Self-assembly of bio-nanomaterials: structural aspects; Transport properties in amorphous conjugated polymers: effect of structural disorder.

Ivan T. Lima Jr., Ph.D.
University of Maryland, 2003
Research Interests: Photonics

Valery R. Marinov, Ph.D.
Technical University of Sofia, 1992
Research Interests: Process Modeling for Machining, Theory of Metal Cutting, Tribological Coatings, Including Nanocomposite Coatings and Deposition Methods, Design for Composites Manufacturing Processes, Packaging for low-cost disposable microelectronics, Direct-write material deposition methods, Laser processing

Sylvio May, Ph.D.
Jena, 1996
Research Interests: Physics of Lipid Membranes, Biophysics

Seth C. Rasmussen, Ph.D.
Clemson University, 1994
Postdoctoral, University of Oregon, 1995–99
Research Area: Inorganic/Organic Materials Chemistry, Chemical History

Jing Shi, Ph.D.,
Purdue University, 2004
Research Interests: Microelectronics
Packaging, Direct Write Material Depositing, Laser Processing for Electronics, RFID Applications, Numerical Modeling of Manufacturing Processes, Computer Integrated Manufacturing

Wenfang Sung, Ph.D.
Chinese Academy of Sciences, 1995;

Postdoctoral, University of Alabama, Birmingham, 1997-1999
Research Area: Organic Materials Chemistry

Chad A. Ulven, Ph.D.
University of Alabama at Birmingham, 2005
Research Interests: Advanced Composites Materials Development, Environmentally Friendly Materials Processing, Nondestructive Evaluation, Impact/High Strain Rate Characterization of
Advanced Materials

Alexander J. Wagner, Ph.D.
University of Oxford, 1997
Postdoctoral MIT, 1998-2000, Edinburgh, 2000-2002
Research Interests: Computational Soft Matter, Phase Separation, Diffusion, Interfaces Physics

Xinnan Wang, Ph.D.
University of South Carolina, 2008
Research Interests: Experimental Biomechanics, Synthesis of Nanomaterials, Nanomechanical Characterization, Nanomanipulation

Dean Webster, Ph.D.
Virginia Polytechnic Institute and State University 1984
Research Interests: Synthesis of high performance polymers, polymerization reactions, crosslinking chemistry, and quantitative structure-property relationship

Xiangfa Wu, Ph.D.
University of Nebraska-Lincoln, 2003
Beijing Institute of Technology, 1998
Research Interests: Nanofabrication and Nanomaterials, Advanced Composites, Fracture and Impact Mechanics

Mathematics

Department Information

- **Department Chair:**
  Benton Duncan, Ph.D.
- **Graduate Coordinator:**
  Indranil Sengupta, Ph.D.
- **Department Location:**
  412 Minard Hall
- **Department Phone:**
  (701) 231-8171
- **Department Web Site:**
  www.ndsu.edu/math
- **Application Deadline:**
  March 1 to be considered for assistantships for fall. Openings may be very limited for spring.
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71; IELTS 6

Program Description

The Department of Mathematics offers graduate study leading to the degrees of Master of Science (M.S.) and Doctor of Philosophy (Ph.D.). Advanced work may be specialized among the following areas:

- algebra, including algebraic number theory, commutative algebra, and homological algebra
- analysis, including analytic number theory, approximation theory, ergodic theory, harmonic analysis, and operator algebras
- applied mathematics, differential equations, dynamical systems,
- combinatorics and graph theory
- geometry/topology, including differential geometry, geometric group theory, and symplectic topology

Beginning with their first year in residence, students are strongly urged to attend research seminars and discuss research opportunities with faculty members. By the end of their second semester, students select an advisory committee and develop a plan of study specifying how all degree requirements are to be met. One philosophical tenet of the Department of Mathematics graduate program is that each mathematics graduate student will be well grounded in at least two foundational areas of mathematics. To this end, each student's background will be assessed, and the student will be directed to the appropriate level of study.

The Department of Mathematics graduate program is open to all qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School requirements (p. 1086), applicants must have earned a cumulative grade point average (GPA) of at least 3.0 or equivalent in all advanced mathematics courses at the baccalaureate level.

Financial Assistance

Teaching assistantships and a small number of research assistantships are available. Graduate tuition is waived for research and teaching assistants.

All students in full standing and, in certain situations, students in conditional status are eligible for assistantships. International students must show proficiency in reading, writing, and speaking English. In particular, they must pass an oral proficiency interview, which is a Test of Spoken English (TSE) prior to receiving a teaching assistantship. This interview is the culmination of the five-week Intensive English Language Program (IELP) available each summer. An indication, but not a guarantee, of being able to pass this interview is a TOEFL score of at least 600 (paper test) or 247 (computer test). All international students applying from outside the United States for a teaching assistantship must expect to take the IELP.

Assistantship applications will be considered at any time. However, opportunities are improved for those received by March 1 preceding the fall semester of intended enrollment.

At least one year of academic work must be spent in residence at NDSU in fulfilling graduate requirements for each graduate degree earned. The M.S. customarily takes two years to complete: the Ph.D. usually last three years beyond the master's. Students must maintain a cumulative GPA of at least 3.0 throughout their graduate career.

Master of Science

The Master of Science degree is offered in two options: the Thesis Option or the Comprehensive Study Option. The Thesis Option emphasizes research and preparation of a scholarly thesis, whereas the Comprehensive Study Option emphasizes a broader understanding of a major area of mathematics.

Departmental Requirements

1. At least 30 credit hours in approved graduate-level mathematics course work, depending on the degree option.
   a. Thesis Option: At least 6 credit hours of MATH 798 Master's Thesis, in addition to at least 18 credit hours in courses numbered 700-789. These 18 credit hours must include six foundational courses.
   b. Comprehensive Study Option: At least 2 credit hours of MATH 797 Master's Paper, in addition to at least 24 credit hours in courses numbered 700-789. These 24 credit hours must include six foundational courses.Subject to the approval of the Supervisory Committee, at most 6 of the required 30 credits may be earned in 600-level mathematics courses (excluding 620, 621, 650, and 651) or in courses outside the Mathematics Department.
2. A grade of Master's Pass in two of the four written preliminary examinations offered by the department. These examinations are offered in four areas: Algebra, Analysis, Applied Mathematics, and Geometry/Topology.
3. Demonstrated proficiency in a computer programming language.
4. A thesis or expository paper written under the supervision of a faculty member and defended at an oral examination administered by the student's supervisory committee.

Timelines

A candidate has three calendar years from the time of enrollment in the Graduate School to complete the Master's degree. Extensions may be granted after review and approval by the Graduate Committee, subject to Graduate School Policy.

Doctor of Philosophy

The Doctor of Philosophy degree is awarded in recognition of high scholarly attainment as evidenced by a period of successful advanced study, the satisfactory completion of prescribed examinations, and the development of an acceptable dissertation covering a significant, original aspect of mathematics.

Departmental Requirements

1. A total of at least 90 credit hours in approved graduate-level mathematics course work, including:
   a. At least 42 credit hours in courses numbered 700-789 or as approved by the Graduate Program Director. These 42 credit hours must include six foundational courses. The advisor should in consultation with the graduate chair ensure that the 42 credit hours contain a broad spectrum of courses (at least 12 credit hours) outside the student's area of emphasis as well as depth in a specific area of mathematics.

   b. At least 3 credit hours of MATH 790 Graduate Seminar.
   c. At least 6 credit hours of MATH 799 Doctoral Dissertation. Subject to the approval of the supervisory committee, at most 12 of the required 42 credit hours may be earned in 600-level mathematics courses (excluding 620,621, 650, and 651) or in courses outside the Mathematics Department. Credits used to satisfy the requirements of a Master's degree at NDSU may be included in the 90 credits hours required for the Ph.D. A student entering the Doctoral program with a Master's degree from another institution need only complete 60 credit hours to complete the Ph.D. degree. Half of these 60 credits must be in courses numbered 700-789 excluding those courses numbered 720, 721, 750, and 751.
2. A grade of Ph.D. Pass in two of the four written preliminary examinations offered by the department. These examinations are offered in four areas: Algebra, Analysis, Applied Mathematics, and Geometry/Topology.
3. Demonstrated reading proficiency of mathematical writing in French, German, or Russian. A student's supervisory committee may require a second foreign language.
4. Demonstrated proficiency in a computer programming language.
5. A passing grade in a preliminary oral examination administered by the student's supervisory committee after completion of the Preliminary Examinations.
6. A dissertation consisting of a written presentation of original and significant research completed by the student under the supervision of a faculty member and defended at an oral examination administered by the candidate's supervisory committee.
7. A dissertation video describing the candidate's research, evaluated by the candidate's supervisory committee.

Timelines

Ph.D. students have 3 years from first enrolling in a 700 level Mathematics course as a graduate student to complete the written Preliminary Examination requirement.

A student advances to candidacy after completion of the preliminary oral examination. All students must advance to candidacy no later than the start of their fourth year in the graduate program of the Department of Mathematics. Extensions may be granted after review and approval by the Graduate Committee, subject to Graduate School Policy.

Azer Akhmedov, Ph.D.
Yale University, 2004
Research Interests: Group Theory, Low Dimensional Topology

Maria Angeles Alfonseca, Ph.D.
Universidad Autonoma de Madrid, Spain, 2003
Research Interests: Fourier Analysis, Partial Differential Equations

Abraham Ayebo,Ph.D.
University of Nevada, Reno, 2010
Research Interests: Mathematics Education

Nikita Barabanov, Ph.D.
University of Kiev, 1979
Research Interests: Differential Equations, Control Theory, Optimization, Neural Networks

Jason Boynton, Ph.D.
Florida Atlantic University, 2006
Research Interests: Algebra

Leo Butler, Ph.D.
Queen's University, 2000
Research Interests: Hamiltonian Mechanics and Geometry

Catalin Ciuperca, Ph.D.
University of Kansas, 2001
Research Interests: Commutative Algebras, Algebraic Geometry

Michael Cohen, Ph.D.
University of North Texas, 2013
Research Interests: Groups,Dynamics Descriptive Set Theory

Dogan Comez, Ph.D.
University of Toronto, 1983
Research Interest: Ergodic Theory, Measureable Dynamics, Operator Theory

Davis Cope, Ph.D.
Vanderbilt University, 1980

Research Interests: Partial Differential Equations, Numerical Methods, Applied Mathematics

Josef Dorfmeister, Ph.D.
University of Minnesota, 2009
Research Interests: Symplectic Topology

Benton Duncan, Ph.D.
University of Nebraska, 2004
Research Interests: Operator Algebras, Noncommutative Functional Analysis, K-theory

Friedrich Littmann, Ph.D.
University of Illinois, Urbana, 2003
Research Interests: Approximation theory, Number theory

William Martin, Ph.D.
University of Wisconsin, 1993
Research Interests: Mathematics Education

Artem Novozhilov, Ph.D.
Moscow State University of Communication Means, 2002
Research Interests: Mathematical Biology

Indranil SenGupta, Ph.D.
Texas A&M University, 2010
Research Interests: Mathematical Finance and Mathematical Physics

Jessica Striker, Ph.D.
University of Minnesota, 2008
Research Interests: Enumerative, Algebraic, Geomentric and Bijective Combinatorics

Abraham Ungar, Ph.D.
Tel-Aviv University, 1973
Research Interests: Differential Equations, Integral Transforms, Wave Propagation, Special Relativity

Mechanical Engineering

Department Information

- **Department Chair:**
  Alan Kallmeyer, Ph.D.
- **Graduate Coordinator:**
  Ghodrat Karami, Ph.D.
- **Department Location:**
  111 Dolve Hall
- **Department Phone:**
  (701) 231-8671
- **Department Email:**
  ndsu.me.gradprogram@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/me/
- **Application Deadline:**
  February 15 for fall semester; September 15 for spring semester. Applications received after the deadline will still be considered, but preference is given to those submitted by the deadline.
- **Degrees Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE (International applicants). Minimum required total (quantitative + verbal): 300; Minimum required quantitative: 155
- **English Proficiency Requirements:**
  TOEFL ibT 79 IELTS 6.5

Program Description

The Department of Mechanical Engineering offers graduate programs leading to the M.S. and Ph.D. degrees. Graduate work may be concentrated in engineering mechanics, fatigue and fracture, biomechanics and biomaterials, thermal engineering, fluid mechanics, energy, controls, and mechatronics, or engineering materials with an emphasis on plastics, composite materials and nanomaterials. Students with a B.S. degree in physics or mathematics may pursue a special graduate program of studies and earn an M.S. degree in Mechanical Engineering.

Admission to the ME program is granted in a competitive process that is based upon consideration of the student's undergraduate GPA, test scores, and area of interest. Students who have graduated from an accredited institution in the United States with a baccalaureate degree in Mechanical Engineering or a closely related field must possess a GPA of 3.0 or greater for consideration of admission at full standing. International students must also provide both the TOEFL (or IELTS) and GRE general test scores before their applications will be considered. Minimum requirements for consideration of admission are 79 on the TOEFL ibT or 6.5 on the IELTS, and 300 on the GRE (combined quantitative and verbal) with a minimum quantitative score of 155.

Financial Assistance

Research and/or teaching assistantships may be available to qualified students. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. The availability of research and teaching assistantships is contingent upon current funding levels.

Mechanical Engineering - M.S.

The minimum total semester credits required for the M.S. degree in Mechanical Engineering is 30. The M.S. degree can be earned with either of two options: the thesis option or the comprehensive study option.

With the thesis option, a student must complete 21-24 credits of graduate courses in mechanical engineering and a master's thesis of 6 to 9 credits of ME 798 Master's Thesis. At the conclusion of the graduate program, the student will be examined orally on the thesis and course work.

With the comprehensive study option, a student must complete 27 credits of graduate courses in mechanical engineering and a master's paper of no more than 3 credits of ME 797 Master's Paper. At the conclusion of the graduate program, the student must pass a comprehensive oral examination on the master's paper and course work.

For more detailed information on the requirements for the M.S. degree, contact the department.

Mechanical Engineering - Ph.D.

The Ph.D. program requires the completion of 90 credit hours of graduate study beyond the baccalaureate degree (60 credits beyond the M.S. degree). In addition to the credit requirements for the M.S. degree, the Ph.D. degree requires a minimum of 24 course credits and a minimum of 24 credits of research-based dissertation. The remaining 12 credits may consist of any approved graduate level credits.

Code	Title	Credits
M.S. Degree		30
Minimum of 24 course credits		24
Minimum of 24 credits of research-based dissertion		24
Any approved graduate level credits		12
Total Credits		90

After the majority of course work has been completed, each student is required to pass a series of written qualifying exams on core subjects. After passing the written exams, an oral preliminary exam will be administered focusing on the student's proposal for the dissertation research. At the conclusion of the Ph.D. program, each student is required to pass a comprehensive oral final examination primarily focused on the dissertation. This exam may also cover material from course work, particularly courses fundamental to the dissertation. For more detailed information on the requirements for the Ph.D. degree, contact the department.

Fardad Azarmi, Ph.D.
University of Toronto, 2008
Research Interests: Thermal Spray Coatings, Thin Film, Multiscale Engineering Analysis, Finite Element Analysis, Failure in Materials, Corrosion, Materials Characterization, High Temperature Materials, Composite Structures, Metal Foams, Functionally Graded Materials

Dilpreet S. Bajwa, Ph.D.
University of Illinois at Urbana-Champaign, 2000
Research Interests: Biobased Polymer Composites, Wood Composites, Processing and Characterization, Recycled Materials, Utilization, Durability Engineering via Weathering and Degradation Mechanisms

Jordi Estevadeordal, Ph.D.
University of Houston, 1996

Research Interests: Advanced Laser Techniques, Thermo-Fluid and Spray Diagnostics, 3D particle Image Velocimetry, Phosphorescence, Infrared Thermography, Filtered Rayleigh Scattering, Bio-Fluid Measurements

Adam Gladen, Ph.D.
University of Minnesota, 2014
Research Interests: Renewable Energy, Solar Thermal Energy, Energy Storage - in particular Thermochemical Energy Storage, Thermodynamics, Solar Thermochemistry, Heat transfer, Radiative Transfer in Participating Media, Solar Reactor Design

Alan R. Kallmeyer, Ph.D.
University of Iowa, 1995
Research Interests: Theoretical, Computational, and Experimental Solid Mechanics, Fatigue and Fracture of Engineering Materials, Composite Materials

Ghodrat Karami, Ph.D.
Imperial College of Science and Technology, University of London, 1984
Research Interests: Multiscale Computational Solid Mechanics, Biomechanics, Cellular Mechanics, Micromechanics Characterization of Composites, Continuum Mechanics, Structural Mechanics, Nonlinear and Large Deformation and Analysis, Thermoelastic Analysis

Sumathy Krishnan, Ph.D.
Indian Institute of Technology, 1995
Research Interests: Solar Heating and Cooling, Concentrated Solar Power, Renewable Energy Integrated Systems

Robert V. Pieri, Ph.D.
Carnegie-Mellon University, 1987
Research Interests: Design, Materials and Nanomaterials Characterization, Instructional Pedagogy, Fracture Mechanics, Measurements, Alternative Energy, and Industrial Support

Majura Selekwa, Ph.D.
Florida A&M University, 2001
Research Interests: Robotics, Machine Intelligence, Soft computing Applications, Numerical Methods and Numerical Optimization, Optimal and Robust Control, Smart Actuation Control Systems, Real-Time Control in Mechatronics

Yildirim Bora Suzen, Ph.D.
Wichita State University, 1998
Research Interests: Computational Fluid Dynamics, Aerodynamics, Modeling of Industrial Transport Processes, Transition and Turbulence Modeling, Active/Adaptive Flow Control, Turbo machinery, Multiprocessor CFD

Annie X.W. Tangpong, Ph.D.
Carnegie Mellon University, 2006
Research Interests: Vibrations and Dynamics, Tribology, Friction Damping in Rotating Structures, Friction Damping in Nano- and Bio-materials

Chad A. Ulven, Ph.D.
University of Alabama at Birmingham, 2005
Research Interests: Advanced Composites Materials Development, Environmentally Friendly Materials Processing, Nondestructive Evaluation, Impact/High Strain Rate Characterization of Advanced Materials

Xinnan Wang, Ph.D.
University of South Carolina, 2008
Research Interests: Experimental Biomechanics, Synthesis of Nanomaterials, Nanomechanical Characterization, Nanomanipulation

Yechun Wang, Ph.D.
University of Maryland, 2007
Research Interests: Microfluidics, Biofluid Mechanics, Computational Fluid Dynamics, Numerical Analysis, and Characterization of Organic Coatings

Xiangfa Wu, Ph.D.
University of Nebraska-Lincoln, 2003
Beijing Institute of Technology, 1998
Research Interests: Nanofabrication and Nanomaterials, Advanced Composites, Fracture and Impact Mechanics

Yan Zhang, Ph.D.
Iowa State University, 2013
Research Interests: Experimental Fluid Dynamics, Advanced Flow Diagnostic Techniques, Wind Engineering and Wind Hazard Mitigation, Bio-Fluid Mechanics and Cariovascular Hemodynamics Modeling

Mariusz Ziejewski, Ph.D.
North Dakota State University, 1986

Research Interests: Impact Biomechanics, Human Body Dynamics, Head and Neck Trauma, Impact Trauma, Human Brain Modeling, Statistical Methods

Merchandising

Department Information

- **Interim Department Head:**
  Rebecca Woods, Ph.D.
- **Graduate Coordinator:**
  Linda Manikowske, Ph.D.
- **Department Location:**
  178 Evelyn Morrow Lebedeff Hall (EML)
- **Department Phone:**
  (701) 231-7352
- **Department Web Site:**
  www.ndsu.edu/dce/degrees/graduate/ms_merch
- **Application Deadline:**
  Applicants should apply at least two months prior to the start of classes each semester.
- **Degrees Offered:**
  M.S., Certificate
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Apparel, Design and Hospitality Management offers graduate study leading to the Master of Science degree or a Graduate Certificate in Merchandising in collaboration with the Great Plains Interactive Distance Education Alliance (GP-IDEA). The Master's degree in Merchandising is an online program offered through Distance and Continuing Education at NDSU. Participating faculty members from the GP-IDEA have jointly developed the merchandising curriculum. Course are taught by faculty within the Alliance from Kansas State University, North Dakota State University, Oklahoma State University, South Dakota State University, and the University of Nebraska-Lincoln.

The master's degree in Merchandising is designed for professionals in a variety of merchandising fields to increase potential for advancing in their careers. Students in this program will learn in-demand skills such as data analysis, problem solving, and critical thinking to identify customer needs and develop effective business strategies. The fully online program allows students to complete course work while maintaining their professional careers.

Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data. A student must meet all requirements for full admission. The following criteria act as guidelines for full acceptance: a cumulative baccalaureate GPA of 3.0 or better on a 4.0 scale, and a GPA of at least 3.25 during the final 30 semester credits of graded undergraduate course work, or a minimum GPA of 3.0 on 10 semester credits of graduate course work.

In completing the application, you are asked to write a statement (500 words or less) identifying and discussing your reasons for applying to this program. Within this statement you are to discuss how learning about diverse perspectives, critical thinking, and effective leadership will enhance your understanding of merchandising.

Recommended Skills and Academic Preparation

Adequate technical skills and access is essential to be successful in an online program. Unlimited web access at high speeds is helpful. Word processing programs that are up-to-date are important, as is knowledge of writing and publishing programs. Familiarity with diverse learning management systems is also helpful. NDSU currently uses Blackboard; other institutions have similar but different programs. An ability to self-motivate and learn independently is necessary for programs where face-to-face interactions are not available.

Financial Assistance

Graduate assistantships are not available since this program is online and facilitated through the Great Plains Interactive Distance Education Alliance and Distance and Continuing Education at NDSU. Students who are full-time (enrolled for six credits or more) may apply for financial aid.

Master of Science

The 36-credit master's degree program consists of ten required 3-credit courses, listed below, as well as a 6-credit comprehensive project required by North Dakota State University. **Course descriptions and tentative schedules are available at** http://www.ndsu.edu/adhm/merchandising/about.html

Code	Title	Credits
ADHM 710	Consumer Behavior in Merchandising	3
ADHM 720	Professional Advancement	3
ADHM 730	Product Design, Develeopment and Evaluation	3
ADHM 740	Promotional Strategies in Merchandising	3
ADHM 750	Retail Theory and Current Practice	3
ADHM 760	Historical and Contemporary Issues in Trade	3
ADHM 770	International Retail Expansion	3
ADHM 775	Research Methods in Merchandising	3
ADHM 780	Financial Merchandising Implications	3
ADHM 785	Strategic Merchandise Planning	3
ADHM 797S	Comprehensive Project (or ADHM 798 or Electives)	6
Total Credits		36

Graduate Certificate

The 12 credit graduate certificate program consists of three required 3-credit courses and one elective 3-credit course, listed below.

Code	Title	Credits
ADHM 710	Consumer Behavior in Merchandising	3
ADHM 720	Professional Advancement	3
ADHM 730	Product Design, Develeopment and Evaluation	3
or ADHM 740	Promotional Strategies in Merchandising	
ADHM 750	Retail Theory and Current Practice	3
Total Credits		12

Microbiology

Department Information

- **Interim Department Head:**
  John McEvoy, Ph.D.
- **Graduate Coordinator:**
  Peter Bergholz, Ph.D.
- **Department Location:**
  Van Es Hall
- **Department Phone:**
  (701) 231-7667
- **Department Web Site:**
  www.ndsu.edu/vetandmicro/
- **Application Deadline:**
  February 15 for fall
- **Degrees Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Veterinary and Microbiological Sciences offers graduate study leading to an M.S. in Microbiology and a Ph.D. in Molecular Pathogenesis. Faculty in the department have expertise in medical microbiology, ecology, genomics, virology, immunology, parasitology, microbial physiology, and food safety. The M.S. in Microbiology emphasizes research methodology and laboratory techniques. The Ph.D. in Molecular Pathogenesis integrates microbial genetics, mechanisms of pathogen-host interaction, and immunology to better understand the molecular basis of disease.

M.S. in Microbiology

A Master's degree in Microbiology at NDSU emphasizes research methodology and laboratory techniques. Student research and academic programs are individually tailored to meet the needs and interests of each student. Graduates are prepared for positions in research or commercial laboratories or for further graduate study. Students shall select a major adviser by the end of the first semester in residence. By the end of the first year in residence, the student and major adviser will select a supervisory committee. Students are encouraged to visit with each faculty member and spend time in each laboratory to acquaint themselves with the department's research programs.

Ph.D. in Molecular Pathogenesis

The Ph.D. in Molecular Pathogenesis encompasses the study of molecular pathogenesis of infectious and non-infectious diseases with an emphasis on zoonotic diseases and public health. The comprehensive doctoral degree in Molecular Pathogenesis integrates the study of microbial genetics, mechanisms of pathogen-host interaction, and cellular immunology to better understand the molecular basis of disease. Doctoral candidates in Molecular Pathogenesis focus on research and utilize the expertise of one or more departmental faculty members. As an outcomes-based program, course work is tailored to the student's training needs and career plans.

In addition to the Graduate School requirements (https://bulletin.ndsu.edu/graduate/admission-information), applicants must have evidence of a strong academic record in the biological sciences. The following science courses are required or recommended:

Biology

- One year of general biology with laboratory (required)
- One course in genetics (required)
- At least one course in cellular biology, cellular physiology, animal physiology, or bacterial physiology (required)
- Microbiology and immunology (recommended)

Chemistry

- One year of general chemistry with laboratory (required)
- Two sequential terms of organic chemistry with a laboratory course (required)
- Biochemistry (required)

Physics

- Two sequential terms of physics with a laboratory (required)

Additional application requirements

The statement of purpose should include the following:

- An explanation of how obtaining a Graduate degree in our program fits your career goals.
- A description of the qualities you possess that will contribute to your success in your chosen field.
- A description of any research experiences you have had. If you have had a research experience, it is important to include a letter of recommendation from your research adviser.
- A list of the areas of research in the department that interest you.

Financial Assistance

The student must first apply to the Graduate School and be accepted in full or conditional status before he/she is eligible for an assistantship. Research and teaching assistantships are contingent upon availability of funds and are awarded competitively. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need.

M.S. in Microbiology

The Master's program requires 24 months of full-time study, completing a minimum of 30 semester credits with an overall GPA of 3.0 or better. Students with inadequate undergraduate training in microbiology will be required to complete undergraduate courses in microbiology in addition to the

required minimum 30 semester credits. The M.S. degree in microbiology requires a research-based thesis, a public seminar of the thesis research, and a final oral defense of the thesis. The supervisory committee administers the oral thesis examination.

Ph.D. in Molecular Pathogenesis

The Ph.D. in Molecular Pathogenesis program is based on defined training outcomes. Degree requirements are in agreement with NDSU Graduate School requirements. The student and major adviser will prepare a plan of study by the end of the first year in residence. The Graduate School requires the plan of study for the Ph.D. degree to include no less than 90 semester graduate credits. Of these 18 credits are in required courses, and the remainder can be tailored to the student's needs. An overall GPA of 3.0 or higher must be maintained. Please refer to the department website for more information on course requirements for this program.

Examinations

Two preliminary examinations must be completed successfully before advancement to candidacy for the doctoral degree. The first, which is generally taken at the end of the first year in residence, examines fundamental areas of knowledge that will be essential for success as a doctoral candidate. The second requires the student to write a research proposal targeted at a program administered by NIH, NSF, or NIFA and defend the proposal in an oral examination. After successful completion of the comprehensive written and oral preliminary examinations, the student will be formally admitted to candidacy for the Doctor of Philosophy degree.

Dissertation Research

In addition to the defense of the written dissertation in the final oral examination, the candidate will present a public seminar based on the dissertation research.

Peter Bergholz, Ph.D.
Michigan State University, 2007
Research Interests: Population Genomics and Evolutionary Ecology

Teresa Bergholz, Ph.D.
Michigan State University, 2007
Research Interests: Functional Genomics of Foodborne Pathogens

Eugene S. Berry, Ph.D.
Northeastern University, 1983
Research Interests: Animal Virology, Molecular Pathogenesis of ss(+) RNA Viruses

Glenn Dorsam, Ph.D.
Virginia Commonwealth University, 1998
Research Interests: Molecular Pathogenesis

Neil W. Dyer, D.V.M., M.S.
Iowa State University, 1991
Research Interests: Studies with *Bacillus anthracis*, Porcine Pneumonia, New Malignant Catarrhal Fever Herpesvirus

Penelope S. Gibbs, Ph.D.
University of Georgia, 2001
Research Interests: Avian *E. coli*, Bacterial Molecular Pathogenesis, Antimicrobial Resistance, Food Safety

John M. McEvoy, Ph.D.
University of Ulster, 2002
Research Interests: *Cryptosporidium* Ecology, Evolution and Host-Parasite Interactions; Environmental Microbiology

Birgit Pruess, Ph.D.
Ruhr-Universitat Bochum, 1991
Research Interests: Global Gene Regulation in Enteric Bacteria, Complex Regulatory Networks

Sheela Ramamoorthy, Ph.D.
Virginia Polytechnic Institute and State University, 2006
Research Interests: Virology and Vaccinology

Jane M. Schuh, Ph.D.
North Dakota State University, 2000
Research Interests: Immunology; Biomedical Significance of the Initiation and Maintenance of Allergic Asthma; The Innate Immune Response in Health and Disease; Murine Models of Human Asthma; *Aspergillus fumigatus*-Induced Immune Response

Molecular Pathogenesis

Department Information

- **Interim Department Head:**
  John McEvoy, Ph.D.
- **Graduate Coordinator:**
  Peter Bergholz, Ph.D.
- **Department Location:**
  Van Es Hall
- **Department Phone:**
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  www.ndsu.edu/vetandmicro/
- **Application Deadline:**
  February 15 for fall
- **Degrees Offered:**
  Ph.D., M.S.
- **Test Requirement:**
  GRE
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Ph.D. in Molecular Pathogenesis

The Ph.D. in Molecular Pathogenesis program is based on defined training outcomes. Degree requirements are in agreement with NDSU Graduate School requirements. The student and major adviser will prepare a plan of study by the end of the first year in residence. The Graduate School requires the plan of study for the Ph.D. degree to include no less than 90 semester graduate credits. Of these 18 credits are in required courses, and the remainder can be tailored to the student's needs. An overall GPA of 3.0 or higher must be maintained. Please refer to the department website for more information on course requirements for this program.

Examinations

Two preliminary examinations must be completed successfully before advancement to candidacy for the doctoral degree. The first, which is generally taken at the end of the first year in residence, examines fundamental areas of knowledge that will be essential for success as a doctoral candidate. The second requires the student to write a research proposal targeted at a program administered by NIH, NSF, or NIFA and defend the proposal in an oral examination. After successful completion of the comprehensive written and oral preliminary examinations, the student will be formally admitted to candidacy for the Doctor of Philosophy degree.

Dissertation Research

In addition to the defense of the written dissertation in the final oral examination, the candidate will present a public seminar based on the dissertation research.

Peter Bergholz, Ph.D.
Michigan State University, 2007
Research Interests: Population Genomics and Evolutionary Ecology

Teresa Bergholz, Ph.D.
Michigan State University, 2007
Research Interests: Functional Genomics of Foodborne Pathogens

Eugene S. Berry, Ph.D.
Northeastern University, 1983
Research Interests: Animal Virology, Molecular Pathogenesis of ss(+) RNA Viruses

Glenn Dorsam, Ph.D.
Virginia Commonwealth University, 1998

Research Interests: Molecular Pathogenesis

Neil W. Dyer, D.V.M., M.S.
Iowa State University, 1991
Research Interests: Studies with *Bacillus anthracis*, Porcine Pneumonia, New Malignant Catarrhal Fever Herpesvirus

Penelope S. Gibbs, Ph.D.
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Research Interests: Avian *E. coli*, Bacterial Molecular Pathogenesis, Antimicrobial Resistance, Food Safety

John M. McEvoy, Ph.D.
University of Ulster, 2002
Research Interests: *Cryptosporidium* Ecology, Evolution and Host-Parasite Interactions; Environmental Microbiology

Birgit Pruess, Ph.D.
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Research Interests: Global Gene Regulation in Enteric Bacteria, Complex Regulatory Networks

Sheela Ramamoorthy, Ph.D.
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Research Interests: Virology and Vaccinology

Jane M. Schuh, Ph.D.
North Dakota State University, 2000
Research Interests: Immunology; Biomedical Significance of the Initiation and Maintenance of Allergic Asthma; The Innate Immune Response in Health and Disease; Murine Models of Human Asthma; *Aspergillus fumigatus*-Induced Immune Response

Music

Department Information

- **Department Chair:**
  E. John Miller, Ph.D.
- **Graduate Music Coordinator:**
  Jo Ann Miller, D.M.A.
- **Department Location:**
  115 Music Education Building
- **Department Phone:**
  (701) 231-7932
- **Department Web Site:**
  www.ndsu.edu/performingarts/music/graduate/index.html
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  D.M.A., M.M.
- **English Proficiency Requirements:**
  TOEFL iBT 79, IELTS 6.5

Graduate Degrees

Graduate degrees (the Master of Music and the Doctor of Musical Arts) are offered in performance, conducting and music education.

Master of Music Degree (M.M.)

Three tracks are offered: Performance, Conducting and Music Education. The Performance, Choral Conducting and Instrumental Conducting tracks require a minimum of 30 credits; the Music Education track requires a minimum of 32 credits.

The M.M. in performance and conducting is the professional degree in music designed for performers and conductors wishing to augment and refine their skills. The M.M. in Music Education is designed for music teachers who wish to update and increase their practical pedagogical knowledge.

Applications may be completed online at www.ndsu.edu/gradschool. A complete application will include three recommendations, transcripts and a scholarly writing example. Applicants should notify the graduate music coordinator, jo.miller@ndsu.edu, (jo.miller@ndsu.edu) of their intention to apply. For applicants in performance and conducting, an on-campus visit and audition are required. Following acceptance into the masters program, applicants will complete a diagnostic exam, which will be used by their advisers to plan appropriate coursework.

All coursework must be passed with a minimum grade of B. Comprehensive written examinations in the student's primary area and in music academic studies must be passed near the end of or after coursework. The final oral examination (administered by the student's committee) occurs after the written comprehensive exam.

Conductors and performers will prepare a recital as their capstone experience. Those in the music education track will complete a written practicum. Both experiences will be planned with guidance by the candidate's committee. The committee will include three graduate faculty members: the adviser, a representative from music academic studies, and at least one other music faculty member.

Master of Music in Music Education Degree

This degree is designed to be completed in three summers or in a combination of summers and the academic year. Students must register for a least six credits per calendar year until all degree requirements are completed. Classes are offered both online and on campus. Course-work can be focused in elementary, choral/vocal, or instrumental music education. No thesis is required; rather, students will complete a four-credit practicum. The practicum will be agreed upon and planned jointly by the student and his/her adviser. Comprehensive written examinations must be passed near the end of or after coursework. The final oral examination (administered by the student's committee) occurs after the written comprehensive examination.

Doctor of Musical Arts (D.M.A.)

The D.M.A. is the terminal professional practical degree in music, designed for performers and conductors wishing to acquire the highest performance abilities. Graduates will have attained the academic qualifications generally accepted for teaching at the college level.

Entering students in the vocal performance track are expected to have appropriate language proficiencies in French, German, and Italian. Remedial work may be required upon recommendation of the adviser and committee.

Recitals and a final written project are planned in conjunction with the candidate's committee, which consists of at least three graduate faculty members: the adviser, a representative from academic studies, and at least one other member at large.

All course work must be passed with a minimum grade of B. Qualifying examinations in the student's primary focus area and in academic studies must be passed near the end of or after course work, and prior to a final oral examination by members of the candidate's committee. All D.M.A. graduates must have reading proficiency in at least one foreign language. For some, an alternative such as a computer language or other research skill, if appropriate to the student's focus area, may be substituted. This proficiency will be determined and assessed by the candidate's committee. Further, students in Choral Conducting must demonstrate appropriate proficiency in foreign language diction.

Two tracks are offered: Performance and Conducting. Each track requires a minimum of 90 credits beyond the baccalaureate degree (93 for the D.M.A. in choral conducting). Students entering the program with an approved master's degree or its equivalent may apply credits toward the D.M.A. The graduate music faculty will determine the viability and number of transfer credits.

Additional information about graduate study at the Challey School of Music may be found at www.ndsu.edu/performingarts/music/graduate/.

Doctor of Musical Arts in Vocal Performance

Code	Title	Credits
MUSC 709	Graduate Ensemble (1,1,1,1,1,1,1,1,1,1)	
MUSC 731	Applied Study (4,4,4,4,4,4)	
MUSC 748	Music Bibliography/Research Methods	
MUSC 780	Recital (4,4,4)	
MUSC 789	D.M.A. Thesis	
Credits		52
History/Theory		14
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	

MUSC 744	20th Century Music History	
Pedagogy		6
MUSC 721	Advanced Vocal Pedagogy	
Literature		9
MUSC 767 & MUSC 768 & MUSC 769	Vocal Literature I-Baroque/Classical and Vocal Literature II-Romantic and Vocal Literature III-20Th Century/Contemporary	
Electives (In consultation with adviser)		9
Total Credits		90

Doctor of Musical Arts in Instrumental Performance

Code	Title	Credits
MUSC 709	Graduate Ensemble (1,1,1,1,1,1,1,1,1,1)	
MUSC 731	Applied Study (4,4,4,4,4,4)	
MUSC 748	Music Bibliography/Research Methods	
MUSC 780	Recital (4,4,4)	
MUSC 789	D.M.A. Thesis	
Credits		52
History/Theory		14
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Pedagogy/Literature (Minimum six credits in each)		15
MUSC 722	Applied Instrumental Pedagogy	
MUSC 764	Applied Instrumental Literature	
Electives (in consultation with adviser)		9
Total Credits		90

Doctoral of Musical Arts in Piano Performance

Code	Title	Credits
MUSC 709	Graduate Ensemble (1,1,1,1) *	
MUSC 731	Applied Study (4,4,4,4,4,4)	
MUSC 732	Applied Collaborative Study (2,2)	
MUSC 748	Music Bibliography/Research Methods	
MUSC 780	Recital (4,4,4)	
MUSC 789	D.M.A. Thesis (1,1,1,1)	
Credits		50
History/Theory**		14
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 734	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	

MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Pedagogy/Literature		15
MUSC 643	Keyboard Literature	
MUSC 723	Advanced Piano Pedagogy	
MUSC 724	Topics in Piano Pedagogy	
MUSC 770	Topics in Keyboard Literature	
Electives (in consultation with adviser)		11
Total Credits		90

* At least 3 credits of MUSC 790 must be earned while in residence at NDSU.
** At least one course must be taken from MUSC 611-734; at least one course must be taken from MUSC 740-744

Doctor of Musical Arts in Collaborative Piano

Code	Title	Credits
MUSC 731	Applied Study (4,4,4,4,2,2) At least 4 semesters of MUSC 731 must be taken in residence during the DMA program	
MUSC 748	Music Bibliography/Research Methods	
MUSC 750	Studies in Collaborative Piano (2,2,2,2)	
MUSC 780	Recital (3,3,3,3)	
MUSC 789	D.M.A. Thesis (1,1,1,1)	
Credits		46
History/Theory *		14
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Pedagogy/Literature		6
MUSC 643	Keyboard Literature	
MUSC 723	Advanced Piano Pedagogy	
MUSC 724	Topics in Piano Pedagogy	
MUSC 770	Topics in Keyboard Literature	
Vocal or Instrumental Specialization **		16-19
GERM 101	First-Year German I	
FREN 101	First-Year French I	
MUSC 642	Opera Literature	
MUSC 705	Graduate Diction Survey I	
MUSC 706	Graduate Diction Survey II	
MUSC 709	Graduate Ensemble	
MUSC 764	Applied Instrumental Literature	
MUSC 767	Vocal Literature I-Baroque/Classical	
MUSC 768	Vocal Literature II-Romantic	
MUSC 769	Vocal Literature III-20Th Century/Contemporary	
Electives (in consultation with adviser)		9
Total Credits		91-94

Doctor of Musical Arts in Conducting

Code	Title	Credits
MUSC 709	Graduate Ensemble (1,1,1,1,1,1,1)	
MUSC 731	Applied Study (4,4,4,4,4)	
MUSC 748	Music Bibliography/Research Methods	
MUSC 780	Recital (4,4,4)	
MUSC 789	D.M.A. Thesis	
Credits		44
History/Theory		14
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Literature		6-12
MUSC 760	Medieval/Renaissance Choral Literature	
MUSC 761	Baroque Choral Literature	
MUSC 762	Classical/Romantic Choral Literature	
MUSC 763	Contemporary Choral Literature	
or MUSC 765	Band Literature:History and Development	
MUSC 766	Band Literature:Chamber Music,Other Genres	
Cognate Courses determined with advisor from Conducting, Music Education, Academic Studies and Performance		14
Electives (in consultation with adviser)		12
Total Credits		90-96

Master of Music in Music Theory Pedagogy

Course List

Music Theory Core

Code	Title	Credits
Required Core Courses		16
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 735	Classroom Pedagogy	
MUSC 736	Music Theory Pedagogy	
MUSC 794	Practicum	
Choose one of the following:		3
MUSC 611	Form and Analysis	
MUSC 734	Analytical Techniques	
Music Core		
74x History (Choose based on availability in course rotation)		3
MUSC 748	Music Bibliography/Research Methods	2
Electives (in consultation with adviser)		6
Total Credits		30

Overview of Program:

The primary purposes of the MM option in Music Theory Pedagogy are (1) to add to the breadth of the experiences for our graduate students and (2) to make them more attractive candidates in their job searches, especially those seeking teaching positions in higher education. The current job market in higher education prioritizes depth of knowledge and experience in more than a single specialty area. Often, this means extensive knowledge and experience in music history and/or music theory. Further, the most successful applicants on the academic job market have not only experience teaching music theory or music history, but also a relevant academic credential. This new program would allow enrolled students to advance their knowledge of music theory and their marketability in teaching the undergraduate theory sequence.

This degree track is designed for students who wish to expand their professional marketability by preparing performers/conductors for the many university positions that involve both performance and classroom teaching. The MM in Music Theory Pedagogy option will primarily be pursued by students jointly with another MM option or DMA in Performance or Conducting, though it has enough unique required courses to be granted as a single degree.

Master of Music in Music Education Degree

Code	Title	Credits
Music Education Core		9
MUSC 701	Psychology Of Music	
MUSC 703	Foundations of Music Education	
MUSC 790	Graduate Seminar	
Music Core		10
MUSC 702	Graduate Theory Survey	
MUSC 704	Graduate Music History Survey	
MUSC 731	Applied Study	
Music Electives		9
MUSC 713	Advanced Choral Music Methods	
MUSC 714	Advanced Elementary Music Methods	
MUSC 715	History of Choral Literature	
MUSC 765	Band Literature:History and Development	
MUSC 766	Band Literature:Chamber Music,Other Genres	
Other Music History, Theory, Literature or Pedagogy (to be determined with adviser)		9
MUSC 794	Practicum	4

Master of Music in Instrumental Performance

Code	Title	Credits
Required Courses		21-23
MUSC 709	Graduate Ensemble (3 credits)	
MUSC 722	Applied Instrumental Pedagogy (2-3 credits)	
MUSC 731	Applied Study (8 credits)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 764	Applied Instrumental Literature (2-3 credits)	
MUSC 780	Recital (4 credits)	
Theory		3
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
History		3
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	

Electives (in consultation with adviser)	1-2
Minimum Total Credits	30

Master of Music in Piano Performance

Code	Title	Credits
Required Courses		17
MUSC 709	Graduate Ensemble (3 credits)	
MUSC 731	Applied Study (8 credits)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 780	Recital (4 credits)	
One course to be taken from each of the following areas:		
Literature		2-3
MUSC 643	Keyboard Literature	
MUSC 770	Topics in Keyboard Literature	
Pedagogy [2-3]		
MUSC 623	Piano Pedagogy I	
MUSC 624	Piano Pedagogy II	
MUSC 723	Advanced Piano Pedagogy	
MUSC 724	Topics in Piano Pedagogy	
Theory		3
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
History		3
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Electives (in consultation with adviser)		1-2
Minimum Total Credits		30

Master of Music in Collaborative Piano

Code	Title	Credits
Required Courses		25
MUSC 705	Graduate Diction Survey I (3 credits)	
MUSC 731	Applied Study (10 credits)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 750	Studies in Collaborative Piano (6 credits)	
MUSC 764	Applied Instrumental Literature (1 credit)	
MUSC 780	Recital	
One course to be taken from each of the following areas:		
Theory		3
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
History		3
MUSC 740	Medieval/Renaissance Music History	

MUSC 741	Baroque and Classical Music History
MUSC 742	Classical Music History
MUSC 743	Romantic Music History
MUSC 744	20th Century Music History
Total Credits	31

Master of Music in Vocal Performance

Code	Title	Credits
Required Courses		19-20
MUSC 709	Graduate Ensemble (3 credits)	
MUSC 721	Advanced Vocal Pedagogy (2-3 credits)	
MUSC 731	Applied Study (8 credits)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 780	Recital (4 credits)	
One course to be taken from each of the following areas:		
Theory		3
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
History		3
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Literature		
MUSC 767	Vocal Literature I-Baroque/Classical	3
MUSC 768	Vocal Literature II-Romantic	3
MUSC 769	Vocal Literature III-20Th Century/Contemporary	3
Electives (in consultation with adviser)		1-2
Minimum Total Credits		30

Master of Music in Choral Conducting

Code	Title	Credits
Required Courses		14
MUSC 709	Graduate Ensemble (2 credits)	
MUSC 721	Advanced Vocal Pedagogy (2 credits)	
MUSC 731	Applied Study (8 credits)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 780	Recital (4 credits)	
Theory (One course)		3
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
History (One course)		3
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	

MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Literature (Two courses)		6
MUSC 760	Medieval/Renaissance Choral Literature	
MUSC 761	Baroque Choral Literature	
MUSC 762	Classical/Romantic Choral Literature	
MUSC 763	Contemporary Choral Literature	
Minimum Total Credits		30

Master of Music in Instrumental Conducting

Code	Title	Credits
Required Courses		18
MUSC 709	Graduate Ensemble (2 credits)	
MUSC 731	Applied Study (Conducting 8 credits)	
MUSC 731	Applied Study (Instrument 8 credits)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 780	Recital (4 credits)	
Theory (One course)		3
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
History (One course)		3
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Literature		6
MUSC 765	Band Literature:History and Development	
MUSC 766	Band Literature:Chamber Music,Other Genres	
Minimum Total Credits		30

Jeremy Brekke, D.A., Associate Professor

Robert W. Groves, Ph.D., Professor

Sigurd Johnson, D.M.A., Associate Professor

Robert J. Jones, D.M.A., Professor

Cassie Keogh, D.M.A., Assistant Professor

Mariane Lemieux, D.M.A., Assistant Professor

Kyle Mack, D.A., Associate Professor

Jo Ann Miller, D.M.A., Professor

John Miller, Ph.D., Professor

Charlette Moe, D.M.A., Assistant Professor

Warren Olfert, Ph.D., Professor

Matthew Patnode, D.M.A., Professor

Michael Weber, D.M.A., Professor

Tyler Wottrich, D.M.A., Assistant Professor

Natural Resources Management

Department Information

- **Program Director:**
  Shawn DeKeyser, Ph.D.
- **Email:**
  Edward.Dekeyser@ndsu.edu
- **Department Location:**
  School of Natural Resource Sciences, Morrill Hall 205
- **Department Phone:**
  (701) 231-8180
- **Department Web Site:**
  www.ndsu.edu/nrm/
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  Ph.D., M.S., MNRM
- **Test Requirement:**
  GRE required for international students applying to the M.S. or Ph.D. program.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

Natural Resources Management (NRM) in the School of Natural Resource Sciences prepares students for the environmental challenges of the 21st century. The Master of Natural Resources Management (MNRM), Master of Science (M.S.) and the Doctor of Philosophy (Ph.D.) NRM degrees are interdisciplinary and offer a broad, systems- based approach toward managing natural resources. NRM graduates are prepared to compete for and be productive in jobs where issues reach beyond a single discipline or subject area. They have the skills necessary to address problems from a sustainable social-ecological perspective.

Through the NRM graduate program, students gain a breadth of knowledge in relevant planning, analysis and management.

In cooperation with the following NDSU academic programs and departments, students select a curriculum and an adviser from one of these participating units:

- Agribusiness and Applied Economics
- Agricultural and Biosystems Engineering
- Biological Sciences (Botany and Zoology)
- Civil Engineering
- Communications
- Entomology
- Plant Sciences
- Range Sciences
- Earth and Climate Science
- Geosciences
- Soil Science
- Sociology/Anthropology/Emergency Management
- Veterinary and Microbiological Sciences

The educational objective of the NRM graduate program is to provide formal education in a chosen specialty area, introductions to other subject areas, appropriate course work in analytical methods, and research and writing experiences in the general area of natural resource management. Problem recognition, definition, analysis and resolution, along with critical thinking are the ultimate learning objectives.

Admissions Requirements

The graduate program in Natural Resources Management is open to qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School requirements, applicants may be recommended or required to take the GRE general exam. Consult with the NRM Program Director.

Financial Assistance

Both research and teaching assistantships may be available through the participating academic units. Application for financial aid must be made directly to a department. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research. Limited scholarships are available.

To qualify for the MNRM degree, the candidate must satisfactorily complete a minimum of 32 semester credits of course work in his/her selected curriculum, and an oral presentation based on an NRM topic of the candidate's choice.

To qualify for the M.S. degree, the candidate must satisfactorily complete a minimum of 30 semester units in his/her selected curriculum, an oral examination, and a thesis or comprehensive study paper.

To qualify for the Ph.D. degree, the candidate must satisfactorily complete a course of study of no less than 90 semester credits (including 30 semester credits from the M.S. degree or equivalent), both a written and an oral preliminary examination, a research-based dissertation, and an oral defense of the dissertation. In addition, the candidate presents final public seminar based on the dissertation research. For more specific information, please refer to the Natural Resources Management Graduate Student Guidelines available on the NRM Web site (http://www.ndsu.edu/nrm).

NRM program courses are offered by NRM and the other participating academic units. These include:

- Agribusiness and Applied Economics
- Agricultural and Biosystems Engineering
- Agricultural Systems Management
- Anthropology
- Biology
- Botany
- Civil Engineering
- Communication
- Computer Science
- Economics
- Entomology
- Geosciences
- Industrial and Manufacturing Engineering
- Mathematics
- Microbiological Sciences
- Philosophy
- Plant Pathology
- Plant Sciences
- Political Science
- Range Science
- Sociology
- Soil Science
- Statistics
- Zoology

Adnan Akyuz, Ph.D.
Assistant Professor/Climatologist
University of Missouri-Columbia, 1994

Francis Casey, Ph.D.
Professor of Soil Science
Iowa State University, 2000

Amitava Chatterjee, Ph.D.
Assistant Professor of Soil Science

University of Wyoming, 2007

Larry J. Cihacek, Ph.D.
Associate Professor of Soil Science
Iowa State University, 1979

Dennis Cooley, Ph.D.
Professor of Philosophy
University of Rochester, 1995

Edward (Shawn) DeKeyser, Ph.D.
Associate Professor of Range Science
North Dakota State University, 2000

Tom DeSutter, Ph.D.
Associate Professor of Soil Science
Kansas State University, 2004

Gary A. Goreham, Ph.D.
Professor of Sociology
South Dakota State University, 1985

Christina Hargiss, Ph.D.
Assistant Professor of Natural Resources Management
North Dakota State University, 2009

Robert Hearne, Ph.D.
Associate Professor of Agricultural Economics
University of Minnesota, 1995

Xinhua Jia, Ph.D.
Associate Professor of Agricultural and Biosystems Engineering
University of Arizona, 2004

Chiwon W. Lee, Ph.D.
Professor of Plant Sciences
Purdue University, 1977

Wei Lin, Ph.D.
Associate Professor of Civil and Environmental Engineering
University of Buffalo, 1992

Zhulu Lin, Ph.D.
Assistant Professor of Agriculture and Biosystems Engineering
University of Georgia, 2003

Rodney G. Lym
Professor of Plant Sciences
University of Wyoming, 1979

Mark Andrew Meister, Ph.D.
Associate Professor of Communication
University of Nebraska, 1997

Jack E. Norland, Ph.D.
Associate Professor of Natural Resources Management
North Dakota State University, 2008

G. Padmanabhan, Ph.D.
Professor of Civil Engineering,
Purdue University, 1980

Deirdre Prischmann-Voldseth, Ph.D.
Associate Professor of Entomology
Washington State University, 2005

David A. Rider, Ph.D.
Professor of Entomology
Louisiana State University, 1988

David Ripplinger, Ph.D.
Assistant Professor of Agribusiness and Applied Economics
North Dakota State University, 2012

David Roberts, Ph.D.
Assistant Professor of Agribusiness and Applied Economics
Oklahoma State University, 2009

Kevin Sedivec, Ph.D.
Professor of Range Science
North Dakota State University, 1994

Halis Simsek, Ph.D.
Assistant Professor of Agriculture and Biosystems Engineering
North Dakota State University, 2012

Dean D. Steele, Ph.D.
Associate Professor of Agricultural and Biosystems Engineering
University of Minnesota, 1991

Joseph D. Zeleznik
Extension Forester
Michigan State University, 2001

Nursing

Department Information

- **Department Chair:**
  Carla Gross, RN, Ph.D.
- **Department Location:**
  D113 SGC Building, 1919 N. University Drive
- **Department Phone:**
  (701) 231-5692
- **Department Web Site:**
  https://www.ndsu.edu/nursing/
- **Application Deadline:**
  Doctor of Nursing Practice, February 15 for BSN to DNP fall admission. BSN to DNP requires a March interview.
- **Degrees Offered:**
  D.N.P - FNP
- **English Proficiency Requirements:**
  TOEFL iBT 79; IELTS 6.5

Program Description

The Doctor of Nursing Practice degree, a clinical doctorate, is offered in the Family Nurse Practitioner specialty. The program includes advanced nursing courses, support courses, clinical practica and clinical disquisition.

Guidelines provided by the American Association of Colleges of Nursing (AACN) and the National Organization of Nurse Practitioner Faculties (NONPF) are utilized in the curriculum. The graduate nursing program is accredited by the Commission on Collegiate Nursing Education (CCNE).

1. Baccalaureate degree in nursing from a nationally accredited nursing program.
2. Undergraduate coursework in research and health assessment.
3. Current unencumbered RN licensure
4. Completed application to the Graduate School.

a. Three references: two from professional colleagues that address clinical competence and potential for graduate education, and one other reference.
b. Written narrative of professional experience and future goals.

5. Interviews required for applicants on either the first or second Friday and Saturday of March.

1. Family Nurse Practitioner/Doctor of Nursing Practice: A minimum of 86 (DNP) semester credits.
2. A maximum of nine graduate semester credits (with a grade of B or better) completed within seven years previous to admission, may be transferred from other regionally accredited colleges or universities with the consent of the student's supervisory committee.
3. Clinical Dissertation

Code	Title	Credits
Core Course Requirements		
NURS 701	Theoretical Perspectives of the Discipline	
NURS 702	Ethics and Health Policy in Nursing	
NURS 704	Nursing Research/Evidence Based Practice	
NURS 706	Health Care Delivery Systems, Financing and Informatics	
Family Nurse Practitioner Requirements (DNP)		
NURS 715	Advanced Community Assessment	
NURS 810	Health Promotion and Disease Prevention	
NURS 812	Advanced Health Assessment	
NURS 812P	Assessment Practicum	
NURS 814	Advanced Pathophysiology I	
NURS 816	Advanced Pathophysiology II	
NURS 820	Advanced Practice Roles	
NURS 830	Clinical Applications	
NURS 831	Advanced Pharmacology I	
NURS 832	Advanced Pharmacology II	
NURS 833	Family Primary Care I:Assessment and Management	
NURS 833P	Family Primary Care:Residency I	
NURS 834	Family Primary Care II:Assessment and Management	
NURS 834P	Family Primary Care:Residency II	
NURS 835	Family Primary Care III: Assessment and Management	
NURS 835P	Practicum IV: FNP Role Integration	
NURS 836P	Practicum V: FNP Role Integration	
NURS 850P	Family Primary Care: Specialty Practicum	
NURS 880		
STAT 725	Applied Statistics	
NURS 899S	Clinical Dissertation	
Total Credits		86

Mykell Barnacle, DNP, FNP
North Dakota State University, 2008

Kelly Buettner-Schmidt, Ph.D., RN, FAAN
University of New Mexico, 2013

Kara Falk, DNP, FNP
Montana State University, 2016

Donna Grandbois, Ph.D., RN
North Dakota State University, 2008

Carla Gross, Ph.D., RN
North Dakota State University, 2012

Dean Gross, Ph.D., FNP
Rush University, 1998

Loretta Heuer, Ph.D., FAAN
University of North Dakota, 1995

Tina Lundeen, DNP, FNP
North Dakota State University, 2010

Allison Peltier, DNP, FNP
North Dakota State University, 2015

Heidi Saarinen, DNP, FNP
North Dakota State University, 2010

Molly Secor-Turner, Ph.D.
University of Minnesota, 2008

Shila Thompson, Ph.D., RN
South Dakota State University, 2012

Pharmaceutical Sciences

Department Information

- **Department Chair:**
  Jagdish Singh, Ph.D.
- **Department Location:**
  102 Sudro Hall
- **Department Phone:**
  (701) 231-7661
- **Department Web Site:**
  www.ndsu.edu/pharmsci/
- **Application Deadline:**
  March 15 for fall semester and October 1 for spring semester, if positions are available.
- **Degrees Offered:**
  Ph.D.
- **Test Requirement:**
  GRE (300 or more)
- **English Proficiency Requirements:**
  TOEFL ibT 90; IELTS 6.5

Program Description

The Department of Pharmaceutical Sciences offers graduate study leading to the Doctor of Philosophy degree. Advanced work may be selected from pharmaceutics, pharmacokinetics, pharmacology, and medicinal chemistry.

The pharmaceutical sciences curriculum consists of a core of courses involving both basic and pharmaceutical sciences. In addition, students will select courses that will prepare them to be competent scientists in their fields.

Admissions Requirements

The Department of Pharmaceutical Sciences graduate program is open to all qualified graduates of recognized universities and colleges. In addition to the Graduate School requirements, the applicant must have adequate preparation in pharmacy or a biological or physical science related to pharmaceutical sciences.

Financial Assistance

Graduate assistantships are available. To be considered for an assistantship, the student must have completed a Graduate School application, be accepted by the department, and submit a formal letter to the department chair requesting an assistantship.

The Doctor of Philosophy program requires the completion of 30 semester credits of letter-graded course work with a GPA of 3.0 or better. Of the 30 credits, at least 18 credits must be at 700 level. Candidates defend their dissertations. Candidates for the Ph.D. will be required to take an examination directed at determining competency in the pharmaceutical sciences.

The department requires the following core courses:

Code	Title	Credits
PSCI 611	Principles of Pharmacokinetics and Pharmacodynamics	3
PSCI 670	Pharmacokinetics	3
PSCI 790	Graduate Seminar	1-3
BIOC 701	Comprehensive Biochemistry I	4
BIOC 702	Comprehensive Biochemistry II	4
STAT 725	Applied Statistics	3

Amanda Brooks, Ph.D.
University of Wyoming, 2006
Postdoctoral: University of California San Diego, 2006-2007; University of Utah, 2008-2010
Assistant Research Professor, 2011-2014
Research interests: Biomimetics, Recombinant Protein Expression for Biomedical Devices, Controlled Drug Delivery to Combat Antibiotic Resistance

Yagna Jarajapu, M.Pharm., Ph.D.
University of Strathclyde, 1998
Glasgow Caledonian University, 2002
Postdoctoral: University of Florida and Wake Forest University 2003-2008
Research Interests: ACE2/Angiotensin-(1-7) and Bone Marrow Progenitor Cells in Diabetes

Estelle Leclerc, Ph.D.
University Paris XI, 1994
Postdoctoral: ETH-Zurich, 1994-1998; The Scripps Research Institute, 1998-2003
Junior Group Leader Children's Hospital Zurich, 2004
Research Assistant Professor Florida Atlantic University, 2005-2009
Research Interests: Biopharmaceutics

Sanku Mallik, Ph.D.
Case Western Reserve University, 1992
Postdoctoral: California Institute of Technology, 1993-95
Research Interests: Synthetic medicinal chemistry

Stephen T. O'Rourke, Ph.D.
University of Wisconsin, 1985
Postdoctoral: Mayo Clinic and Foundation, 1985-87
Research Interests: Vascular Pharmacology

Steven Qian, Ph.D.
The University of Iowa, 1999
Postdoctoral: National Institute of Environmental Health Science (NIEHS, NIH) 2000-2004
Research Interests: Roles of Lipid Derived and Protein-Derived Free Radical Metabolites in All Kinds of Health Related Problems

Jagdish Singh, Ph.D.
Banaras Hindu University, 1982
Postdoctoral: University of Otago, New Zealand, 1985-88; University of California–San Francisco, 1992-94
Research Interests: Novel Dosage and Drug Delivery Systems, Biopharmaceutics

Kristine Steffen, Pharm.D., Ph.D.
North Dakota State University, 2002
North Dakota State University, 2007
Postdoctoral: Neuropsychiatric Research Institute, 2007-2009
Research Interests: Pharmacokinetics, Bariatric Surgery, Eating Disorder and Obesity Pharmacotherapy

Chengwen Sun, M.D., Ph.D.
Norman Bethune University of Medical Sciences, 1988
Norman Bethune University of Medical Sciences, 1996
Postdoctoral: Department of Physiology, Medical College of Wisconsin, 1996-2000
Research Interests: Central Blood Pressure Control and Hypertension Gene Therapy

Sathish Venkatachalem, Ph.D.
University of Madras, 2003

Postdoctoral: University of Western Ontario, 2004-2006
Research Interests: Human Lung Diseases (Asthma, Chronic Obstructive Pulmonary Disease and Pulmonary Hypertension)

Stefan Vetter, Ph.D.
Swiss Institute of Technology (ETH) Zurich,1998
Postdoctoral: The Scripps Research Institute, 2000-2005
Research Interest: Medicinal Protein Biochemistry

Physics

Department Information

- **Department Chair:**
  Sylvio May, Ph.D.
- **Graduate Coordinator:**
  Alan Denton, Ph.D.
- **Department Location:**
  218 South Engineering
- **Department Phone:**
  (701) 231-8974
- **Department Web Site:**
  www.ndsu.edu/physics/
- **Application Deadline:**
  For U.S. students, one month before registration; for international students, March 1 for fall semester and September 1 for spring/summer semester.
- **Degrees Offered:**
  Ph.D., M.S., Accelerated M.S.
- **Test Requirement:**
  GRE (general and subject recommended)
- **English Proficiency Requirements:**
  RA-TOEFL iBT 79, IELTS 6; TA- TOEFL iBT 81 (Speaking 23, Writing 21), IELTS 7 (Speaking 6, Writing 6)

Program Description

The Department of Physics offers graduate study leading to the M.S. and Ph.D. degrees. Advanced work may involve specialized training in the following areas: biophysics, computational physics, condensed matter, nanomaterials, physics education research, polymer physics, soft matter physics, and statistical mechanics.

Research and academic programs are tailored to meet individual needs and interests. New students are strongly urged to visit faculty members to discuss research opportunities soon after their arrival.

Admissions Requirements

The Department of Physics graduate program is open to all qualified graduates of universities and colleges of recognized standing.

Financial Assistance

Prospective students must apply to the Graduate School and be accepted in full or conditional status before being eligible for an assistantship in the Department of Physics.

Generally, graduate students are supported during the academic year by either teaching assistantships or research assistantships. The 2018-2019 academic year stipend is $18,500 for 9 months. Additional support during the summer is also possible. Graduate tuition (but not student fees) is fully waived for all teaching assistants and research assistants.

Research Equipment

NDSU's Materials and Nanotechnology Center is located in the Research and Technology Park. The Center is equipped with two state-of-the-art wet labs, a synthesis lab, optical characterization facilities (optical/NIR fluorescence microscopy, laser-scanning confocal microscopy, and light scattering/reflectometry), and surface characterization facilities (nano-indentation and atomic-force microscopy). There are seven fume hoods in the lab space, as well as a number of synthesis tools, including a Beckman Coulter Optima L-80 XP Ultracentrifuge. We also have access to state-of-the-art chemical synthesis facilities in the Departments of Chemistry and Biochemistry and Coatings and Polymeric Materials, including a Photo Emissions

Tech Model SS50AAA Solar Simulator equipped with a Keithley 2400 Series Source meter. NDSU's Center for Computationally Assisted Science and Technology (CCAST) provides large-scale computing resources to NDSU users.

The Graduate Coordinator or Chair shall assign to each incoming graduate student a temporary advisor, who shall assist in the selection of courses. During the first semester, the student is expected to discuss potential projects for thesis research with faculty members. By the beginning of the second semester, the student must have a permanent research supervisor. By the end of the second semester, the student must have filed a plan of study, selected a thesis topic, and secured two additional faculty members for the Advisory Committee.

Master of Science

Code	Title	Credits
Physics courses number 601-689 or 700-789		16
PHYS 790	Graduate Seminar	1
PHYS 798	Master's Thesis	6-10

Each student must earn at least 30 graduate credits, numbered 601-798, of which:

- at least 10 credits are Physics courses numbered 601-689 or 700-789;
- at least 16 credits are didactic courses numbered 601-689 or 700-789;
- between 6 and 10 credits are Physics 798 (Master's Thesis);
- at least one credit must be Physics 790 Graduate Seminar.

Students are required to attend all seminars and colloquia.

Accelerated Master of Science

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 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

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, 485/685, and 486/686 while fulfilling the requirements for the bachelor's degree.
- Between 6 and 8 credits are PHYS 798 (Master's Thesis), with the goal to publish a paper based on the thesis research, although this is not a requirement to graduate.
- At least one credit is PHYS 790 Graduate Seminar.

Doctoral Degree

Code	Title	Credits
Required Courses		16
PHYS 752	Mathematical Methods in Physics I	
PHYS 758	Statistical Physics	

PHYS 761	Electromagnetism	
PHYS 771	Quantum Physics I	
PHYS 781	Solid State Physics	
PHYS 790	Graduate Seminar	
Letter-graded courses (no more than 12 cr in non-physics courses)		27
PHYS 899	Doctoral Dissertation	
Total credits		90

Credits used to satisfy the requirements for the M.S. degree may be included in the total. Students are required to attend all seminars and colloquia.

Comprehensive Examination

By the end of their fourth semester, students:

- submit a report that summarizes their research results so far and details a research plan for the rest of their research work;
- give a talk about their research accomplishments and plans; and
- must pass an oral examination by the Advisory Committee to confirm doctoral candidacy.

Students who pass the comprehensive examination and, at the time of the exam, have completed 30 credits (16 of which are didactic) will earn a master's degree and be eligible to participate in commencement that semester. Students should choose the Ph.D. + master's option from the drop-down menu on the Doctoral Degree Plan of Study and on the Request to Schedule Examination. After students have passed the comprehensive examination, they should complete the Exit Survey and the Degree Application. A link to these items will be emailed to them by the Graduate School.

If the student fails the comprehensive examination, she/he will be given the opportunity to repeat the examination in the next semester (this examination can be repeated only once). Alternatively, the student may elect to work for a master's degree instead.

Students should submit their doctoral thesis for examination at the end of their fourth year

Dissertation Video

Doctoral students are required to submit a three-minute video summarizing their dissertation research for a lay audience. The video should be produced, with guidance from the thesis supervisor, during the final semester of study and presented to the supervisory committee at the final defense.

For the comprehensive and final examinations, students must submit the appropriate forms to the Graduate School.

Warren Christensen, Ph.D.
Iowa State University, 2007
Postdoctoral: University of Maine, 2007-2009
Research Interests: Physics Education Research, Student Content Understanding, Curriculum Development

Yongki Choi, Ph.D.
The City University of New York, 2010
Postdoctoral: University of California Irvine, 2010-2014
Research Interests: Nano-Bio-physics, Nano-electronics, Single-Molecule science

Andrew Croll, Ph.D.
McMaster University, 2009
Postdoctoral: University of Massachusetts, 2008-2010
Research Interests: Polymers, Diblock Copolymers, Thin Films, Pattern Formation, Mechanics

Alan R. Denton, Ph.D., Graduate Coordinator
Cornell University, 1991
Postdoctoral: University of Guelph, 1991-94; Technical University of Vienna, 1994-95, Research Center Julich, 1996-98
Research Interests: Soft Condensed Matter Theory, Computational Physics

Eric Hobbie, Ph.D.
University of Minnesota, 1990
Research Interests: Nanotechology, Nanoparticles, Polymers, Optics and Rheology

Andrei Kryjevski, Ph.D.
University of Washington, 2004
Research Interests: First-Principles Numerical Techniques for Fermi Systems, Electronic Structure of Nanoparticles

Mila Kryjevskaia, Ph.D.

University of Washington, 2008
Research Interest: Physics Education

Sylvio May, Ph.D., Department Chair
Friedrich-Schiller University, 1996
Research Interests: Physics of Lipid Membranes, Biophysics

Orven Swenson, Ph.D.
Air Force Institute of Technology, 1982
Research Interests: Laser Materials Processing, Optics Education

Alexander J. Wagner, Ph.D.
University of Oxford, 1997
Postdoctoral: MIT, 1998-2000, Edinburgh, 2000-2002
Research Interests: Computational Soft Matter, Phase Separation, Diffusion, Interfaces Physics

Emeritus

Ghazi Q. Hassoun, Ph.D.
University of Minnesota, 1963
Postdoctoral: University of Michigan, 1963-65
Research Interests: Foundations of Quantum Mechanics

Daniel M Kroll, Ph.D.
University of Chicago, 1973
Research Interests: Theoretical and Computational Modeling of Complex Fluids and Biomembranes

Charles A. Sawicki, Ph.D.
Cornell University, 1975
Postdoctoral; Cornell University, 1975-79
Research Interests: Acoustics, Biophysics, Geophysics

Mahendra K. Sinha, Ph.D.
Pennsylvania State University, 1961
Postdoctoral: National Research Council (Ottawa), 1964-66
Research Interests: Field Emission and Field-Ion Microscopy Adjunct

Adjunct Faculty

Stuart Croll, Ph.D.
University of Leeds, 1974
Research Interests: Weathering Durability, Film Formation, Internal Stresses In Films, Modern Art Conservation, and History of Paint Technology

Eric M. Foard, Ph.D.
North Dakota State University, 2013
Research Interests: Theoretical, Computational, Soft Matter, and Phase Separation Physics

Kenneth Lepper, Ph.D.
Oklahoma State University, 2001
Research Interests: Applied Solid State Physics (geologic materials) and Materials Characterization

Konstantin Pokhodnya, Ph.D.
Moscow Institute of Science and Technology, 1977
Research Interests: Materials, Thin Film Fabrication, Spintronics

Plant Pathology

Department Information

- **Department Chair:**
  Jack Rasmussen, Ph.D.
- **Department Location:**
  Walster Hall
- **Department Phone:**
  (701) 231-8362

- **Department Web Site:**
  www.ag.ndsu.edu/plantpath/
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 79; IELTS 6.5

Program Description

The Department of Plant Pathology offers graduate study leading to the M.S. and Ph.D. degrees. Advanced degrees may involve specialized training in the following areas: host-parasite genetics, molecular biology and genomics, epidemiology, tissue culture, soil and seed-borne diseases, microbial ecology, and integrated disease management.

Student research and academic programs are tailored to individual needs and interests.

Five graduate faculty members are housed in the Northern Crops Science Laboratory located on campus. This relationship provides additional opportunities for research and consultation.

The Department of Plant Pathology graduate program is open to all qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School requirements (p. 1086), the applicant must have adequate preparation in Plant Pathology or Biology.

Financial Assistance

Research assistantships and part-time positions are available in the department. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference must be submitted. In addition to these materials, international applicants must also submit TOEFL scores. These items must be submitted to the Graduate School.

Master of Science

Completion of a Master of Science degree is dependent on the completion of 30 semester hours in Plant Pathology or approved courses from related departments. Not less than 10 credits must reflect research in the desired area. No minor area of study is required with an MS degree, but a minor may be elected.

Doctor of Philosophy

Completion of a Doctor of Philosophy degree is dependent on the completion of 60 semester hours beyond the MS degree or 90 credits total. Courses may include Plant Pathology or approved courses from related departments. Not less than 10 credits must reflect research in the desired area. A minor area of study is required with a PhD degree. Options are available in plant science, agronomy, plant breeding, microbiology, entomology and others.

Robert Brueggeman, Ph.D.
Washington State University, 2009
Research Interests: Barley Disease Resistance Gene Characterization and Deployment, Molecular Mechanisms of Host-Pathogen Interactions

Luis del Rio, Ph.D.
Iowa State University, 1999
Research Interests: Epidemiology of Plant Diseases, Chemical and Biological Control of Fungal Diseases, Management of Canola Diseases

Andrew Friskop, Ph.D.
North Dakota State University, 2013
Research interests: Extension Plant Pathology, Chemical Control, Corn Diseases, Small Grain Diseases, IPM

Neil C. Gudmestad, Ph.D.
North Dakota State University, 1982
Research Interests: Ecology and Epidemiology of Plant Pathogenic Bacteria, Foliar Diseases of Potato

Mohamed Khan, Ph.D.
Clemson University, 1998
Research Interests: Sugarbeet Management

Janet J. Knodel, Ph.D.

North Dakota State University, 2005
Research Interests: Extension Entomology, IPM of Field Crop Insects, Insect-Disease Surveys, Emerging Insects, Chemical Control

Zhaohui Liu, Ph.D.
North Dakota State University, 2006
Research interests: Molecular biology and genetics of host-pathogen interactions in wheat leaf spot diseases

Samuel Markell, Ph.D.
University of Arkansas, 2007
Research Interests: Extension Plant Pathology, Rust Diseases, IPM, Emerging Diseases, Chemical Control

Steven W. Meinhardt, Ph.D.
University of Illinois, 1984
Research Interests: Structure/Function Relationships in Enzymes and Toxins

Berlin D. Nelson, Ph.D.
Washington State University, 1979
Research Interests: Oilseed Diseases, Biological Control, Mycology

Jack B. Rasmussen, Ph.D.
Michigan State University, 1987
Research Interests: Molecular Biology and Role in Disease of Pathogen-Produced Toxins, Genetics of Resistance to Cereal Rust Diseases

Gary A. Secor, Ph.D.
University of California-Davis, 1978
Research Interests: Potato Diseases Management and Control, Biotechnology for Cultivar Improvement

Julie Sherman Pasche, Ph.D.
North Dakota State University, 2012
Research Interests: Pulse Crop and Dry Bean disease management, fungicide efficacy and resistance management, pathogen detection and diversity

Shaobin Zhong, Ph.D.
North Dakota State University, 2000
Research Interests: Fusarium Head Blight of Wheat, Fungal Biology and Genetics, Genomics and Functional Genomics of Host-Pathogen Interaction in Cereal Crops

Adjunct

Timothy L. Friesen, Ph.D.
USDA/ARS
North Dakota State University, 2001
Research Interests: Host Parasite Interactions of Foliar Diseases of Cereals

Michael C. Edwards, Ph.D.
USDA/ARS
Cornell University, 1983
Research Interests: Virology, Cereal Virus Diseases

Rubella Goswami, Ph.D.
University of Minnesota, 2005
Research Interests: Pathogen Interactions, Fungal Biology, Molecular Biology and Genomics

Thomas J. Gulya, Ph.D.
USDA/ARS
Iowa State University, 1978
Research Interests: Downy Mildew, Rust, Phomopsis Stem Canker, Sclerotinia Wilt of Sunflower

Michael Wunsch, Ph.D.
Cornell University, 2010
Research Interests: Varietal Disease Resistance, Fungicide Efficacy and Timing, and Use of Cropping Systems t

Plant Sciences/Horticulture

Department Information

- **Department Head:**
  Richard Horsley, Ph.D.
- **Graduate Coordinator:**
  Edward Deckard, Ph.D.
- **Department Location:**
  166 Loftsgard Hall
- **Department Phone:**
  (701) 231-7971
- **Department Web Site:**
  www.ag.ndsu.edu/plantsciences/
- **Application Deadline:**
  International applications are due May 1st for Fall and August 1 for Spring. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  Ph.D. (Plant Sciences only), M.S.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Plant Sciences offers graduate studies leading to the M.S. degrees in Cereal Science, Plant Sciences, and Horticulture, and to a Ph.D. degree in Cereal Science or Plant Sciences, with an optional Program of Emphasis in Plant Breeding and Genetics. Specialized academic and research training in Plant Sciences is available in plant breeding and genetics, weed science, biotechnology, and field and forage crop production and management. Areas of specialization in Horticulture and Forestry include breeding and genetics, biotechnology, physiology, propagation, sports and urban turfgrass management, and production and management of horticultural crops such as woody plants, potatoes, vegetables, and herbaceous ornamentals. Areas of specialization in Cereal Science may involve research in the areas of carbohydrates, enzymes, legumes, and other northern-grown crops; barley malting and brewing; wheat milling, baking, and pasta processing. Each study area is designed to provide students with comprehension of the discipline and of relevant regional and global-community social issues.

The Department of Plant Sciences is located in Loftsgard Hall, which provides a state-of-the-art facility for interdisciplinary research in plant sciences, ranging from basic studies and biotechnology to the more traditional applied areas. Facilities for cereal science research are located in Harris Hall. These facilities include analytical laboratories for grain quality research, baking, milling, malting and brewing, and pasta and noodle processing. State-of-the-art greenhouses and extensive growth chamber facilities are also available, as are 100 acres of field research land adjacent to the Plant Science Complex. An additional 500 acres of research land are located near the North Dakota State University campus. A horticultural farm only 25 miles west of campus has an extensive arboretum. Excellent supporting disciplines located nearby, or in the Plant Science Complex, include Soil Science, Botany, Food Safety, Biochemistry and Molecular Biology, Entomology, and Plant Pathology. The Department of Plant Sciences encourages interdisciplinary research, and students frequently tailor their research program to meet their interests by working with faculty in one or more of the supporting disciplines.

Graduate student numbers per faculty member are limited, so the student gets adequate personal attention and works closely with their adviser in research. Final selection of the adviser will be made on the basis of the student's interest, availability of space in the researcher's laboratory, and a common desire of the student and professor to work together.

The Department of Plant Sciences graduate programs are open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full status to the program, the applicant must meet the Graduate School admission requirements.

Students who do not meet all requirements for admission, but show potential for successful graduate study, may be admitted under a conditional status. Evidence must be provided, showing that the applicant's potential is not adequately reflected by his/her record.

Financial Assistance

Research assistantships (half-time) are provided on a competitive basis, usually based on scholarship and potential to undertake advanced study and research. As of the 2017-18 academic year, the annual stipend generally is $17,000 for an M.S. candidate and $18,200 for a Ph.D. candidate, but this may vary based on the research project. Graduate tuition is waived for all students with research assistantships. A limited number of graduate fellowships are available. The information provided for the application to the Graduate School is also used to assign available assistantships to applicants. The Department of Plant Sciences also has numerous annual scholarships of $500 to $1000 each for outstanding Plant Sciences graduate students.

Master of Science The M.S. program (Thesis Option) requires completion of at least 30 credits; this includes 10 credits of thesis research. The Ph.D. program requires completion of at least 90 credits; this includes 30 credits for an earned M.S. degree (Thesis Option) and 20 additional research credits. For each M.S. or Ph.D. candidate, a plan of study will be developed in the first year that meets the disciplinary requirements as well as the individual needs of the student. The faculty adviser and other members of the student's supervisory/advisory and examining committee assist in developing of the plan of study as well as the student's research plan. An M.S. Program (Comprehensive Study Option) is also offered in Plant Sciences. This option requires completion of at least 30 credits, including 3 credits of a Master's Paper.

Candidates for the M.S. degree normally satisfy all requirements within a two-year period, and Ph.D. candidates normally require three additional years. For M.S. candidates, an oral examination of academics related to the discipline and the research-based thesis is required. The Ph.D. candidates are required to pass a preliminary written and oral examination of academics related to the discipline and a final oral defense of a research-based dissertation. A B.S. to Ph.D. program is permitted for students who meet higher admission requirements.

Code	Title	Credits
Plan A - Thesis Option		30
600-700 level courses including 3 credits of PLSC 724 or equivalent		19
16 of which must be in didactic courses approved for graduate credit numbered 600-689 and 700-789		
PLSC 790	Graduate Seminar	1
PLSC 798	Master's Thesis	10
Plan B - Comprehensive Study Option		30
600-700 level courses including 3 credits of PLSC 724 or equivalent		27
At least 21 of the 30 credits must be in didactic courses approved for graduate credit numbered 600-689 and 700-789		
PLSC 790	Graduate Seminar	1
PLSC 797	Master's Paper	3

See information in Graduate Bulletin

Marisol Berti, Ph.D.
North Dakota State University, 2007
Research Interests: Forage and Biomass Crop Production

Chris M. Boerboom, Ph.D.
University of Minnesota, 1989
Research Interests: Weed Science

Xiwen Cai, Ph.D.
Washington State University, 1998
Research Interests: Wheat Genetics

Bingcan Chen, Ph.D.
University of Massachusetts, 2012
Research Interests: Cereal and Food Chemistry

Michael J. Christoffers, Ph.D.
University of Missouri-Columbia, 1998
Research Interests: Weed Science/Genetics

David Wenhao Dai, Ph.D.
North Dakota State University, 2001
Research Interests: Woody Plant Physiology, Biotechnology

Edward L. Deckard, Ph.D.
University of Illinois, 1970
Research Interests: Crop Physiology

Elias M. Elias, Ph.D.
North Dakota State University, 1987
Research Interests: Durum Wheat Breeding, Genetics

Kenneth F. Grafton, Ph.D.
University of Missouri, 1980
Research Interests: Dry Bean Breeding, Genetics

Greta Gramig, Ph.D.
University of Wisconsin-Madison
Research Interests: Weed Biology and Ecology

Andrew J. Green, Ph.D.
Kansas State University, 2016
Research Interests: Hard Red Spring Wheat, Genetics

Clifford A. Hall III, Ph.D.
University of Nebraska, Lincoln, 1996
Research Interests: Phytochemical Stability in Food Systems, Pulse Utilization and Quality, Flaxseed, Chemical Food Safety, Effect of Processing on Food Safety Issues

Harlene Hatterman-Valenti, Ph.D.
Iowa State University, 1993
Research Interests: High-Value Crop Production

Theodore C. Helms, Ph.D.
Iowa State University, 1986
Research Interests: Soybean Breeding, Genetics

Richard D. Horsley, Ph.D.
North Dakota State University, 1988
Research Interests: Barley Breeding, Genetics

Kirk A. Howatt, Ph.D.
Colorado State University, 1999
Research Interests: Weed Science, Annual Weeds

Burton L. Johnson, Ph.D.
North Dakota State University, 1993
Research Interests: Crop Production

Thomas J. Kalb, Ph.D.
Virginia Polytechnic Institute & State University, 1988
Research Interests: Extension Horticulture

Herman J. Kandel, Ph.D.
North Dakota State University, 1995
Research Interests: Crop Production

Chiwon W. Lee, Ph.D.
Purdue University, 1977
Research Interests: Vegetables, Floriculture, Biotechnology

Deying M. Li, Ph.D.
Iowa State University, 2001
Research Interests: Sports Turf Management

Xuehui Li, Ph.D.
University of Georgia, 2009
Research Interests: Statistical Genomics

Rodney G. Lym, Ph.D.
University of Wyoming, 1979
Research Interests: Weed SciencePerennial Weeds

Frank A. Manthey, Ph.D.
North Dakota State University, 1985
Research Interests: Durum Wheat Quality, Pasta/Noodle Processing

G. Francois Marais, Ph.D.
North Dakota State University, 1979
University of Stellenbosch, 1992
Research Interests: Hard Red Winter Wheat Breeding, Genetics

Phillip E. McClean, Ph.D.
Colorado State University, 1982
Research Interests: Dry Bean Genetics, Biotechnology

Esther E. McGinnis
University of Minnesota, 2013
Research Interests: Extension Horticulture, Native Plants, Perennial Hardiness, Floriculture

Michael S. McMullen, Ph.D.
University of Minnesota, 1976
Research Interests: Oat Breeding, Genetics

Rebekah Oliver, Ph.D.
North Dakota State University, 2006
Research Interests: Genetics

Juan Osorno, Ph.D.
North Dakota State University, 2006
Research Interests: Dry Edible Bean Breeding

Thomas Peters, Ph.D.
North Dakota State University, 1990
Research Interests: Sugarbeet Agronomy, Weed Science

Mukhlesur Rahman, Ph.D.
University of Manitoba, 2007
Research Interests: Canola Breeding

Joel K. Ransom, Ph.D.
University of Minnesota, 1982
Research Interests: Small Grains

Jiajia Rao, Ph.D.
University of Massachusetts, 2013
Research Interests: Food Chemistry, Ingredient Technology

Andy Robinson, Ph.D.
Purdue University, 2012
Research Interests: Potato Production

Paul B. Schwarz, Ph.D.
North Dakota State University, 1987
Research Interests: Malting Barley Quality

Kalidas Shetty, Ph.D.
University of Idaho, 1989
Research Interests: Food Safety

Senay Simsek, Ph.D.
Purdue University, 2006
Research Interests: Hard Spring Wheat Quality

Asunta L. Thompson, Ph.D.
University of Idaho, 1998
Research Interests: Potato Breeding

Anuradha Vegi, Ph.D.
North Dakota State University, 2008
Research Interests: Teaching Techniques

Todd West, Ph.D.
Southern Illinois University, 2004
Research Interests: Woody Plant Improvement

Qi Zhang, Ph.D.
Kansas State University, 2007

Research Interests: Turfgrass Stress Physiology

Alan J. Zuk, Ph.D.
Kansas State University, 2005
Research Interests: Sports and Urban Turfgrass Management

Adjunct and Affiliate

James V. Anderson, Ph.D.
Virginia Polytech Institute, 1990
Research Interests: Plant Biochemistry

James Beaver, Ph.D.
University of Illinois, 1980
Research Interests: Dry Bean Genetics

Patrick M. Carr, Ph.D.
Montana State University, 1989
Research Interests: Sustainable Agriculture

Wun Shaw Chao, Ph.D.
University of California-Davis, 1996
Research Interests: Perennial Weeds

Linda Dykes, Ph.D.
Texas A&M University, 2008
Research Interests: Food Science and Technology

Justin D. Faris, Ph.D.
Kansas State University, 1999
Research Interests: Wheat Molecular Genetics

Michael E. Foley, Ph.D.
University of Illinois, 1982
Research Interests: Weed Biology

Shana M. Forster, Ph.D.
North Dakota State University, 2017
Research Interests: Crop Production

Jose G. Franco, Jr., Ph.D.
Texas A&M University, 2015
Research Interests: Agroecology, Sustainable Food Systems

Karen L. Fugate, Ph.D.
Ohio State University, 1995
Research Interests: Sugarbeet Physiology

Russell Gesch, Ph.D.
Texas A&M University, 1995
Research Interests: Physiology of Oilseed Crops

Darrin Haagenson, Ph.D.
Purdue University, 2001
Research Interests: Crop Physiologyand Ecology

David P. Horvath, Ph.D.
Michigan State University, 1993
Research Interests: Perennial Weed Physiology

Brent Hulke, Ph.D.
University of Minnesota, 2007
Research Interests: Flax and Sunflower Genetics

Brian Jenks, Ph.D.
University of Nebraska, Lincoln, 1996

Research Interests: Integrated Weed Management

Blaine Johnson, Ph.D.
University of Nebraska, 1986
Research Interests: Quantitative Genetics

Edward C. Lulai, Ph.D.
North Dakota State University, 1978
Research Interests: Potato Physiology

Kevin McPhee, Ph.D.
University of Idaho, 1995
Research Interests: Pulse Crops

Grant Mehring, Ph.D.
North Dakota State University, 2016
Research Interests: Agronomy; Wheat and Corn Research

Mohamed Mergoum, Ph.D.
Colorado State University, 1991
Research Interests: Hard Red Spring Wheat Breeding

Jae-Bom Ohm, Ph.D.
Kansas State University, 1996
Research Interests: Grain Science

Michael Ostlie, Ph.D.
Colorado State University, 2012
Research Interests: Weed Science

Timothy Porch, Ph.D.
Cornell Univisery, 2012
Research Interests: Dry Bean Breeding and Genetics

Lili Qi, Ph.D.
Nanjing Agricultural University, 1997
Research Interests: Wheat Genetics

Susan Raatz, Ph.D.
University of Minnesota, 1996
Research Interests: Human and Clinical Nutrition

Gerald J. Seiler, Ph.D.
North Dakota State University, 1980
Research Interests: Sunflower and Sugarbeet Germplasm

Jochum Wiersma, Ph.D.
University of Minnesota, 1995
Research Interests: Small Grains

Steven S. Xu, Ph.D.
North Dakota State University, 1994
Research Interests: Hard Red Spring Wheat Development

Psychological Clinical Science

Department Information

- **Department Chair:**
  Mark Nawrot, Ph.D.
- **Department Location:**
  232 B2 Minard Hall
- **Department Phone:**
  (701) 231-7065
- **Department Web Site:**

www.ndsu.edu/psychology/graduate_programs/psychological_clinical_science/

- **Application Deadline:**
  January 15
- **Degrees Offered:**
  Ph.D.
- **Test Requirement:**
  GRE
- **English Proficiency Requirements:**
  TOEFL ibT 100; IELTS 7

Program Description

The primary purpose of this program is to prepare students for careers in academic or research settings. Thus, a major emphasis is on research training. We hope to train researchers who will contribute to psychological knowledge through the investigation of clinically relevant issues, including basic research on the nature, etiology, and course of health related problems or psychological disorders, as well as applied research which investigates the prevention and treatment of health and mental health problems.

When making admission decisions, grades, GRE scores, research experience, letters of recommendation (preferably from faculty who can comment on your research skills and academic potential), and the personal statement are considered. To the extent that an applicant has a strong background in psychology, including course work in statistics, research methods, abnormal psychology, and personality, and good research experience, this will be an advantage.

Applicants who already have a master's degree will be judged by the same criteria. For applicants with a master's degree, credit towards the doctorate will depend on how well previous course work matches with the program requirements.

Campus visits or interviews are not required, although the department may arrange for a visit via phone or internet video with top candidates.

Applications are due by January 15 in order to receive full consideration for admission in the upcoming academic year. Admission decisions will be made by mid-March. Applications are reviewed once a year and students are admitted for fall semester only.

Students are required to gain a breadth of knowledge in the foundations of psychology through courses in biological, cognitive, and social bases of behavior. Course work in research methods and statistics, assessment, psychopathology, health, and interventions comprise the clinical portion of the curriculum.

Practicums at local hospitals, clinics, and mental health agencies provide supervised experience in service delivery and applied research. This is a full-time program and will take five years, including internship, to complete.

Code	Title	Credits
Evaluation and Intervention		13
Four courses cover content related to the history of clinical psychology, ethics, psychopathology, and current empirically supported approaches to assessment and treatment.		
PSYC 755	Empirically Supported Interventions I	
PSYC 756	Empirically Supported Interventions II	
PSYC 770	Testing and Assessment	
Choose one course on current theories and research on psychopathology with a focus either on adulthood or childhood.		
PSYC 672	Advanced Psychopathology	
PSYC 673	Child Psychopathology and Therapy	
PSYC 758	Diversity in Clinical Psychology	
PSYC 795	Field Experience (Clinical Training)	
PSYC 794	Practicum/Internship	
Fundamentals of Psychology and Breadth		9
One course from each of three core categories to include an option for the biological basis of behavior, the cognitive basis of behavior, and the social basis of behavior. These courses are for breadth. Students may choose the particular courses and may take additional elective courses to supplement their knowledge and research skills in Health, Social, Cognition, or Vision.		
Biological Basis of Behavior		
PSYC 660	Sensation & Perception	
PSYC 665	Psychobiology	
PSYC 686	Neuropsychology	
PSYC 718	Visual Neuroscience	

Cognitive Basis of Behavior		
PSYC 661	Memory and Knowledge	
PSYC 664	Attention & Thinking	
PSYC 720	Advanced Topics in Cognitive Neuroscience	
Social Basis of Behavior		
PSYC 653	Organizational Psychology	
PSYC 670	Experimental Social Psychology	
PSYC 771	Social/Health Psychology Research	
PSYC 787	Advanced Social Psychology and Health	
Research Traning		
PSYC 793	Individual Study/Tutorial	
PSYC 798	Master's Thesis	
or PSYC 899	Doctoral Dissertation	
Three courses on research methods		
PSYC 640	Experimental Methods	
PSYC 761	Applied Research Methods	
PSYC 762	Advanced Research Methods and Analysis	
PSYC 790	Graduate Seminar (8 total credits)	
Teaching Requirement		4
One course and seminar in college teaching.		
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences	
PSYC 791	Temporary/Trial Topics	
PSYC 794	Practicum/Internship	

Keith Donohue, Ph.D.
Florida State University, 2011
Field: Clinical; Substance Abuse, Research Methods, and Teaching

Robert Dvorak, Ph.D.
University of South Dakota, 2012
Field: Clinical; Self-Regulation, Health, and Addiction

Kathryn Gordon, Ph.D.
Florida State University, 2008
Field: Clinical; Disordered Eating, Suicidal Behavior

Clayton Hilmert, Ph.D.
University of California at San Diego, 2003
Field: Health/Social; Stress, Psychophysiology, and Health

Leah Irish, Ph.D.
Kent State University, 2011
Field: Health/Social; Health Behaviors, Sleep, Stress

Michael D. Robinson, Ph.D.
University of California Davis, 1996
Field: Social/Personality Affective Processes

Paul D. Rokke, Ph.D.
University of Houston, 1985
Field: Clinical; Psychopathology

Psychology

Department Information

- **Department Chair:**
  Mark Nawrot, Ph.D.
- **Department Location:**

232 B2 Minard

- **Department Phone:**
(701) 231-7065
- **Department Web Site:**
https://www.ndsu.edu/psychology/graduate_programs/
- **Application Deadline:**
January 15
- **Degrees Offered:**
Ph.D.
- **Test Requirement:**
GRE
- **English Proficiency Requirements:**
TOEFL iBT 79, IELTS 6.5

Program Description

The Department of Psychology at North Dakota State University grants both M.S. and Ph.D. degrees. We have three doctoral programs that prepare students for research and academic careers: Psychological Clinical Science, Visual and Cognitive Neuroscience, and Health/Social Psychology.

Doctoral Programs

Students enter one of three Ph.D. programs: Psychological Clinical Science, Visual and Cognitive Neuroscience, or Health/Social Psychology. These areas represent the strengths of the department's faculty in experimental research, as well as three of the most active and cutting-edge areas in the field of psychology. The program accommodates approximately 20 students, with approximately 4 new Ph.D. degrees awarded each year. Training in the program includes course work in the student's area of emphasis, as well as methods courses, breadth requirements, and research experience under the supervision of a faculty mentor. Training and experience in college-level teaching is an important part of all three programs. Student support is available through teaching assistantships, research assistantships, and teaching stipends.

Admissions Requirements

The Department of Psychology graduate programs are open to qualified graduates of universities and colleges of recognized standing. Applications are due by January 15 in order to receive full consideration for admission in the upcoming academic year. However, applications will be considered after this date to the extent that space in the program is still available.

Financial Assistance

Students are routinely supported through research and teaching assistantships. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. All students who submit complete applications to the program by the appropriate deadlines are considered for assistantships. There is not a separate application for financial aid. Doctoral students are eligible for university fellowships that are awarded on a competitive basis.

1. Complete a master's degree in Psychology. This may be done at NDSU or elsewhere.
2. Complete at least 90 hours of graduate credit, including those completed for the master's degree;
3. 60 or more of these credits must be earned at NDSU. At least 30 credit hours must be in approved didactic courses, and at least 18 of these must be at the 700 level.
4. Complete quantitative and research methods courses.

Code	Title	Credits
PSYC 640 & PSYC 762	Experimental Methods and Advanced Research Methods and Analysis	6
PSYC 761	Applied Research Methods (for Health/Social)	3

5. Complete core courses in the specific program area:

Code	Title	Credits
Health & Social Psychology		
PSYC 733	Social Judgment	3
PSYC 771	Social/Health Psychology Research	3
PSYC 782	Emotions	3
PSYC 787	Advanced Social Psychology and Health	3
Visual & Cognitive Neuroscience:		

Select three of the following:		9
PSYC 718	Visual Neuroscience	
PSYC 720	Advanced Topics in Cognitive Neuroscience	
PSYC 727	Advanced Topics in Visual Perception	
PSYC 731	Fundamental Processes in Cognition	
PSYC 760	Research Methods in Visual and Cognitive Neuroscience	
PSYC 764	Advanced Topics in Attention	
Psychological Clinical Science:		
PSYC 755	Empirically Supported Interventions I	4
PSYC 756	Empirically Supported Interventions II	4
PSYC 770	Testing and Assessment	3
PSYC 672	Advanced Psychopathology	3
or PSYC 673	Child Psychopathology and Therapy	
PSYC 758	Diversity in Clinical Psychology	3
PSYC 794	Practicum/Internship	1-8
PSYC 795	Field Experience	1-15

6. Complete three (for Psychological Clinical Science), two (for Health/Social students), or one (for Visual & Cognitive Neuroscience students) breadth courses at the graduate level from area outside specialty track (which can include approved courses from other departments).
7. Complete Psyc 790 (graduate seminar and colloquium series) each semester.
8. Participate in a continued program of research apprenticeship with at least one faculty member and, accordingly, enroll in Psyc 793 each semester for 1-5 credits.
9. Teach one undergraduate course under the supervision of a faculty member, after completion of COMM 702 Introduction to College Teaching in the Humanities and Social Sciences, or STEM 810 Teaching College Science.
10. Complete a major area paper to serve as the comprehensive exam for Ph.D. candidacy. The area paper will be a comprehensive literature review of the student's area of research and will include an oral defense.
11. Complete the dissertation. The student will defend a written proposal before a faculty committee, conduct an original research project, and complete a comprehensive written report on the project. The student will complete a final oral defense before the same committee.

Benjamin J. Balas, Ph.D.
Massachusetts Institute of Technology, 2007
Field: Brain and Cognitive Sciences

Barbara Blakeslee, Ph.D.
University of California, Santa Barbara, 1983
Field: Biopsychology, Vision Science

Martin D. Coleman, Ph.D.
University of Sussex, 2005
Field: Emotion and Decision Making

Erin Conwell, Ph.D.
Brown University, 2009
Field: Cognitive and Linguistic Sciences

Keith F. Donohue, Ph.D.
Florida State University, 2011
Field: Clinical Psychology; Alcohol, Research Methods, Teaching

Robert D. Dvorak, Ph.D.
The University of South Dakota, 2012
Field: Clinical Psychology; Selfregulation, Health-Risk Behaviors, & Ecological Momentary Assessment

Kathryn H. Gordon, Ph.D.
Florida State University, 2008
Field: Clinical Psychology, Eating Disorders, Suicidal Behavior

Clayton J. Hilmert, Ph.D.
University of California, San Diego, 2003
Field: Health and Social Psychology; Stress Psychophysiology, Cardiovascular Health, and Pregnancy

Verlin B. Hinsz, Ph.D.
University of Illinois, 1983
Field: Social and Industrial/Organizational; Small Group Performance, Group Decision Making

Leah Irish, Ph.D.
Kent State University, 2011
Field: Health and Social Psychology, Health Behaviors, Sleep, Stress

Jeffrey S. Johnson, Ph.D.
University of Iowa, 2008
Field: Visual Cognitive Neuroscience

Linda Langley, Ph.D.
University of Minnesota, 1998
Field: Cognitive Neuroscience, Cognitive Aging, Attention

Kevin D. McCaul, Ph.D.
University of Kansas, 1978
Field: Social Psychology; Health Behavior, Applied Social Psychology

Mark E. McCourt, Ph.D.
University of California, Santa Barbara, 1982
Field: Biopsychology, Vision Science; Visual Psychophysics, Neuropsychology

Mark Nawrot, Ph.D.
Vanderbilt University, 1991
Field: Visual Neuroscience; Neural Mechanisms for Perception of Depth and Motion, Eye Movements, Alcohol

Michael D. Robinson, Ph.D.
University of California, Davis, 1996
Field: Social/Personality Affective Processes

Paul D. Rokke, Ph.D.
University of Houston, 1985
Field: Clinical Psychology; Psychopathology

Clay Routledge, Ph.D.
University of Missouri-Columbia, 2005
Field: Health and Social Psychology

Laura E. Thomas, Ph. D.
University of Illinois, 2008
Field: Embodied cognition, Links between action, perception, and cognition

David A. Wittrock, Ph.D.
State University of New York at Albany, 1990
Field: Clinical Psychology; Behavioral Medicine, Headache, Stress, Appraisal and Coping

Adjunct

Terence W. Barrett, Ph.D.
University of North Dakota, 1989
Field: Counseling; Issues in Therapy, Forensic Psychology

Scott G. Engel, Ph.D.
North Dakota State University, 2003
Field: Health and Social Psychology; Obesity and Eating Disorders

Holly Hegstad, Ph.D.
University of North Dakota, 1999
Field: Clinical Psychology; Anxiety and Mood Disorders

Jessica T. Kaster, Ph.D.
University of South Dakota, 2004
Field: Clinical Psychology; Child Psychopathology, Assessment

H. Katherine O'Neill, Ph.D.
University of North Dakota, 1991
Field: Clinical Psychology; Psychopathology, Addiction, Anxiety

Jennifer A. Redlin, M.S.
North Dakota State University, 1999
Field: Clinical and Behavioral Psychology

Public Health

Department Information

- **Department Vice Chair:**
  Abby Gold, Ph.D.
- **Program Coordinator:**
  Stefanie Meyer
- **Department Location:**
  Research Park Building 2
- **Department Phone:**
  (701) 231-6549
- **Department Web Site:**
  www.ndsu.edu/publichealth/
- **Application Deadline:**
  March 1, 2019
- **Degrees Offered:**
  MPH
- **Test Requirement:**
  GRE The PCAT/MCAT are acceptable substitutes for the GRE requirement. Applicants who wish to substitute MCAT scores for the GRE must include the MCAT score validation .pdf with application.
- **English Proficiency Requirements:**
  TOEFL ibT 90; IELTS 6.5

Program Description

Public health is defined as the practice of helping members of society live healthier, longer lives. Public health is both an art and a science, and is practiced by multidisciplinary teams of professionals whose training spans a wide array of medical, social, and physical sciences. Public health focuses on the general health of communities through efforts to monitor the spread of diseases, initiatives, (both clinical and policy- oriented) to prevent disease and disability, and by promoting healthy lifestyles through education and community engagement.

The program focuses on rural health, health promotion and prevention, disease state management, and related activities of interest to North Dakota public health care practitioners and policy makers. Specializations include American Indian public health, public health in clinical systems, health promotion, and management of infectious diseases.

A admission decisions are based upon full review of all information in the application in order to ensure fairness and to balance the limitations of any single element of the application. Strong preference for admission will be given to applicants with at least one year of practical experience in their field, including practical field experience gained within an academic program.

Minimum Program Admission Requirements

In addition to the Graduate School admission requirements, applicants must have adequate preparation in a field related to public health and show potential to undertake advanced study, research and practical training as evidenced by previous academic accomplishment and experience.

The Admissions Committee will invite selected applicants for an interview on the basis of the Committee's review of all submitted application materials.

Final decisions will be made after all interviews are completed. Satisfactory completion of a background check is required prior to admission.

Policy on Transfer of Credit

A limited amount of graduate work completed at a regionally accredited North American institution prior to, or after matriculation in the program, may be applied toward the MPH. Graduate work is considered for transfer only on an individual basis and only after the student has completed satisfactory

work in the program. Transfer credits approved by the student's adviser, course instructor, Program Director, and the Dean of the Graduate School will be included in the Program of Study for the MPH degree and recorded on the transcript.

The basic purpose of the transfer policy is to ensure that transferred work is of comparable content, level, timeliness, and quality to that of NDSU's and included on a master's degree program of study. The following policies are generally applicable to the acceptance of the graduate work for transfer:

- The work must have been undertaken at an accredited North American institution.
- The student must have been enrolled at that institution as a graduate student
- The work must have received graduate credit at the institution where it was earned.
- The student must have earned a grade of B or better.
- The work must be less than seven years old at the time the MPH degree is awarded.

The maximum amount of transfer credit that will be accepted toward the MPH degree is nine (9) semester credit hours.

Code	Title	Credits
Required Coursework		
PH 704	Public Health Management and Policy	3
PH 720	Environmental Health	3
PH 731	Biostatistics	3
PH 741	Social and Behavioral Sciences in Public Health	3
PH 745	Community Health Leadership	3
PH 751	Essentials in Epidemiology	3
PH 794	Practicum	3
PH 789	Integrative Learning Experience (Integrative Learning Experience)	3
Specialization Courses (select from below)		18
Total Credits		42

American indian public health option

Code	Title	Credits
PH 771	American Indian Health Policy	3
PH 772	American Indian Health Equity	3
PH 773	Social and Cultural Determinants in Indian Health	3
PH 774	Research Issues in Tribal Communities	3
Elective Courses		6

Management of Infectious Diseases Option

Code	Title	Credits
PH 735	Principles of Infectious Disease Management I	3
PH 736	Principles of Infectious Disease Management II	3
PH 752	Advanced Topics in Epidemiology	3
PH 755	Integrating Primary Care and Public Health	3
Electives		6

Community Health Sciences OPTION

Code	Title	Credits
PH 700	Preventing and Managing Chronic Illness	3
PH 725	Promoting Health through Policy, System and Environment	3
PH 755	Integrating Primary Care and Public Health	3
NURS 715	Advanced Community Assessment	3
Elective Courses		6

Dietetics accelerated masters

Please see attachments for required documentation to start an accelerated bachelor's to master's option. This has been approved by Dietetics and the MPH curriculum committee.

*Master's Paper

The PH master's paper is a requirement for graduation for students in the Master of Public Health (MPH) Program. This is an opportunity to work on public health projects under the direction of faculty and community public health practitioners or researchers. The goal is to synthesize, integrate and apply the skills and competencies acquired in the PH Program to a public health problem. Completion of the PH master's paper requires both written and oral components.

Practicum/Internship

Concepts and competencies learned from PH coursework are integrated through a minimum of 240 hours practicum that provides an opportunity to apply knowledge in a practice setting. A wide range of settings and opportunities are available and are individually tailored to assure competence in general PH and specialization-specific skills. The practicum is designed to meet student goals, specialization criteria, and the needs of the agencies or institutions involved. The practicum is selected by the student in consultation with faculty and approved by the adviser. This experience is usually completed in the student's final term in the program and often results in the capstone project written report and presentation. However, students may register for 1 to 3 credits, repeated up to 3 times if appropriate.

All work must be approved in advance by the PH program. Students cannot receive credit for past work experience.

For more information about PH specializations, please visit the PH website http://www.ndsu.edu/publichealth/specializations/.

Each certificate option is 18 credits and may be completed in one academic year.

Code	Title	Credits
American Indian Public Health		
PH 704	Public Health Management and Policy	3
PH 771	American Indian Health Policy (The drop down options did not have PH 755 listed)	3
PH 772	American Indian Health Equity	3
PH 773	Social and Cultural Determinants in Indian Health	3
PH 774	Research Issues in Tribal Communities	3
PH 775	Case Studies in Indian Health	3
General Public Health		
PH 704	Public Health Management and Policy	3
PH 731	Biostatistics	3
PH 741	Social and Behavioral Sciences in Public Health	3
PH 720	Environmental Health	3
HNES 745	Community Health Leadership	3
PH 751	Essentials in Epidemiology	3
Health Systems Leadership		
PH 704	Public Health Management and Policy	3
PH 731	Biostatistics	3
PH 751	Essentials in Epidemiology	3
PH 755	Integrating Primary Care and Public Health	3
Infection Prevention		
PH 704	Public Health Management and Policy	3
PH 755 Integrating Primary Care and		
PH 735	Principles of Infectious Disease Management I	3
PH 736	Principles of Infectious Disease Management II	3
PH 751	Essentials in Epidemiology	3

American Indian Public Health

Donna Grandbois, RN, Ph.D.
Donald Warne, M.D., M.P.H.
Andrea Huseth, Ph.D.
Siobhan Wescott, M.D., M.P.H

Community Health Sciences

Molly Secor-Turner, Ph.D.
Mark Strand, Ph.D., CPH

Abby Gold, Ph.D., M.P.H., R.D.
Mary Larson, Ph.D., M.P.H., R.D., C.D.E.

Management of Infectious Diseases

Paul Carson, M.D.
Teresa Bergholz, Ph.D.
Rick Jansen, Ph.D.

Range Science

Department Information

- **Director, School of Natural Resource Sciences:**
  Frank Casey, Ph.D.
- **Interim Program Leader:**
  Ryan Limb, Ph.D.
- **Department Location:**
  201 Morrill Hall
- **Department Phone:**
  (701) 231-7582
- **Department Web Site:**
  www.ndsu.edu/range/
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Range Science program in the School of Natural Resource Sciences offers graduate study leading to M.S. and Ph.D. degrees. Advanced work may involve specialized training in the following areas: rangeland ecology, fire ecology, plant community dynamics, restoration of ecosystem services, ecosystem reclamation, and wildlife population dynamics in rangelands.

Student research and academic programs are tailored to individual student needs and interests. Interdisciplinary approaches to range science programs are fostered.

The Range Science graduate program is open to all qualified graduates of universities and colleges of recognized standing that meet the Graduate School requirements (p. 1086).

Financial Assistance

Research assistantships are available. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research. To be considered for an assistantship, a completed Graduate School application, official transcripts, three letters of reference, and a TOEFL score for international applicants must be submitted to the Graduate School no later than April 15.

Each student must choose an adviser, usually based upon area of academic and research interest, within the first program year. By the end of the first year of residence, the student must have selected an advisory/supervisory committee and have an approved graduate plan of study, including a research proposal. The advisory/supervisory committee advises the student and administers the graduate exams to the student. Students are referred to the Range Science Graduate Student Handbook for information regarding additional requirements.

Master of Science Program

The range science program has two options for the M.S. degree: the thesis option and the comprehensive study option. The M.S. program requires completion of 30 semester credits of approved graduate and letter-graded course work with an overall GPA of 3.0 or better. The M.S. candidates are required to take an oral examination which covers both the research and academic subject matter covered in their program.

Candidates for the M.S. normally complete their degree requirements in two years.

Code	Title	Credits
Plan A - Thesis Option		30
Didatic Courses (numbered 601-689, 691; 700-789, 791; 800-889, 891)		16
Additional Credits		2
RNG 798	Master's Thesis	6-10

Code	Title	Credits
Plan B - Comprehensive Study Option		30
Didatic Courses (numbered 601-689, 691; 700-789, 791; 800-889, 891)		21
Additional Credits		6-8
RNG 797	Master's Paper	1-3

Doctoral Program

The Ph.D. program requires the completion of 90 semester credits (or the equivalent) of graduate approved and letter graded course work with an overall GPA of 3.0 or better. Candidates for the Ph.D. are required to take a preliminary written and oral examination directed toward the academic subject matter of their chosen discipline and a final defense of a research based thesis.

Candidates for the Ph.D. generally complete their degree requirements in three to four years.

Code	Title	Credits
Master's to Ph.D.		60
Didactic coursework (numbered 601-689, 691; 700-789,791; 800-889, 891)		15
Additional courses		30-44
RNG 899	Doctoral Dissertation	1-15

Code	Title	Credits
Bachelor's to Ph.D.		90
Didactic coursework (numbered 601-689, 691; 700-789,791; 800-889, 891)		27
15 of these credits must be at the 700 or 800 level		
Additional courses		48-62
RNG 899	Doctoral Dissertation	1-15

Torre J. Hovick, Ph.D.
Oklahoma State University, 2014
Research Interests: Global change, Avian Ecology, Fire Ecology, Rangeland Management

Ryan F. Limb, Ph.D.
Oklahoma State University, 2008
Research Interests: Fire Ecology, Plant Community Ecology, Grassland Disturbance & Restoration Ecology, Invasive Species Ecology & Management

Devan A. McGranahan, Ph.D.
Iowa State University, 2011
Research Interests: Fire behavior and ecology, plant community ecology, fire and grazing management, and effects of global environmental change in rangeland ecosystems worldwide

Kevin K. Sedivec, Ph.D.
North Dakota State University, 1994
Research Interests: Plant Community Ecology, Grazing and Wildlife Interaction, Reclamation of Energy Developed Lands, Range Nutrition, Range Monitoring

Adjunct Faculty

Benjamin Geaumont, Ph.D.
North Dakota State University, 2009
Hettinger Research and Extension Center
Research Area/Activity: Interactions Between Agriculture, Wildlife, and the Environment

John Hendrickson, Ph.D.

Texas A&M University, 1996
USDA, Mandan, ND
Research Area/Activity: Rangeland Ecology and Management

Chris Schauer, Ph.D.
Oregon State University, 2003
Hettinger Research Extension Center
Research Area/Activity: Nutritional Management of Grazing Livestock

Lance Vermeire, Ph.D.
Texas Tech University, 2002
USDA-ARS Fort Keogh, Miles City, MT
Research Area/Activity: Grazing Ecology, Prescribed Fire, Drought Effects on Rangelands

Rhetoric, Writing and Culture

Department Information

- **Department Chair:**
  Elizabeth Birmingham, Ph.D.
- **Graduate Coordinator:**
  Verena Theile, Ph.D.
- **Department Location:**
  318 Minard Hall
- **Department Phone:**
  (701) 231-7143
- **Department Web Site:**
  www.ndsu.edu/english/graduate_programs/phd_degree/
- **Application Deadline:**
  February 1
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL ibt 100; IELTS 7

The Rhetoric, Writing and Culture Ph.D. degree program is open to all qualified graduates of universities and colleges of recognized standing. The Ph.D. in Rhetoric, Writing and Culture provides students with employable skills in the area of professional and technical communication. This innovative and regionally unique program invites students to work at the intersection of rhetorical, textual, and cultural studies. The number of positions available in technical communication significantly surpasses the number of new Ph.D.s produced each year by a sizable margin. Graduates from NDSU's program may pursue careers as:

- professors in universities or colleges;
- training and development specialists, user-experience experts, and human-computer interaction specialists in industry;
- technical, scientific, or professional writers and editors in research and development organizations, high-tech companies, non-profit organizations, or government agencies.

Hands-on experience is essential to our program. The Rhetoric, Writing and Culture Ph.D. requires six credits of experiential learning. Students can work with professors or mentors in disciplinary writing. Others opt to intern for non-profits or local industries.

NDSU offers opportunities for students in the Ph.D. program to teach discipline-specific writing, such as writing in the sciences, writing for engineers, and writing in business and finance. Ph.D. students are eligible for Presidential Doctoral Graduate Fellowships.

To be admitted with full status to the program, the applicant must fulfill all of the requirements set out below.

- In most cases, applicants are expected to have completed a Master of Arts or Science, but exceptional candidates may be admitted directly out of the Bachelor's degree
- Have completed a BA, BS, MA, or MS from an accredited educational institution.
- Have a minimum cumulative grade point average (GPA) of 3.5.

Conditional admission may be granted to students who do not meet all requirements for admission or have deficiencies in prerequisite course work, but demonstrate potential for graduate study. Such students may be required to take additional courses to address deficiencies in prerequisite course work.

In addition to the Graduate School required materials, applications must include:

- an academic writing sample, not to exceed 20 pages, that reflects the student's academic or professional interests and that demonstrates the student's critical and analytical abilities
- A statement of purpose that includes the following:
  - coursework you plan to complete in the program
  - faculty members with whom you wish to study
  - research you plan to pursue
  - a sense of what you hope to do once you have completed a Ph.D. degree in English
  - how your education and/or life experience have prepared you for graduate work
- official transcripts from all previous undergraduate and graduate institutions
- a letter stating your interest in and qualifications for a teaching assistantship.

Preferred additional materials:

- Practical and / or Professional writing sample not to exceed 10 pages

Financial Assistance

Teaching assistantships are available and awarded based on the applicant's scholastic record and letters of recommendation. Students need to apply to the Graduate School to be considered for admission in the Department of English and before they are eligible for an assistantship. Letters of interest for teaching assistantships, detailing prior experience (if applicable) and qualifications, need to be submitted as part of the application to the program.

Teaching assistantships are reviewed and renewed annually based on academic and professional performance, as well as funding. The annual stipend is $14,000, which is in addition to tuition waivers (including summer) for the duration of the degree program; TAs are responsible for books and fees. In rare cases, teaching fellowships may be granted to advanced doctoral students who have passed their comp exams and completed their course work. Scholarships (https://www.ndsu.edu/english/scholarshipsandfellowships) are available through the Department, the College, the Graduate School, and the University.

The Ph.D. program requires 90 credits beyond the baccalaureate degree and a minimum of 60 graduate credits taken beyond the M.A. and at NDSU.

- Students must take a minimum of 30 credits at the 700- or 800-level.
- English 764: Teaching Strategies is required of all Graduate Teaching Assistants who have not taken a similar class elsewhere.
- Students must take 48 of 60 credits at NDSU from within the Department of English.
- Students with a master’s degree in another discipline may be required to complete additional graduate course work in specific areas of English, as specified by their adviser and supervisory committee.
- No more than 10 credits may be transferred into the program.

Anastassiya Andrianova, Ph.D.
City University of New York, 2011
Field: British Romantic and Victorian Literature, Drama, Translation, Pedagogy, Postcolonial Literature, Slavic Literature, Animal Studies

Lisa R. Arnold, Ph.D.
University of Louisville, 2011
Field: Rhetoric and Composition, Writing Program Administration, History of Writing Instruction

Elizabeth Birmingham, Ph.D.
Iowa State University, 2000
Field: Rhetoric and Professional Communication, Gender Studies, Architectural History, Theory, and Criticism

Kevin Brooks, Ph.D.
Iowa State University, 1997
Field: Rhetoric and Professional Communication, Computers and Composition, Writing Program Administration

Muriel Brown, Ph.D., Emerita
University of Nebraska, 1971
Field: Medieval Literature, Modern Drama, Women's Studies

Sean Burt, Ph.D.

Duke University, 2009
Field: Ancient Jewish Literature, Genre Theory, Ancient Hebrew Poetry, Poetics, Horror Literature & Theory

Gordon Fraser, Ph.D.
University of Connecticut, 2015
Field: Nineteenth-Century and Early American Literature; American Studies; Nationalism and Revolution

Adam Goldwyn, Ph.D.
City University of New York, 2010
Field: Medieval Studies, Medieval Greek World, Influence of Ancient Greek Culture in the Middle Ages

Alison Graham Bertolini, Ph.D.
Louisiana State University, 2009
Field: Contemporary American Literature, Literature of the Southern United States, Women's Literature, Contemporary Ethnic and Postcolonial Literature

Linda L. Helstern, Ph.D., Emerita
Southern Illinois University-Carbondale, 2001
Field: Native American Literature, Modernism, Contemporary Poetry, Literature and the Environment

R.S. Krishnan, Ph.D., Emeritus
University of Nebraska, 1981
Field: Restoration and 18th-Century British Literature, Postmodern Theories, British Novel, Postcolonial Literature

Bruce Maylath, Ph.D.
University of Minnesota, 1994
Field: International Technical Communication, Rhetoric and Composition, Linguistics

Robert O'Connor, Ph.D., Emeritus
Bowling Green State University, 1979
Field: Romantic Literature, Science Fiction and Fantasy

Kelly Sassi, Ph.D.
University of Michigan, Ann Arbor, 2008
Field: English Education, Composition and Rhetoric, Native American Literatures, Culturally Responsive Pedagogy

Dale Sullivan, Ph.D., Emeritus
Rensselaer Polytechnic Institute, 1988
Field: Rhetoric Theory and History, Rhetoric of Science, Rhetoric of Religion, Technical Communication

Amy Rupiper Taggart, Ph.D.
Texas Christian University, 2002
Field: Writing and Rhetoric, Pedagogy, Literacy Studies

Verena Theile, Ph.D.
Washington State University, Pullman, 2006
Field: 16th/17th Century Literature, Shakespeare, Early Modern Drama, European Literature, Literary Theory, Science Fiction and Fantasy, Film and Adaptation Studies

Emily D. Wicktor, Ph.D.
Kansas, 2010
Field: 19th Century British Literature and Culture, particularly Victorian Sexuality and Sexual History; Rhetoric, Composition, and Pedagogy; Literary Theory; Modern British and American Drama; Research Methods and Methodology

Sociology

Department Information

- **Interim Department Chair:**
  Jeff Bumgarner, Ph.D.
- **Graduate Coordinator:**
  Pamela Emanuelson, Ph.D.
- **Department Location:**
  Minard 428
- **Department Phone:**

(701) 231-8657

- **Department Email:**
  ndsu.soc.anth@ndsu.edu
- **Department Web Site:**
  www.ndsu.edu/socanth
- **Application Deadline:**
  For full consideration, applications must be received by February 15 for fall semester and September 15 for spring semester
- **Degrees Offered:**
  M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Sociology and Anthropology offers the M.S. degree in Sociology. This program is based on the principle that graduate level education in Sociology is a desirable preparation for a growing number of career orientations. Sample positions that our graduates have obtained include research analyst, instructor and human service worker. The precise plan of study for each student will be established in consultation with the academic adviser with the student's career goal in mind.

The focus of graduate education in Sociology is directed toward both the development of applied sociologists and the advanced training of those seeking to pursue a doctoral degree. Students may elect to take courses in a specialty area, or they may pursue a background in general sociology. Areas of specialization include medical sociology/gerontology and community development.

The Sociology graduate program provides students with the opportunity to expand their background and perspectives in research methods and theory. Consequently, the first year of the program is designed to expose students to theory and both quantitative and qualitative research methods.

Two program options are available for students. In the thesis option, students work on a research-based thesis. Students typically test theoretical assumptions using primary or secondary data. The comprehensive study option is designed for students who wish to combine their studies with some type of specialized field experience. Students electing this option are required to complete a comprehensive study paper related to their internship, such as evaluating a program.

Students in the Sociology graduate program benefit from a favorable faculty-to-student ratio.

Admissions Requirements

The Department of Sociology and Anthropology graduate program is open to qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School requirements (p. 1086), the applicant must have earned a cumulative grade point average in all courses of at least 3.0 or equivalent and a grade point average of 3.2 or higher in sociology.

Financial Assistance

Teaching assistantships are available to qualified applicants. Research assistantships may also be available, contingent on faculty research funds. Applicants for assistantships are considered on the basis of scholarship and potential to undertake advanced study and research. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference must be received by the Graduate School no later than February 15.

Students must complete a minimum of 30 credits and a master's thesis for the thesis option, or a minimum of 35 credits and a paper for the comprehensive study option. An oral defense of the thesis or the paper is required.

Requirements for the M.S. degree in sociology are as follows:

1. Successfully complete

Code	Title	Credits
SOC 723	Social Theory	3
SOC 700	Qualitative Methods	3
SOC 701	Quantitative Methods	3

2. Complete an additional 21 credits (including thesis) or 26 credits (including comprehensive study).
3. Complete a research-based thesis or comprehensive study paper, and pass an oral defense of the thesis or paper administered by the student's supervisory committee.

Gina Aalgaard Kelly, Ph.D.

University of Minnesota, 2007
Research Interests: Medical Sociology, Aging/Social Gerontology, Quantitative Methods

Pamela Emanuelson, Ph.D.
University of South Carolina, 2008
Research Interests: Small Group Processes, Social Psychology, Mathematical Sociology. Economic Sociology, Sociopolitical Evolution

Gary A. Goreham, Ph.D.
South Dakota State University, 1985
Research Interests: Rural Sociology, Community, Family, Research Methods, Sociology of Religion, Sociology of Agriculture

Christina D. Weber, Ph.D.
SUNY–Buffalo, 2005
Research Interests: Social Theory, Feminist Theory, Sociology of Gender, Memory and Trauma Studies, Social Change

Christopher M. Whitsel, Ph.D.
Indiana University, 2009
Research interests: Social Inequality, Research Methods, Global Comparative Sociology, Post-Soviet Central Asia

Michael J. Yellow Bird, Ph.D.
University of Wisconsin, 1994
Indigenous Tribal Studies, Social Welfare, Social Work

Software Engineering

Department Information

- **Department Head:**
  Kendall E. Nygard, Ph.D.
- **Graduate Coordinator:**
  Gursimran Walia, Ph.D.
- **Department Location:**
  258 QBB
- **Department Phone:**
  (701) 231-8562
- **Department Email:**
  gradinfo@cs.ndsu.edu
- **Department Web Site:**
  cs.ndsu.edu/
- **Application Deadline:**
  February 1 for fall admission; September 1 for spring admission* No summer admission for any Software Engineering Program
- **Degrees Offered:**
  Ph.D., M.S., M.S.E, Certificate
- **Test Requirement:**
  GRE (M.S. and Ph.D. only)
- **English Proficiency Requirements:**
  TOEFL iBT 79; IELTS 6.5

**Spring admissions are given only occasionally, depending on funding and faculty interest. If there are no spring openings, spring applicants are automatically considered for the subsequent fall semester.*

Program Description

Software Engineering is focused on the application of systematic, disciplined, and quantifiable approaches to the development, operation, and maintenance of software systems. Inclusive of computer programming but going well beyond, Software Engineering is concerned with methodologies, techniques, and tools to manage the entire software life cycle, including development of requirements, specifications, design, testing, maintenance, and project management. The advent of Software Engineering is a natural result of the continuous quest for software quality and reusability, and the maturing of the software development industry.

The Department of Computer Science offers a Graduate Certificate in Software Engineering, Master of Software Engineering, Master of Science in Software Engineering, and Ph.D. in Software Engineering. The programs are designed to appeal to both full-time students and software professionals who are employed and wish to pursue a program part time. The Master of Software Engineering is a course work only program while the Master of

Science in Software Engineering is a course work, comprehensive examination and research program. For additional information, see cs.ndsu.edu or contact the Computer Science Department at (701) 231-8562 or gradinfo@cs.ndsu.edu.

In addition to the Graduate School requirements (p. 1086), applicants must fulfill the program requirements listed below:

Certificate

1. B.S. or equivalent degree from an educational institution of recognized standing, including 12 semester hours or equivalent of Computer Science or Software Engineering courses from an educational institution of recognized standing, or at least one year full-time professional software engineering experience;
2. Programming skill in a modern higher level programming language, preferably C++, C#, or Java;
3. A 2.85 (on a 4.0 scale) GPA in previous course work.

Master of Software Engineering

1. Bachelor's level (B.S., B.A., Sc.B., etc.) degree from an educational institution of recognized standing;
2. Ability to design and implement a program consisting of several interacting classes that might total approximately 100 executable statements;
3. International Students require a minimum TOEFL ibT of 79 or an IELTS of 6.5.
4. A 3.0 (on a 4.0 scale) GPA in previous coursework. Conditional admission may be given with a 2.7 or higher GPA and professional experience.

Master of Science

1. Four year or longer B.S. or equivalent degree from an educational institution of recognized standing with at least a 3.0 grade point average on a 4.0 grade point scale. Eighteen semester hours or equivalent in Computer Science from an educational institution of recognized standing, or at least 2 years of full-time professional software engineering experience. Full time professional experience may offset the GPA requirement at the rate of 0.1 in GPA for each 18 months of such experience to a maximum of 0.3 in GPA;
2. Programming skill with one modern higher level programming language, preferably C++, C#, or Java.
3. A 3.0 (on a 4.0 scale) GPA in all previous coursework.

Doctor of Philosophy

1. Four year or longer B.S. or equivalent degree from an educational institution of recognized standing with at least a 3.25 grade point average (GPA) on a 4.0 grade point scale. Eighteen semester hours or equivalent in Computer Science from an educational institution of recognized standing, or at least 3 years of full-time professional software engineering experience. Significant full-time professional software development experience may offset this GPA requirement at the rate of 0.1 in GPA for each 2 years of such experience to a maximum of 0.4 in GPA. If the applicant has an M.S. or equivalent degree from an educational institution of recognized standing, the GPA in that degree should be at least 3.35 on a 4.0 scale.
2. Programming skill in at least 1 higher level programming language, preferably C++, C#, or Java.

Graduate Certificate

Code	Title	Credits
CSCI 713	Software Development Processes	3
Select two of the following:		6
CSCI 714	Software Project Planning and Estimation	
CSCI 715	Software Requirements Definition and Analysis	
CSCI 716	Software Design	
CSCI 717	Software Construction	
CSCI 718	Software Testing and Debugging	
CSCI 848	Empirical Methods in Software Engineering	3
Total Credits		12

Masters of Software Engineering

Code	Title	Credits
Core Courses - 15 Credits		
CSCI 713	Software Development Processes	
CSCI 715	Software Requirements Definition and Analysis	

CSCI 716	Software Design
CSCI 718	Software Testing and Debugging
CSCI 848	Empirical Methods in Software Engineering
Electives - 15 Credits	
CSCI 714	Software Project Planning and Estimation
CSCI 717	Software Construction
CSCI 724	Survey of Artificial Intelligence
CSCI 736	Advanced Intelligent Systems
CSCI 765	Introduction To Database Systems
CSCI 834	Knowledge Based Systems
CSCI 846	Development of Distributed Systems
CSCI 847	Software Complexity Metrics
Total Credits - 30	

Master of Science

Code	Title	Credits
Core Courses		12
Students must complete the core within five semesters of their entering the program.		
CSCI 713	Software Development Processes	
CSCI 715	Software Requirements Definition and Analysis	
or CSCI 718	Software Testing and Debugging	
CSCI 716	Software Design	
CSCI 765	Introduction To Database Systems	
Six credits (not part of the core) from:		6
CSCI 714	Software Project Planning and Estimation	
CSCI 715	Software Requirements Definition and Analysis	
CSCI 717	Software Construction	
CSCI 718	Software Testing and Debugging	
CSCI 845	Formal Methods for Software Development	
CSCI 846	Development of Distributed Systems	
CSCI 847	Software Complexity Metrics	
CSCI 848	Empirical Methods in Software Engineering	
Other Computer Science or Computer Engineering courses selected with and approved by the student's graduate advisory committee. (six - thesis students) or three (paper students)		3-6
CSCI 790	Graduate Seminar (in software engineering areas (1 credit each), approved by adviser)	3
Research Component*		3-6
CSCI 797	Master's Paper	
or CSCI 798	Master's Thesis	
Total Credits		33

Students seeking an option in cybersecurty must take 9 credits from the below list. No more than 3 credits can be from CSCI 790.

Code	Title	Credits
CSCI 676	Computer Crime & Forensics	3
CSCI 793	Individual Study/Tutorial (cybersecurity focus)	1-5
CSCI 791	Temporary/Trial Topics (cybersecurity focus)	1-5
CSCI 790	Graduate Seminar (cybersecurity focus)	1-3
CSCI 669	Network Security	3
CSCI 773	Foundations of the Digital Enterprise	3
CSCI 783	Topics In Software Systems (cybersecurity focus)	3

* Either a thesis option or comprehensive study paper based on a significant software development project undertaken by the student, perhaps as a member of a team, either at the University or as part of a job. This project will require design, implementation, and testing of a significant piece of computer software.

Doctor of Philosophy

Code	Title	Credits
Select 5 from the courses listed below and not duplicating any items used to satisfy requirements for the Master of Science degree:		15
CSCI 713	Software Development Processes	
CSCI 714	Software Project Planning and Estimation	
CSCI 715	Software Requirements Definition and Analysis	
CSCI 716	Software Design	
CSCI 717	Software Construction	
CSCI 718	Software Testing and Debugging	
CSCI 845	Formal Methods for Software Development	
CSCI 846	Development of Distributed Systems	
CSCI 847	Software Complexity Metrics	
CSCI 848	Empirical Methods in Software Engineering	
Courses in Computer Science or Electrical and Computer Engineering approved by the student's Supervisory Committee.		9
CSCI 899	Doctoral Dissertation	15
Total Credits		39

Students seeking an option in cybersecurty must take 9 credits from the below list. No more than 3 credits can be from CSCI 790.

Code	Title	Credits
CSCI 676	Computer Crime & Forensics	3
CSCI 790	Graduate Seminar (cybersecurity focus)	1-3
CSCI 791	Temporary/Trial Topics (cybersecurity focus)	1-5
CSCI 793	Individual Study/Tutorial (cybersecurity focus)	1-5
CSCI 669	Network Security	3
CSCI 773	Foundations of the Digital Enterprise	3
CSCI 783	Topics In Software Systems (cybersecurity focus)	3

Department Faculty

Anne Denton, Ph.D.
University of Mainz, 1996
Research Interests: Data Mining, Bioinformatics, Scientific Informatics, Databases, Geospatial Data, Cloud Computing

Dean Knudson, Ph.D.
Northwestern University, 1972
Research Interests: Software Engineering, International Capstone Programs, University/Industry Relationships

Jun Kong, Ph.D.
University of Texas, Dallas, 2005
Research Interests: Human Computer Interaction, Mobile Computing, Software Engineering

Juan (Jen) Li, Ph.D.
University of British Columbia, 2008
Research Interests: Large-scale Distributed System (P2P and Cloud Computing, Distributed Search, Routing Algorithms), Semantic Web Technologies, Social Networks, Information Retrieval, Knowledge Discovery

Simone Ludwig, Ph.D.
Brunel University, 2004
Research Interests: Swarm Intelligence, Evolutionary Computation, Fuzzy Reasoning, Cloud Computing

Kenneth Magel, Ph.D.
Brown University, 1977

Research Interests: Software Engineering, Human-Computer Interfaces, Software Complexity, and Software Design

Kendall Nygard, Ph.D.
Virginia Polytechnic Institute and State University, 1978
Research Interests: Data Science, Optimization Modeling, Smart Grid, Sensor Networks, Agents, Artificial Intelligence, Security, Adaptive Systems, Swarm Intelligence

Saeed Salem, Ph.D.
Rensselaer Polytechnic Institute, 2009
Research Interests: Bio-Informatics and Data Mining

Brian Slator, Ph.D.
New Mexico State University, 1988
Research Interests: Artificial Intelligence, Educational Media

Jeremy Straub, Ph.D.
University of North Dakota, 2015
Research Interests: Multi-tier Mission Architecture & Control, Autonomous Data Link Reduction, Autonomous Vehicle Control, Machine Vision, Super Resolution

Vasant Ubhaya, Ph.D.
University of California-Berkeley, 1971
Research Interests: Algorithm Analysis, Approximation and Optimization

Gursimran Walia, Ph.D.
Mississippi State University, 2009
Research Interests: Empirical Software Engineering, Software Errors and Software Quality Improvement, Requirements Engineering, Human Cognition in Software Engineering, Managing and Estimating Software Quality

Changhui Yan, Ph.D.
Iowa State University, 2005
Research Interests: Bioinformatics, Computational Biology, Genomics, Machine Learning, Data Mining, Big Data, Cloud Computing

Professors of Practice

Oksana Myronovych, Ph.D.
North Dakota State University, 2009

Mark Pavicic, Ph.D.
Columbia University, 1985

Affiliate Faculty

Otto Borchert, Ph.D.
North Dakota State University, 2015
Research Interests: Artificial Intelligence, Educational Games, STEM Learning

Hyunsook Do, Ph.D.
University of Nebraska, 2007
Research Interests: Software Engineering, Software Testing, Regression Testing, Software Maintenance, Requirements Verification, Software Empirical Methodologies

Hassan Reza, Ph.D.
North Dakota State University, 2002
Research Interests: Software Architecture, Cloud Computing, Architectural Analysis & Description

Xiaodong Zhang, Ph.D.
Dalhousie University, Canada, 2001
Research Interests: Satellite Sensing, Geographic Information Systems

Soil Science

Department Information

- **Director, School of Natural Resource Sciences:**
  Frank Casey, Ph.D.

- **Program Leader:**
  Thomas DeSutter, Ph.D.
- **Email:**
  Thomas.DeSutter@ndsu.edu
- **Department Location:**
  106 Walster Hall
- **Department Phone:**
  (701) 231-8901
- **Department Web Site:**
  https://www.ndsu.edu/soils/
- **Application Deadline:**
  International applications are due May 1st for fall and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Degrees Offered:**
  Ph.D., M.S.
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Soil Science in the School of Natural Resource Sciences offers graduate study leading to the M.S. and Ph.D. degrees that provide training in agricultural and/or environmental career tracks. The instructional and research programs emphasize an understanding of soil-plant-atmosphere interactions and their application to soil and water resource management. Students may pursue degrees with emphasis in soil chemistry, soil fertility, soil genesis and morphology, soil management, soil physics, environmental modeling, water quality, soil salinity, plant nutrition, soil survey, soil conservation, soil reclamation, soil mineralogy or agricultural climatology and meteorology. M.S. and Ph.D. programs in Natural Resources Management and Environmental and Conservation Science with emphasis in soil science are also available.

A close working relationship exists between the department and various state and federal agencies and the private sector. Strong supporting course work is available from other departments and programs at North Dakota State University. Programs of study are designed to meet student interests and needs.

North Dakota's diversity of soils and agricultural practices provides an exceptional field setting in which to study soil science. The department is well equipped for field and laboratory investigations.

Admissions Requirements

The Soil Science graduate program is open to all qualified graduates of universities and colleges of recognized standing. All applicants must meet the Graduate School requirements (p. 1086).

Financial Assistance

Research assistantships are available. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. To be considered for an assistantship, applicants must submit a completed application. A complete application will include three recommendations, transcripts and a scholarly writing example. A TOEFL score for international applicants must also be received by the Graduate School.

The M.S. program normally requires 24 months of full-time study and research while the Ph.D. program normally requires a minimum of 36 months. An overall GPA of 3.0 or better must be maintained. An oral defense of thesis and academic subject matter is required of M.S. candidates. Ph.D. candidates are required to take a preliminary written and oral examination of academic subject matter and a final oral defense of a research-based dissertation.

F. Adnan Akyuz, Ph.D.
University of Missouri-Columbia, 1994
Research Area/Activity: Applied Climatology and Microclimatology/Climate Based Agricultural Management

Francis X.M. Casey, Ph.D.
Iowa State University, 2000
Research Area/Activity: Field Oriented Soil Physics, Measurement and Prediction of Water Transfer and Chemical Transport Through Soil

Amitava Chatterjee, Ph.D.
University of Wyoming, 2007

Research Area/Activity: Soil Fertility Management, Greenhouse Gas Emissions

Larry J. Cihacek, Ph.D.
Iowa State University, 1979
Research Area/Activity: Erosion and Productivity Relationships, Conventional and Alternative Crop Management, Carbon Sequestration, Nutrient Management

Thomas M. DeSutter, Ph.D.
Kansas State University, 2004
Research Area/Activity: Trace Elements, Land Application of Byproducts, Inorganic Soil Chemistry, Soil Environmental Conditions

David W. Franzen, Ph.D.
University of Illinois, 1993
Research Area/Activity: Soil Fertility/State Soil Specialist

Caley Gasch, Ph.D.
University of Wyoming, 2013
Research Area/Activity: Soil Ecology, Restoration, Reclamation, Monitoring of Degraded Soils

R. Jay Goos, Ph.D.
Colorado State University, 1980
Research Area/Activity: Soil Fertility and Management/Fertilizer Management for Small Grains

David G. Hopkins, Ph.D.
North Dakota State University, 1997
Research Area/Activity: Interactions Among Landscape, Soil Morphology, Soil Properties and Environmental Aspects of Land Use

Abbey Wick, Ph.D.
University of Wyoming, 2007
Research Area/Activity: Soil Health in Agricultural and Range Lands; Mine Reclamation

Adjunct Faculty

Allan W. Cattanach, Ph.D.
University of Minnesota, 1979
Research Area/Activity: Soil Fertility, Sugarbeet Management

Gary H. Halvorson, Ph.D.
Oregon State University, 1979
Director of Agriculture, Sitting Bull College, Fort Yates, SD

Mark Liebig, Ph.D.
University of Nebraska, 1998
USDA-ARS Northern Great Plains Research Laboratory, Mandan, ND
Research Area/Activity: Soil Quality, Soil Carbon Dynamics, Greenhouse Gas Flux, Semiarid Agroecosystems

Stephen D. Merrill, Ph.D.
University of California, Riverside, 1976
USDA-ARS Northern Great Plains Research Laboratory, Mandan, N.D.
Research Area/Activity: Soil Erosion Processes; Crop Root Growth and Soil/Crop Hydrology; Mined Land Reclamation

Jill Motschenbacher, Ph.D.
University of Arkansas, 2012
North Dakota State University, Fargo, ND
Research Area/Activity: Soil Physics, Sustainable Cropping Systems

Kristine Nichols, Ph.D.
University of Maryland, 2003
USDA-ARS Northern Great Plains Research Laboratory, Mandan, ND
Research Area/Activity: Soil Microbiology and Aggregate Stability

Laura F. Overstreet Gentry, Ph.D.
North Carolina State University, 2005
Assistant Professor, University of Illinois Urbana-Champaign
Research Area/Activity: Soil Fertility, Grain Crops, Bioenergy Crops, Crop Management, Environmental Systems

Jimmie L. Richardson Ph.D.
Iowa State University, 1974
Research Area/Activity: Soil Salinization, Soil Development in Wetlands, Hydrologic Patterns, Sedimentation

James A. Staricka, Ph.D.
University of Minnesota, 1990
Williston Research Extension Center,
Research Area/Activity: Soil and Water Conservation and Nutrient Use Efficiency in Dryland and Irrigated Crop Production

Donald L. Tanaka, Ph.D.
University of Nebraska, 1980
USDA-ARS Northern Great Plains Research Laboratory, Mandan, ND
Research Area/Activity: Dryland Integrated Agricultural Systems, Soil and Crop Ecological Interactions

Statistics

Department Information

- **Department Chair:**
  Rhonda Magel, Ph.D.
- **Department Location:**
  221 Morrill Hall
- **Department Phone:**
  (701) 231-7177
- **Department Email:**
  ndsu.stats@ndsu.edu
- **Department Web Site:**
  https://www.ndsu.edu/statistics/
- **Application Deadline:**
  Application deadline is March 15 for international students and applicants who would like an opportunity for an assistantship if available.
- **Degrees Offered:**
  Ph.D., M.S., Certificate
- **Test Requirement:**
  GRE (recommended)
- **English Proficiency Requirements:**
  TOEFL iBT 79; IELTS 6.5

Program Description

The Department of Statistics offers programs leading to a Ph.D. in statistics or a master's degree in applied statistics. The program is flexible enough to be individually planned around prior experience and in accord with professional goals.

During the first year of the program, students are strongly encouraged to meet with each faculty member to discuss possible research topics. The student should select an advisory and examining committee by the end of the first year.

A joint master's degree in computer science and statistics may also be obtained. A graduate certificate in Statistics for non majors is also offered.

Graduate Certificate

- B.S. or equivalent degree from an accredited university,
- Knowledge of College Algebra

Master's Program in Applied Statistics

In addition to the Graduate School requirements (p. 1086), the applicant must:

- Have had at least one year of calculus,
- Have had at least one course in statistics, and
- Have had at least one programming language

Joint Master's Program in Computer Science and Statistics

To be admitted with full status into the M.S. program in computer science and statistics, the applicant must satisfy the admission requirements for both the M.S. program in computer science and the M.S. program in applied statistics.

Ph.D. Program in Statistics

In addition to the Graduate School requirements, the applicant must:

- Have an M.S. degree in statistics or related area

Students not holding a master's degree in statistics or a closely related field will not be admitted to the Ph.D. program in statistics. These students must first apply to the M.S. program in applied statistics and complete the M.S. degree.

Ph.D. Program in Statistics (with Emphasis in Sports Statistics)

In addition to the Graduate School requirements, the applicant must:

- Have an M.S. degree in statistics or related area and some knowledge or interest in sports

Financial Assistance

Teaching assistantships are available. To be considered for an assistantship, the application must be complete with the Graduate School no later than March 15.

Graduate Certificate

The graduate certificate requires 12 semester credit hours consisting of graduate level courses in statistics. STAT 725 needs to be the first course taken for students with little or no prior knowledge of statistics. No credit will be given for STAT 725 for the certificate if it is not the first course taken. Students in the certificate program should not take both STAT 661 and STAT 726. STAT 726 is recommended. Also, students in this program should not take both STAT 670 and STAT 671. After completing the requirements for the certificate, please contact the Department of Statistics to verify completion.

Code	Title	Credits
STAT 670	Statistical SAS Programming	3
STAT 671	Introduction to the R Language	3
STAT 725	Applied Statistics (must be taken first or no credit will be given)	3
STAT 726	Applied Regression and Analysis of Variance	3
or STAT 661	Applied Regression Models	
Total Credits		12

Master of Science in Applied Statistics

The program for the M.S. degree in applied statistics requires 32 semester credits with an overall GPA of 3.0 or higher. An oral defense of a research-based thesis or paper is required.

Code	Title	Credits
Complete a set of core courses* with a grade of B or better, including		
STAT 661	Applied Regression Models	3
STAT 662	Introduction to Experimental Design	3
STAT 764	Multivariate Methods	3
or STAT 774	Generalized Linear Models	
STAT 767	Probability and Mathematical Statistics I	3
STAT 768	Probability and Mathematical Statistics II	3
Successfully complete two 1-credit practicums in consulting. Each statistical practicum will be listed as STAT 794		2
Complete an additional 9-12 hours (depends on number of research hours) of course work selected from the following courses:		9-12
STAT 660	Applied Survey Sampling	
STAT 663	Nonparametric Statistics	
STAT 664	Discrete Data Analysis	

STAT 669	Introduction to Biostatistics
STAT 670	Statistical SAS Programming
STAT 671	Introduction to the R Language
STAT 672	Time Series
STAT 673	Actuarial Statistical Risk Analysis
STAT 677	Introductory Survival and Risk Analysis I
STAT 678	Introductory Survival and Risk Analysis II
STAT 730	Biostatistics
STAT 732	Introduction to Bioinformatics
STAT 770	Survival Analysis
STAT 775	Using Statistics in Sports
STAT 786	Advanced Inference
STAT 796	Special Topics
STAT 851	Bayesian Statistical Inference
STAT 859	Applied Spatial Statistics
STAT 798	Master's Thesis
or STAT 797	Master's Paper
Must have 15 hours of 700-800 level courses.	

*If one of these courses has been taken at the undergraduate level, another graduate level course should be substituted. STAT 725 Applied Statistics and STAT 726 Applied Regression and Analysis of Variance will not be counted for this degree program.

- A plan of study must be submitted at least one semester prior to graduation.
- Pass a written comprehensive exam. This exam consists of two sections. Exam 1 covers STAT 767 Probability and Mathematical Statistics I and STAT 768 Probability and Mathematical Statistics II. Exam 2 covers STAT 661 Applied Regression Models, STAT 662 Introduction to Experimental Design and STAT 764 Multivariate Methods or STAT 774 Generalized Linear Models. Exam 1 is two hours and Exam 2 is three hours. These exams are offered during approximately the fifth week of each semester. A maximum of two attempts is allowed.
- Complete and successfully defend the research thesis or paper.

M.S. Degree in Computer Science and Statistics

Code	Title	Credits
Statistics Courses		
STAT 661	Applied Regression Models	3
STAT 671	Introduction to the R Language	3
STAT 669	Introduction to Biostatistics	3
STAT 772	Computational Statistics	3
STAT 732	Introduction to Bioinformatics	3
One additional graduate course in statistics, not including STAT 725 Applied Statistics or STAT 726 Applied Regression and Analysis of Variance		
Computer Science Courses		
CSCI 713	Software Development Processes	3
CSCI 724	Survey of Artificial Intelligence	3
CSCI 732	Introduction To Bioinformatics	3
CSCI 765	Introduction To Database Systems	3
Two additional graduate level courses in computer science.		
Master's Thesis or Master's Paper Research Credits		
Total Credits		42

Ph.D. Degree in Statistics

The program for the Ph.D. degree requires an additional 30 credits of course work beyond the M.S. degree and 30 hours of research. An oral defense of a dissertation is required. All students entering program must have an M.S. degree in statistics or closely related field. Any core course (or similar

course) required for the M.S. degree that has not been taken before entering the Ph.D. program, must be taken before obtaining the Ph.D. degree. This may require additional course work beyond the 30 credits depending on the area in which the M.S. degree was obtained.

Successfully complete two 1-credit practicums in Consulting/Presentation Practicum. Each statistical practicum will be listed as **STAT 794** Practicum/Internship

Complete at least 30 semester credits of statistics courses at the 600- to 800-level (does not include STAT 725 Applied Statistics STAT 726 Applied Regression and Analysis of Variance). At least 15 credits must be at the 700- to 800-level. Students must take STAT 786 Advanced Inference , STAT 764 Multivariate Methods and STAT 774 Linear Models I if not taken at the M.S. level.

Upon approval by the adviser and advisory committee, up to 9 hours may be taken in Mathematics or Computer Science. It is recommended that a student have knowledge of real analysis at some level such as MATH 650 Real Analysis I .

- A plan of study must be submitted at least one semester prior to graduation.
- Pass a written comprehensive exam. This exam consists of two sections. Exam 1 covers STAT 767 and STAT 768. Exam 2 covers STAT 661, STAT 662 and STAT 764 or STAT 774. Exam 1 is two hours and Exam 2 is three hours. These exams are offered during approximately the fifth week of each semester. A maximum of two attempts is allowed.
- Submit a research proposal and pass an oral exam on the proposal and related topics.
- Complete and successfully defend the research dissertation.

Code	Title	Credits
Core Courses		
STAT 661	Applied Regression Models	3
STAT 662	Introduction to Experimental Design	3
STAT 764	Multivariate Methods	3
or STAT 774	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

Ron Degges, Ph.D.
North Dakota State University, 2011
Field: Sampling, Regression Analysis

Seung Won Hyun, Ph.D.
University of Missouri, 2010
Field: Optimal Designs, Adaptive Designs, Clinical Trials

Rhonda Magel, Ph.D.
University of Missouri-Rolla, 1982
Field: Nonparametrics, Inference Under Order Restrictions, Regression

Megan Orr, Ph.D.
Iowa State University, 2012
Field: Biostatistics, Gene Expression Analysis, High-Dimensional Data, Analysis and Multiple Testing

Gang Shen, Ph.D.
Purdue University, 2009
Field: Mathematical Statistics, Asymptotic Theory, Bayesian Analysis, Change-Point Problem

Yarong Yang, Ph.D.
Northern Illinois University, 2010
Field: Machine Learning, Spatial Statistics, Bayesian Statistics, Bioinformatics

STEM Education

Department Information

- **Acting Program Director:**
  Jeffrey Boyer, Ph.D.
- **Department Location:**
  Deans Office, College of Science and Mathematics
- **Department Phone:**
  (701) 231-5953
- **Department Web Site:**
  www.ndsu.edu/csme/stem_education_graduate_programs/
- **Degrees Offered:**
  Ph.D. (Dual Major in STEM Education and STEM discipline is an option)
- **English Proficiency Requirements:**
  TOEFL iBT 88, IELTS 6.5

Program Description

Applicants are invited for NDSU's interdisciplinary Ph.D. program in Science-Technology-Engineering-Mathematics (STEM) Education. The program conducts and disseminates empirical research to improve STEM learning and teaching in higher education.

Coursework centers on graduate-level courses in the discipline area, a common core of STEM Education courses, and elective courses focused on research training. An interdisciplinary team of faculty supervised the candidate's dissertation research, which will investigate teaching and learning within/across one or more STEM disciplines.

Although interdisciplinary in nature, graduate students in the STEM Education Ph.D. Program have an academic home in the STEM department/program of their discipline preference. Graduate committee membership includes faculty from the STEM Education program and from the department/program of discipline preference.

Applicants will not be considered without a core faculty member who has agreed to serve as the major advisor.

Applicants for the STEM Education PhD program must meet at least one of the following criteria:

- Completed a Masters (or PhD) degree in a STEM discipline.
- Accepted into an NDSU Master's program in a STEM discipline.
- Accepted into an NDSU PhD program in a STEM discipline.

The program requires 60 semester hours beyond the Master's Degree. Additionally, by completion of the doctorate, the coursework must include either a Master's Degree or its equivalent coursework in the chosen STEM discipline (this applies if the Master's Degree is in Education or another related field). In consultation with the student's graduate committee, a plan of study will be developed to ensure that the student has a strong background in

1. discipline-based educational research at the undergraduate level,
2. curriculum, teaching, learning, and assessment, and
3. content expertise within a discipline.

Students enrolled in program must maintain an overall GPA of at least 3.0 both within the content area and STEM courses. If the GPA in either component should drop below 3.0, then the student is placed on academic probation within the program for the following semester. If at the end of that semester the GPA still remains below 3.0, the student is subject to dismissal from the program.

Core Faculty

Jeff Boyer, Director STEM Education

Abraham Ayebo, Mathematics/Education

Warren Christensen, Physics/STEM Education

Mila Kryjevskaia, Physics/STEM Education

William Martin, Mathematics

Jennifer Momsen, Biology/STEM Education

Lisa Montplaisir, Biology/STEM Education

James Nyachwaya, Chemistry/Education

Affiliate Faculty

Julia Bowsher, Biological Sciences

John Buncher, Physics

Angela Hodgson, Biological Sciences

Teacher Education

Department Information

- **School of Education Head:**
  Chris Ray, Ph.D.
- **Program Coordinator:**
  Stacy Duffield, Ph.D.
- **Department Location:**
  School of Education, FLC 210
- **Department Phone:**
  (701) 231-7921
- **Department Web Site:**
  www.ndsu.edu/education/
- **Application Deadline:**
  International applications are due May 1 for fall semester and August 1 for spring semester. Domestic applicants should apply at least one month prior to the start of classes.
- **English Proficiency Requirements:**
  TOEFL iBT 88, IELTS 6.5

Program Description

The School of Education offers graduate study leading to the Master of Education (M.Ed.) and Master of Science (M.S.) degrees. Graduate majors are offered in the following areas: Curriculum and Instruction, Agricultural Education, English Education, Family and Consumer Sciences Education, History Education, Mathematics Education, Music Education, Science Education, Social Science Education and Teacher Licensure.

Curriculum and Instruction

The program focuses on further development of teacher leaders through study of instructional delivery and enhancement. The program curriculum includes areas of human development, learning, foundations of education, school curriculum, roles of schools and society, and further study in areas of interest. Candidates choosing this option for an M.S. degree must also complete a thesis.

Agricultural Education (p. 249)

Agricultural Education offers graduate study leading to the M.Ed. and M.S. degrees. Advanced work may involve specialized training in vocational education, extension education, international extension, and agricultural education.

Degree programs are planned cooperatively to meet the needs of individual students. Candidates are encouraged to include supporting work relevant to subject matter areas of interest. Some courses focus on problems related to various phases of Agricultural Education, including secondary, post-secondary, adult, and extension programs. Others emphasize issues common to all service areas in agricultural and extension education. Provision may be made for candidates to include internships in agribusiness, natural resources education, or other aspects of agricultural and extension education in their programs. Candidates should work closely with an adviser.

English Education

Content-focused master's degree program in Teacher Education focus on increasing both pedagogical skills and content expertise. Candidates in these programs complete the four core pedagogical courses listed on the program of study and at least nine credits of master's-level content coursework; the total program of study is typically 33-36 credits. Candidates work with their graduate committee and adviser to identify an appropriate plan of study. This degree plan does not lead to teacher licensure, and candidates are encouraged to work their advisers if licensure is desired.

Family and Consumer Sciences Education (p. 347)

Students have the option of pursuing a Master of Education (M.Ed.) or Master of Sciences (M.S.) degree in Family and Consumer Sciences Education. Advanced work may be taken in FCSE, Career and Technical Education, Extension, and curriculum design and development.

History Education

Content-focused master's degree program in Teacher Education focus on increasing both pedagogical skills and content expertise. Candidates in these programs complete the four core pedagogical courses listed on the program of study and at least nine credits of master's-level content coursework; the total program of study is typically 33-36 credits. Candidates work with their graduate committee and adviser to identify an appropriate plan of study. This degree plan does not lead to teacher licensure, and candidates are encouraged to work their advisers if licensure is desired.

Mathematics Education

Content-focused master's degree program in Teacher Education focus on increasing both pedagogical skills and content expertise. Candidates in these programs complete the four core pedagogical courses listed on the program of study and at least nine credits of master's-level content coursework; the total program of study is typically 33-36 credits. Candidates work with their graduate committee and adviser to identify an appropriate plan of study. This degree plan does not lead to teacher licensure, and candidates are encouraged to work their advisers if licensure is desired.

Music Education (p. 393)

The Master of Education (M.Ed.) degree with a Music Education option is a dual program offered collaboratively by the School of Education and the Department of Music. The program is designed to facilitate the needs of currently working music teachers as well as students who wish to continue their education to the master's level after having completed the baccalaureate degree. It is possible to complete the M.Ed. degree in Music Education by attending three consecutive summer sessions, two years in residence during the academic year, or a combination of both. Most courses in the degree program are offered in the late afternoon or evening. Applied study may be in the areas of vocal, instrumental, or conducting. Students electing the choral emphasis will take vocal pedagogy and survey of choral literature. Students electing the instrumental emphasis will take instrumental pedagogy (woodwind, brass, or percussion) and survey of band literature. No thesis is required; rather, students will complete 2 three-credit hour practicum experiences: one in education and one in music. The practica will be agreed upon and planned jointly by the student and his/her adviser(s).

Science Education

Content-focused master's degree program in Teacher Education focus on increasing both pedagogical skills and content expertise. Candidates in these programs complete the four core pedagogical courses listed on the program of study and at least nine credits of master's-level content coursework; the total program of study is typically 33-36 credits. Candidates work with their graduate committee and adviser to identify an appropriate plan of study. This degree plan does not lead to teacher licensure, and candidates are encouraged to work their advisers if licensure is desired.

Social Science Education

Content-focused master's degree program in Teacher Education focus on increasing both pedagogical skills and content expertise. Candidates in these programs complete the four core pedagogical courses listed on the program of study and at least nine credits of master's-level content coursework; the total program of study is typically 33-36 credits. Candidates work with their graduate committee and adviser to identify an appropriate plan of study. This degree plan does not lead to teacher licensure, and candidates are encouraged to work their advisers if licensure is desired.

Teacher Licensure

The Teacher Licensure option allows students with a degree in teachable major to complete professional education coursework to earn teacher licensure. The program is aligned with ND teacher licensure options but transfers well to other states. Additional content coursework may be needed to meet licensure requirements and will be evaluated upon entry to the program. The Praxis Core Academic Skills exam is required for full admission to the program. Contact the Teacher Education program for a transcript evaluation to determine a plan of study.

The graduate program in Teacher Education is committed to the further development of educational leaders who are dedicated to educational equity for all persons. The Teacher Education graduate program is aligned with the National Board for Professional Teaching Standards (NBPTS) to reflect the importance of applied research and content development of educators. Programs offered in Teacher Education are designed for the practitioner. Students pursuing the M.Ed. will engage in action research as a component of the program. Students are encouraged to work closely with an academic adviser to ensure that personal and professional goals are clear and achievable. Some of the options with unique features are described in more detail below and on the next page.

The NDSU programs in education are accredited by National Council for Accreditation of Teacher Education and are approved by the ND Education Standards and Practices Board. Changes in national and state legislation, standards, or rules can affect academic program requirements.

Qualified students may apply for admission to graduate programs in the School of Education leading to Master of Education (M.Ed.) or Master of Science (M.S.) degrees.

In addition to the Graduate School's required application materials, the program requires submission of a statement of career goals consistent with the five propositions of the National Board of Professional Teaching Standards (NBPTS) (http://www.nbpts.org), as well as reasons for applying to

the program. The School of Education reserves the right to obtain additional information about the student's professional competence from qualified professionals.

In addition to meeting the requirements stated above, applicants must meet two additional requirements for the **Teacher Licensure** option:

1. Hold a bachelor's degree in a content area related to a teaching major offered at NDSU, including the following: biology, chemistry, earth science, English, French, health, history, mathematics, music, physics, or Spanish. If you hold a different major, consult with program faculty for additional information.
2. Pass the Praxis Core Academic Skills exam, meeting ND cut scores in reading, writing and math.
3. Complete 20 hours working with youth. Verification forms are provided in the application system.

Admission is considered only after all required application materials have been received and reviewed. Where appropriate, all international student requirements must be met.

Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data. A student must meet all requirements for full admission.

Financial Assistance

Graduate assistantships are available in the School of Education. Applications are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. Students must be accepted into the Graduate School before they are eligible for an assistantship.

All enrollments in Education courses before the student files a graduate plan of study must be approved by the adviser. The School of Education will evaluate graduate courses taken prior to filing the graduate plan of study when the student's plan of study is being considered. Only those courses approved by the School of Education may be included on the final plan of study leading to the degree. Master's programs within the School of Education require a minimum of 30 semester credits (minimums vary by academic program). The Master of Science (M.S.) degree requires a disquisition. The Master of Education (M.Ed.) degree is a non-disquisition, practitioner-oriented degree. Programs vary on requiring a written comprehensive exam or a portfolio/oral.

Teacher Education Required Courses

Code	Title	Credits
EDUC 750	Reflective Practice and Research in Education	3
EDUC 751	Students and Their Learning	3
EDUC 752	Curriculum Design and Delivery	3
EDUC 753	Managing/ and Monitoring Learning	3
Major/Concentration		18
EDUC 794	Practicum/Internship (or)	3
EDUC 798	Master's Thesis	6-10

Teacher Licensure Option

Code	Title	Credits
Professional Education Coursework		
EDUC 651P	Instructional Planning, Methods and Assessment	3
EDUC 681P	Classroom Practice/Methods of Teaching I (Some content areas require an additional special methods course, EDUC 682)	3
EDUC 685P	Student Teaching Seminar	1
EDUC 686	Classroom Management for Diverse Learners	3
EDUC 689	Teaching Students of Diverse Backgrounds	3
EDUC 724	Advanced Educational Psychology	3
EDUC 775	Content Area Reading	2
Content Area & Elective Coursework		
Practicum		
EDUC 687P	Student Teaching	9
EDUC 688P	Applied Student Teaching	3

Core Faculty

Mari Borr, Ph.D.
University of North Dakota, 2005

Research Interests: Qualitative Research, Family and Consumer Science Education, Adolescent Development, Experiential Learning, and Professional Development Evaluation

Stacy Duffield, Ph.D.
University of North Dakota, 2003
Research Interests: Middle School, Literacy, Learning Theory, and Instructional Practices

Jeanette Hoffman, Ph.D.
University of St. Thomas, 2006
Research Interests: Multicultural education, Social justice education, Assessing student learning

Adam A. Marx, Ph.D.
University of Missouri, 2014
Research Interests: Adolescent Career Decision-Making, Student Engagement, Teacher Development

Larry Napoleon, Ph.D.
The Pennsylvania State University-University Park, 2009
Research Interests: Student Options and Retention, Career and Technical Education, Historically Disenfranchised Learners, African-American History

James M. Nyachwaya, Ph.D.
University of Minnesota, 2012
Research Interests: High School And College Students' Conceptual Understanding of the Particulate Nature of Matter, Pre-Service And In-Service Teachers' Pedagogical Content Knowledge (PCK) of Chemistry/Science

Florin Salajan, Ed.D.
Columbia University, 2007
Research Interests: Areas Of Expertise: Interactive Learning Technologies; Educational Technology Effectiveness For Teaching And Learning; Generational Attitudes Toward Learning Technologies; Comparative E-Learning; European Higher Education Policies; International Education

Teresa Shume, Ph.D.
University of North Dakota, 2013
Research Interests: Place-based Environmental Education, Socio-Scientific Issues, Ecojustice Theory and Practice, Systems Thinking, Content-Area Language Instruction

Justin J. Wageman, Ph.D.
University of North Dakota, 1999
Research Interests: Standards, Curriculum, Instruction, Assessment, Professional Development and Evaluation

Associate Faculty

Abraham Ayebo, Mathematics Education

Ashley Baggett, History Education

Warren Christensen, Physics/STEM Education

Mila Kryjevskaia, Physics/STEM Education

Jenny Linker, Physical Education

William Martin, Mathematics/STEM Education

Lisa Montplaisir, Biology/STEM Education

Warren Olfert, Music Education

Kelly Sassi, English Education

Michael Weber, Music Education

Technology Enhanced Curriculum

Department Information

- **Head, School of Education:**
  Chris Ray, Ph.D.
- **Graduate Coordinator:**

Nate Wood, Ph.D.

- **Degrees Offered:**
  Certificate

Transportation and Logistics

Department Information

- **Program Director:**
  Denver Tolliver, Ph.D.
- **Department Chair:**
  Joseph Szmerekovsky, Ph.D.
- **Academic Coordinator:**
  Jody Bohn Baldock
- **Email:**
  jody.bohn.baldock@ndsu.edu
- **Department Location:**
  Upper Great Plains Transportation Institute, Quentin Burdick Building 448
- **Department Phone:**
  (701) 231-7767
- **Department Web Site:**
  www.ndsu.edu/business/departments/tl/
- **Application Deadline:**
  March 1 for fall semester, October 1 for spring semester
- **Degrees Offered:**
  Ph.D.
- **Test Requirement:**
  GRE (GMAT may be substituted)
- **English Proficiency Requirements:**
  TOEFL iBT 71, IELTS 6

Program Description

The Department of Transportation, Logistics and Finance offers a Ph.D. degree in Transportation and Logistics (TL). The degree is awarded through the College of Business in collaboration with the Upper Great Plains Transportation Institute to provide high quality assistantships for students. The program takes an interdisciplinary approach to transportation and logistics and attracts students with backgrounds in transportation and logistics, as well as agribusiness, applied economics, civil engineering, construction management, emergency management, finance, geosciences, industrial/manufacturing engineering, and supply chain management.

Admission Requirements

The Transportation and Logistics Ph.D. program is open to qualified graduates of universities and colleges of recognized standing. To be admitted with full standing, the applicant must:

1. Hold a master's degree (preferred) from an educational institution of recognized learning, baccalaureate degree a minimum.
2. Have adequate preparation in one or more of the disciplines comprising transportation and logistics
3. Have shown the potential to undertake advanced study and research as evidenced by prior academic performance
4. Have earned a cumulative grade point average of at least 3.0 or equivalent in all courses completed at the highest education level reached
5. Submit a Graduate Record Examination (GRE) score at the time of the application. If a student has a recent GMAT score it may be substituted for the GRE.
6. Submit an NDSU Graduate School application consisting of the application, letter of intent, official transcripts, letters of reference, and English proficiency scores (if applicable). Additional documents that may be submitted could include resume and professional vita. Applications for admission will be submitted via the Graduate School website before March 1 for Fall semester and October 1 for Spring semester. Applicants must meet all application requirements of the graduate school and department before being considered for acceptance.

Students who do not meet all requirements for admission or have deficiencies in prerequisite course work, but show satisfactory potential for graduate study, may be admitted conditionally. The conditional status may be changed to full graduate standing after the first or second semester of study, based on the student's academic performance.

The Transportation Infrastructure and Capacity Planning option is restricted to students with undergraduate degrees in Civil or Construction Engineering. A student wishing to pursue an area of concentration in Transportation Economics and Regulation must have completed intermediate-level microeconomics and taken at least one course in macroeconomics. In order to pursue an area of concentration in Logistics and Supply Chain Systems, a student must have earned a baccalaureate degree in Agribusiness, Business, Economics, Finance, Industrial Engineering, Management, Marketing, or a related field. All applicants must meet the general program prerequisites of at least one year of calculus and one course in statistics and economics.

Apply for Admission

To apply for admission, please visit the Admission Information page (https://bulletin.ndsu.edu/graduate/admission-information).

Financial Assistance

The number of assistantships vary from year to year, depending on grant availability and the number of students in residence. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research.

To be considered for an assistantship, an applicant must complete a Graduate School application, be accepted by the department, and identify the desire for an assistantship or financial need in the statement of purpose.

Graduate tuition is waived for students with assistantships, but all fees are the student’s responsibility.

Degree Requirements

The Ph.D. program requires the completion of a minimum of 90 credits of graduate study beyond the baccalaureate degree with an overall GPA of 3.0 or higher. Each student must develop a plan of study under the guidance of a faculty adviser and a supervisory committee. Twenty-four of the graduate credit hours must consist of core Transportation & Logistics courses or suitable substitutes. A minimum of 30 credit hours must be taken in the student's area of concentration, including quantitative methods courses related to the concentration. A minimum of 30 credit hours must consist of research-based dissertation credits. The remaining credits may be comprised of technical electives and additional dissertation credits.

Students must take a qualifying examination upon completion of the core courses as identified below. In addition to core courses, transportation elective courses in supply-chain, transportation, and quantitative methods are typically completed after the first year.

The qualifying exam will include two components: (1) core transportation and logistics knowledge and (2) competency in quantitative methods. After passage of the qualifying examination and successful completion of the courses designated in the plan of study, the student may schedule a comprehensive examination. The comprehensive exam includes written and oral components related to the student's area of concentration. The comprehensive exam also includes a dissertation prospectus examination in which the student must present and defend a plan for undertaking and completing a dissertation. After passage of the comprehensive exam and completion of the dissertation, the doctoral candidate must pass a final examination in which the completed dissertation is presented and defended.

Code	Title	Credits
Core Courses (≥ 24 credits)		
TL 757	Intelligent Transportation Solutions	3
TL 782	Highway Planning and Logistics	3
TL 783	Transportation Systems II	3
TL 789	Leadership, Ethics, and Academic Conduct in Transportation	3
TL 831	Modeling for Transportation and Logistics Decision Analysis	3
TL 885	Geospatial Information Systems for Transportation	3
TL 892	Graduate Teaching Experience	1-6
ENGR 770	Quantitative Modeling	3
Transportation Concentration Elective Courses (≥ 9 credits)		
TL 751	Transportation Systems Security	3
TL 752	Transportation Planning and Environmental Compliance	3
TL 753	Transportation System Modeling	3
TL 754	Urban Transportation Systems Analysis	3
TL 755	Context Sensitive Solutions	3
TL 756	Transportation and Land Use Integration	3

TL 781	Program Evaluation	3
TL 785	Spatial Analysis in Transportation	3
TL 786	Public Transportation	3
TL 787	Public Transportation II	3
Supply-chain Concentration Elective Courses (≥ 9 credits)		
TL 715	Introduction to ERP	3
TL 719	Crisis Analysis and Homeland Security	3
TL 721	International Logistics Management	4
TL 725	ERP Configuration	3
TL 733	Case Studies in Logistics	3
TL 735	Practical Data Analytics	3
TL 811	Modeling for Logistics Research	4
TL 823	Contemporary Supply Chain Research	3
TL 829	Supply Chain Risk Management	3
Quantitative Methods Elective Courses (≥ 6 credits)		
COMM 707	Quantitative Research Methods in Communication	3
EDUC 885	Structural Equation Modeling Fundamentals	3
ENGR 771	Probabilistic and Deterministic Methods	3
SOC 700	Qualitative Methods	3
SOC 701	Quantitative Methods	3
Dissertation (≥ 30 credits)		
TL 899	Doctoral Dissertation	1-15

In addition to these courses, technical electives may be selected from graduate courses offered by participating departments, subject to the approval of the student's advisory committee. For a description of potential electives, see the graduate program descriptions for: Agribusiness and Applied Economics (https://bulletin.ndsu.edu/graduate/programs/agribusiness-applied-economics), Business Administration (https://bulletin.ndsu.edu/graduate/programs/business-administration), Civil Engineering (https://bulletin.ndsu.edu/graduate/programs/civil-engineering), Construction Management (https://bulletin.ndsu.edu/graduate/programs/construction-management), and Industrial and Manufacturing Engineering (https://bulletin.ndsu.edu/graduate/programs/industrial-manufacturing-engineering).

Faculty

Raj Bridgelall, Ph.D.
North Dakota State University, 2015
Research Interests: Big Data Analytics, Internet-of-Things (IoT), Cloud Computing; Connected and Autonomous Vehicles (CAV), Shared Mobility, Intelligent Transportation Solutions; Signal processing and mathematical modeling of transportation systems; Remote Sensing with Unmanned Aircraft Systems; Hyperspectral Image Analysis; Radio-frequency identification (RFID); Real-time locating systems (RTLS); Energy Harvesting and massive scale autonomous wireless sensor networks
Department: Transportation and Logistics

Alan Dybing, Ph.D.
North Dakota State University, 2013
Research Interests: Asset management, Energy impacts, Freight transportation, Agricultural transportation, Supply chain management, Transportation economics, Spatial analysis, Transportation systems modeling
Department: Transportation and Logistics

Ranjit Godavarthy, Ph.D.
Kansas State University, 2012
Research Interests: Public transportation in small urban and rural areas, Demand response transit and paratransit research, Bike share research, Roundabouts research, Traffic engineering and operations, Transportation and highway safety
Department: Transportation and Logistics

Jill Hough, Ph.D.
University of California-Davis, 2007
Research Interests: Public transportation in rural and small urban locations, Workforce development, Mobility of the aging, Transportation planning and policy, Intelligent transportation systems
Department: Transportation and Logistics

Michal Jaroszynski, Ph.D.
Florida State University, 2014
Research Interests: Socioeconomic impacts of transportation investments and policies; Travel demand modeling; Transportation funding, finance, and equity; Multimodal transportation systems
Department: Transportation and Logistics

Pan Lu, Ph.D.
North Dakota State University, 2011
Research Interests: Transportation infrastructure management, Freight rail transportation, Multi-mode transportation efficiency, GIS application in transportation, Operations research in transportation, Commercial truck safety, Railway transportation safety, Data mining application in transportation, Transportation resiliency analysis
Department: Transportation and Logistics

Jeremy Mattson, Ph.D.
North Dakota State University, 2017
Research Interests: Public transportation, Transportation economics, Demand modeling, Travel behavior, Built environment
Department: Transportation and Logistics

Diomo Motuba, Ph.D.
North Dakota State University, 2009
Research Interests: Transportation and land use planning, Freight modeling, Transportation economics, Connected automated vehicles, Logistics and supply chain management, Transportation safety
Department: Transportation and Logistics

Joseph Szmerekovsky, Ph.D.
Case Western Reserve University, 2003
Research Interests: Project management and scheduling, Supply chain management and technology, Energy supply chain management, Healthcare logistics
Department: Transportation and Logistics

Denver Tolliver, Ph.D.
Virginia Polytechnic Institute and State University, 1989
Research Interests: Highway systems modeling, Multimodal transportation planning, Freight transportation, Energy and environmental analysis
Department: Transportation and Logistics

Kimberly Vachal, Ph.D.
George Mason University, 2005
Research Interests: Human factors in traffic safety, Healthy community transport, Agricultural and biofuels transportation, CMV safety & security, Containerized and identity preserved grain marketing, Regional economic development
Department: Transportation and Logistics

Transportation and Urban Systems

Department Information

- **Program Director:**
  Denver Tolliver, Ph.D.
- **Department Chair:**
  Joseph Szmerekovsky, Ph.D.
- **Academic Coordinator:**
  Jody Bohn Baldock
- **Email:**
  jody.bohn.baldock@ndsu.edu
- **Department Location:**
  Upper Great Plains Transportation Institute, QBB 448
- **Department Phone:**
  (701) 231-7767
- **Department Web Site:**
  www.ndsu.edu/business/departments/tl/
- **Application Deadline:**
  July 1 for fall semester, December 1 for spring semester
- **Degrees Offered:**

M.S., M.T.U.S., Certificate - All programs offered online only

- **English Proficiency Requirements:**
  TOEFL iBT 71; IELTS 6

Program Description

The Department of Transportation and Logistics offers a Master of Science in Transportation and Urban Systems, a Master of Transportation and Urban Systems and a Certificate in Transportation and Urban Systems. The degree is awarded through the College of Business, which collaborates with the Upper Great Plains Transportation Institute to provide high-quality graduate programs for students. The program takes an interdisciplinary approach to transportation and logistics and attracts students with backgrounds in transportation and logistics, as well as agribusiness, applied economics, civil engineering, construction management, emergency management, finance, geosciences, industrial/manufacturing engineering, and supply chain management.

Master of Science (M.S.) in Transportation and Urban Systems

This degree focuses on: (1) urban transportation systems; (2) relationships between transportation, land use, environment, emergency response, and logistical delivery systems; (3) coordinated planning, operations, and security; and (4) the spatial dimensions of urban systems. The curriculum is built around the topics of: public transportation systems, geographic information systems, freight transportation and logistical delivery systems, urban geography and land use, the environmental impacts of transportation systems, transportation systems security, and the sustainability of transportation and urban systems. The M.S. degree requires a thesis and is targeted at students with strong research interests.

Master of Transportation and Urban Systems (MTUS)

This is a non-disquisition degree that is primarily intended for professional planners and engineers. Students in the M.S. and MTUS programs can select from a common set of courses. However, students enrolled in the non-disquisition (MTUS) program have more opportunities for synthesis of practice and additional course work, with less emphasis on research. Students in this option are required to complete a creative component as coordinated with their advisor.

Certificate in Transportation and Urban Systems

The Certificate in Transportation and Urban Systems is primarily targeted at practicing professionals who wish to gain additional knowledge in the emerging fields of transportation and urban systems. The certificate requires a minimum of 9 course credits from the list of core courses.

Admission Requirements

The Transportation and Urban Systems programs are open to qualified graduates of universities and colleges of recognized standing. To be admitted with full standing, the applicant must:

1. Hold a baccalaureate degree from an educational institution of recognized learning with a minimum grade point average (GPA) of 3.0 or equivalent
2. Have adequate preparation in one or more of the disciplines comprising transportation and logistics and must have professional experience or interests in community practice
3. Have shown the potential to undertake advanced study as evidenced by prior academic performance and have a stated interest in transportation and (for the M.S.) the capability to conduct transportation research
4. Submit official transcripts
5. Submit a two-page resume
6. Submit a one-page "Letter of Intent" outlying your reasons for pursuing the Master of Transportation and Urban Systems
7. Submit three letters of recommendation (NA for Certificate Option)
8. Submit online application through the NDSU Graduate School website
9. International applicants whose first language is not English and who do not possess an U.S. bachelor's degree or higher are subject to additional requirements when they apply for admission. They must meet the minimum requirements on measures of general English language proficiency. The accepted measures of language proficiency are the TOEFL ibT 71 and IELTS 6.

Students who do not meet all requirements for admission or have deficiencies in prerequisite course work, but show satisfactory potential for graduate study, may be admitted conditionally. The conditional status may be changed to full graduate standing after the first or second semester of study, based on the student's academic performance.

Apply for Admission

To apply for admission, please visit the Admission Information page (https://bulletin.ndsu.edu/graduate/admission-information).

Degree Requirements

Master of Science (M.S.) in Transportation and Urban Systems

A minimum of 30 credits is required for the degree of which 21 must be core courses and 3 credits of electives. All students must take a final examination which covers the course work taken by the candidate, as well as the thesis topic as coordinated with their adviser.

Each thesis must be of sufficient depth and quality to warrant at least six (6) graduate credits. However, no more than 10 credits can be earned for any thesis. Each thesis will contribute one of the following:

- New models – may be achieved through the synthesis of several techniques, the modification of existing models, or new applications of analytical techniques to transportation/urban problems.
- Knowledge – may be accomplished through the collection and analysis of original data or the development of innovative planning techniques.

Master of Transportation and Urban Systems (MTUS)

MTUS is a non-thesis degree. However, each student must complete a creative component, which can be a case study, practicum, or paper. In the creative component, a student may develop a case study of a metropolitan region, transit system, or public program. Case studies may include:

1. Comprehensive transportation planning processes in metropolitan areas
2. Urban transit systems or operations
3. Emergency or disaster response case studies or plans
4. Security programs or issues
5. Integrated transportation/environmental plans

The case study must be approved by the student's adviser and should involve transportation and community professionals from federal, state, or local agencies, or private industries. In lieu of a case study, the adviser may approve other activities or outcomes that would comprise the creative component.

A minimum of 30 credits is required for the degree of which 21 must be core courses and 7 credits of electives. A minimum of two (2) credits and a maximum of four (4) credits will be awarded for the creative component.

Certificate in Transportation and Urban Systems

The certificate in Transportation and Urban Systems will consist of a minimum of 9 credits selected from the core courses below. Additional courses may be offered online in the future.

Code	Title	Credits
Core Courses		
TL 751	Transportation Systems Security	3
TL 752	Transportation Planning and Environmental Compliance	3
TL 753	Transportation System Modeling	3
TL 754	Urban Transportation Systems Analysis	3
TL 755	Context Sensitive Solutions	3
TL 756	Transportation and Land Use Integration	3
TL 757	Intelligent Transportation Solutions	3
TL 786	Public Transportation	3
TL 787	Public Transportation II	3
Electives (for M.S. and MTUS)		
TL 711	Logistics Systems	4
TL 721	International Logistics Management	4
TL 723	Advanced Supply-Chain Planning Across the Enterprise	3
TL 729	Adaptive Planning in Logistics Systems	3
TL 731	Logistics Decision Analysis	3
TL 735	Practical Data Analytics	3
TL 789	Leadership, Ethics, and Academic Conduct in Transportation	3
Creative Component (for M.S. and MTUS)		
TL 798	Master's Thesis	
or TL 797	Master's Paper	

Areas of Focus *(for M.S. and MTUS)*

Code	Title	Credits
Spacial Analysis		
GEOG 655	Introduction to Geographic Information Systems	4
GEOG 656	Advanced Geographic Information Systems	3
TL 785	Spatial Analysis in Transportation	3

Code	Title	Credits
Information Systems Technologies		
TL 725	ERP Configuration	3
TL 735	Practical Data Analytics	3

Code	Title	Credits
Enterprise Management		
TL 715	Introduction to ERP	3
TL 727	Organizational Change Management	3

Code	Title	Credits
Transportation Planning		
CE 780	Transportation Planning	3

Code	Title	Credits
Emergency Response and Disaster		
TL 719	Crisis Analysis and Homeland Security	3

Faculty

Raj Bridgelall, Ph.D.
North Dakota State University, 2015
Research Interests: Big Data Analytics, Internet-of-Things (IoT), Cloud Computing; Connected and Autonomous Vehicles (CAV), Shared Mobility, Intelligent Transportation Solutions; Signal processing and mathematical modeling of transportation systems; Remote Sensing with Unmanned Aircraft Systems; Hyperspectral Image Analysis; Radio-frequency identification (RFID); Real-time locating systems (RTLS); Energy Harvesting and massive scale autonomous wireless sensor networks
Department: Transportation and Logistics

Alan Dybing, Ph.D.
North Dakota State University, 2013
Research Interests: Asset management, Energy impacts, Freight transportation, Agricultural transportation, Supply chain management, Transportation economics, Spatial analysis, Transportation systems modeling
Department: Transportation and Logistics

Ranjit Godavarthy, Ph.D.
Kansas State University, 2012
Research Interests: Public transportation in small urban and rural areas, Demand response transit and paratransit research, Bike share research, Roundabouts research, Traffic engineering and operations, Transportation and highway safety
Department: Transportation and Logistics

Jill Hough, Ph.D.
University of California-Davis, 2007
Research Interests: Public transportation in rural and small urban locations, Workforce development, Mobility of the aging, Transportation planning and policy, Intelligent transportation systems
Department: Transportation and Logistics

Michal Jaroszynski, Ph.D.
Florida State University, 2014
Research Interests: Socioeconomic impacts of transportation investments and policies; Travel demand modeling; Transportation funding, finance, and equity; Multimodal transportation systems
Department: Transportation and Logistics

Pan Lu, Ph.D.
North Dakota State University, 2011
Research Interests: Transportation infrastructure management, Freight rail transportation, Multi-mode transportation efficiency, GIS application in transportation, Operations research in transportation, Commercial truck safety, Railway transportation safety, Data mining application in transportation, Transportation resiliency analysis
Department: Transportation and Logistics

Jeremy Mattson, Ph.D.
North Dakota State University, 2017
Research Interests: Public transportation, Transportation economics, Demand modeling, Travel behavior, Built environment
Department: Transportation and Logistics

Diomo Motuba, Ph.D.
North Dakota State University, 2009
Research Interests: Transportation and land use planning, Freight modeling, Transportation economics, Connected automated vehicles, Logistics and supply chain management, Transportation safety
Department: Transportation and Logistics

Joseph Szmerekovsky, Ph.D.
Case Western Reserve University, 2003
Research Interests: Project management and scheduling, Supply chain management and technology, Energy supply chain management, Healthcare logistics
Department: Transportation and Logistics

Denver Tolliver, Ph.D.
Virginia Polytechnic Institute and State University, 1989
Research Interests: Highway systems modeling, Multimodal transportation planning, Freight transportation, Energy and environmental analysis
Department: Transportation and Logistics

Kimberly Vachal, Ph.D.
George Mason University, 2005
Research Interests: Human factors in traffic safety, Healthy community transport, Agricultural and biofuels transportation, CMV safety & security, Containerized and identity preserved grain marketing, Regional economic development
Department: Transportation and Logistics

Admission Information

Admission Requirements

North Dakota State University is fully committed to equal opportunity in employment decisions and educational programs and activities, in compliance with all applicable federal and state laws and including appropriate affirmative action efforts. NDSU does not discriminate in its programs and activities on the basis of age, color, gender expression/identity, genetic information, marital status, national origin, participation in lawful off-campus activity, physical or mental disability, pregnancy, public assistance status, race, religion, sex, sexual orientation, spousal relationship to current employee, or veteran status, as applicable.

Admission to the Graduate College is a selective process intended to identify applicants who are outstanding among recipients of baccalaureate degrees. The following minimum qualifications are required of all students seeking an advanced degree:

1. The applicant must have a baccalaureate degree from an educational institution of recognized standing.
2. The applicant must have adequate preparation in the chosen field of study and must show potential to undertake advanced study and research as evidenced by academic performance and experience.
3. At the baccalaureate level, the applicant must have earned a cumulative grade point average (GPA) of at least 3.0, or equivalent, to attain full standing in a graduate degree program. Applicants whose last degree completed is a graduate degree may be admitted in full standing if the final GPA of that degree is at least 3.0 or equivalent.
4. Each program may set higher qualifications and may require the submission of additional evidence of academic performance.

A student shall be permitted to register for graduate study only after formal admission. Programs make recommendations on all applications, but the final admission decision is the responsibility of the Dean of the Graduate College.

Application Requirements

Complete the Online Application (https://ndusndsugrad.askadmissions.net/emtinterestpage.aspx?ip=application). The application fee is $35. You will be prompted to pay the fee when you have completed all of the required fields in the online application. If you choose to apply to more than one graduate program, you must submit a separate application using a new email address, statement of purpose, and $35 application fee. If you would like to use any other previously submitted documents, please email us at ndsu.grad.school@ndsu.edu.

A Statement of Purpose is required for certificate and degree programs. State your reasons for pursuing graduate study, specifying your special interests within your chosen discipline and including your background preparation in that area. Mention any relevant skills or experience that you have acquired. Please refer to your intended program page to see if it has any additional requirements regarding the statement.

Official transcripts (transcripts in a sealed, stamped envelope from the granting institution and signed by the school official responsible for issuing such records, i.e. Registrar or Controller of Examinations) of all previous undergraduate and graduate records must be received by the Graduate College before the application file is considered complete. When a transcript is submitted in advance of completion of either undergraduate or graduate studies, an updated transcript showing all course credits, grades, and degree completions must be provided prior to initial registration at NDSU.

Online letters of recommendation are required before action is taken on any application. Three recommendations are required unless otherwise noted. **We do not accept paper, emailed, or faxed letters**.

Programs requiring or recommending Graduate Record Examination (GRE) or Graduate Management Admission Test (GMAT) scores are indicated on their information pages. Minimum TOEFL (Test of English as a Foreign Language) or IELTS (International English Language Testing System) scores by program are also listed on English Language Test Score Requirements (https://www.ndsu.edu/gradschool/apply/international).

Application Deadline

All application materials are due at least one month before registration for U.S. applicants; several programs have earlier deadlines. (See program sections (https://bulletin.ndsu.edu/programs-study/graduate) within the Graduate Bulletin for details.)

For international students, the completed application (https://www.ndsu.edu/gradschool/apply/international) and all required documents and test scores must be received by the Graduate College prior to May 1 for fall semester and prior to August 1 for spring semester unless the department has other posted deadlines.This deadline applies to students matriculating from abroad because of the time required to obtain current financial information, determine student status, and issue the appropriate immigration form.

Action on Applications

Admission of all graduate students requires approval by the Dean of the Graduate College. All applicants who have submitted the required application materials will receive notification of their admission decision by email.

Admission of International Students

North Dakota State University welcomes international students as part of the student body, and the Graduate College encourages applications from qualified students throughout the world. More than 25% of the approximately 2,100 graduate students are international.

In addition to meeting the previously stated admission requirements, to qualify for admission in an advanced degree program, all international students must demonstrate proficiency in English and must provide evidence of adequate financial support for themselves and any dependents for the duration of their graduate program.

Language Proficiency for Admission

English proficiency must be demonstrated prior to admission by obtaining a minimum score of 525 (paper-based test) or 71 (internet-based test) on the Test of English as a Foreign Language (TOEFL) or a score of 6 on the International English Language Testing System (IELTS). Some programs require higher scores for admission to their degree programs. The test date must be within two years of the date of the application to the Graduate College. Information about these tests is available on our website (http://www.ndsu.edu/gradschool/prospective_students/international_applicants/english_language_score_requirements/#c41215).

The TOEFL or IELTS score may be waived for students who have been raised in one of the following countries or who have earned a bachelor's degree or higher from a recognized institution in one of the following countries.

Antigua and Barbuda	Liberia
Australia	Mauritius
Bahamas	Micronesia (Federated States of)
Barbados	New Zealand
Bermuda	Nigeria
Canada (except Quebec)	Saint Lucia
Dominica	Saint Vincent and the Grenadines
Gambia	Scotland
Ghana	Sierra Leone
Great Britain	Solomon Islands
Grenada	Trinidad and Tobago
Guyana	United States
Ireland	Zambia
Jamaica	Zimbabwe

Required Student Health Insurance

All international students in F and J status are required by the North Dakota University System (NDUS) to purchase the approved health insurance policy through UnitedHealthcare StudentResources. The charge for health insurance is due no later than the sixth week of each semester, and it is to be paid onto your student account. For more information on payment deadlines and the policy itself, please see the following website: https://www.ndsu.edu/international/insurance.

Immunization Requirements

Please see the NDSU Student Health Service 'Immunization' webpage for important information about immunizations and all other immunization requirements. To familiarize yourself with these requirements, please visit this website: https://www.ndsu.edu/studenthealthservice/immunizations/.

Language Proficiency for Teaching Assistants

There are two recognized categories of teaching assistants:

(1.) Graduate Teaching Assistants (who have direct contact with students) must have one of the following minimum scores:

- TOEFL iBT 81 (speaking 23 or above and writing 21 or above)
- IELTS 7.0 (speaking and writing 6.0 or above)
- PTE Academic 54 (speaking 62 or above and writing 56 or above)

(2.) Graders (who have no direct contact with students) must have one of the following minimum scores*:

- TOEFL iBT 79 (speaking 19 or above and writing 21 or above)
- IELTS 6.5 (speaking 5.5 or above and writing 6.0 or above)
- PTE Academic 53 (speaking 51 or above and writing 56 or above)

*Graders may serve in this capacity for no more than one (1) calendar year. To continue as a GTA, students must meet the GTA language requirements listed under (1.) above OR successfully complete the following courses:

1. LANG 701 English Language and Classroom Skills for International GTAs

2. LANG 702 English Language Tutorial for International GTAs

Admission Status

Graduate students will be admitted under one of the following classifications:

Full Graduate Standing
These students have met all requirements for admission and have been accepted by a program leading to a graduate degree. A student must have full graduate standing to receive a graduate degree.

Conditional Standing
Students in conditional standing do not meet all requirements for admission or have deficiencies in prerequisite course work but show potential for successful graduate study. Evidence must be provided showing that the applicant's potential is not adequately reflected by his or her record. In making this recommendation, the program must specify standards of performance that must be satisfied for a change in status to full graduate standing.

Any student admitted in CONDITIONAL status is automatically placed on academic WARNING until the conditions of admission are met. If a student on academic warning fails to achieve a cumulative GPA of at least 3.0 in the subsequent semester of attendance, the student will be placed on academic probation. The student may not earn more than 12 semester hours of graduate credit while in conditional status.

Non-Degree Enrollment

This category is for individuals who desire to pursue study beyond the baccalaureate degree for personal growth and improvement of skills but not in order to work toward an advanced degree objective. To become a non-degree student, individuals must submit the online application form and fee (and English proficiency test score, if applicable). Students must have the prerequisite courses or background/experience necessary for the course or courses in which they desire to enroll. This may require consultation and approval from course instructors. In courses with limited enrollment, preference will be given to degree-seeking students.

Students enrolled with non-degree status are not eligible for graduate assistantships, tuition waivers, or federal title IV student financial assistance. Students in this category are affiliated with the Graduate College and not an academic program. No more than 10 credits taken under the non-degree status with a grade of B or higher can be transferred to any official program of study should there be, at any future date, a decision to seek degree classification. Professional development graduate courses (numbered 600) are not eligible for graduate degree programs and may be taken without formal admission to NDSU.

Change in Classification
Students enrolled with non-degree status may subsequently desire to be considered for admission to the Graduate College to pursue an advanced degree. Such a change in status may be accomplished for a subsequent term by submitting a complete application to the Graduate College as a degree-seeking student. The student must be acceptable to a specific program. Appropriate course credits (no more than 10) earned in the non-degree status may be used to fulfill graduate degree requirements if approved by the student's program committee and the Dean of the Graduate College. No course taken in the non-degree status for which the grade is less than B will be permitted on a plan of study for a graduate degree.

Graduate College Policies

General Policies

Scholastic Standards

To be in academic good standing and to receive a graduate degree, a student must have a cumulative grade point average (GPA) of at least 3.0.

All courses taken by a graduate student for which grades are given will be used in calculating the GPA. Credits taken as Satisfactory or Unsatisfactory grading are not used in calculating the GPA. When a course has been repeated, both grades will appear on the transcript, but only the second grade will be used in calculating the GPA. A specific course can be retaken only once, and only three total courses can be retaken.

In fulfilling graduate course requirements on any plan of study, only grades of A, B, or C are acceptable. For master's paper (797), master's thesis (798), and doctoral dissertation (899), only the grade of satisfactory (S) is acceptable. For seminar (790/890), graduate teaching experience (792/892), individual study/tutorial (793/893), practicum/internship (794/894), or field experience (795/895), only grades of A, B, C, or S are acceptable for graduate credit.

Programs and/or supervisory committees may require a higher performance than C in certain courses. While some courses may be used for graduate credit with a grade of C, courses with grades of D, F, or U may not be used for graduate credit. Acquisition of more than two grades of C, D, F or U may be grounds for dismissal upon recommendation by the program administrator.

These minimal scholastic requirements apply to each student enrolled in the Graduate College. Additional requirements may exist for certain graduate programs.

Academic Warning

Any student in GOOD STANDING whose cumulative GPA drops to less than 3.0 at any time of attendance is automatically placed on academic WARNING. Any student admitted in CONDITIONAL status because of grade deficiency is automatically placed on academic WARNING. A student on academic WARNING cannot register for the following semester until the grades for the current semester post.

If a student on academic WARNING fails to achieve a cumulative GPA of at least 3.0 in the subsequent semester of attendance, then the student will be placed on academic PROBATION.

Academic Probation

A student on academic PROBATION may not continue the pursuit of a graduate degree program without a recommendation from the appropriate program administrator and a waiver from the Dean of the Graduate College. This recommendation must include a review of the student's current status and a proposed plan of remediation which provides the student an opportunity to return to a cumulative GPA of at least 3.0 within one additional semester (fall or spring) for full-time students and two semesters for part-time students (i.e. students taking 5 credits or fewer).

The remediation plan must be developed in collaboration with the adviser and approved by the graduate program coordinator or department chair; the approved remediation plan has to be submitted to the Graduate College in order to receive a waiver from the Dean of the Graduate College.

This plan must include: #

- the specific course(s) you plan to take #
- verification that the course(s) will be offered #
- the grade you plan to earn in order to return to a cumulative GPA of at least 3.0 within one semester #
- any additional information that addresses past obstacles to academic success (optional).

The remediation plan must be submitted and approved in time for the student to register for the academic term (fall or spring) that immediately follows the term in which the student was placed on probation. If the student does not submit an acceptable plan in time to enroll for the next

academic term (fall or spring), or if the cumulative GPA is not at least 3.0 after the probationary period, the student will be dismissed from his or her graduate program.

A student on academic PROBATION is not eligible for a graduate assistantship or tuition waiver.

Dismissal from the Graduate College

Graduate students may be suspended or dismissed from NDSU as a result of failure to meet our scholastic standards, academic or professional misconduct, insufficient progress toward a degree, failure to meet professional expectations or standards or failure to submit an acceptable remediation plan. Students suspended or dismissed from the Graduate College are not eligible for admission into any degree-granting or certificate program or into non-degree status for a period of at least one calendar year from the date of their suspension or dismissal.

Suspension or dismissal does not become complete until the completion of any appeal process (p. 1105).

Graduate Courses

Courses approved at the 600, 700 and 800 level may be taken for graduate credit and used to satisfy course requirements on the student's graduate plan of study.

Didactic courses are those courses approved for graduate credit numbered 601-689, 691; 700-789,791; 800-889, 891. Courses numbered 690, 692-699, 790, 792-799, 890, 892-899 are considered special or experimental courses and are not to be included as didactic courses on a plan of study.

Courses that a student has used to fulfill the requirements of a baccalaureate degree may not be used on that student's graduate plan of study.

Registration for Research Credit

A student conducting research for the disquisition is to be enrolled in 797, 798 or 899 for the number of credits specified on the plan of study. Such registration is required even in absentia when faculty and/or administration time is consumed in manuscript review, communication, and other forms of assistance.

Enrollment Status

The Graduate School requires students be **registered for at least one credit fall and spring semester** until all degree requirements are completed. Nine credits are considered a full-time graduate load. Graduate Assistants working 20 hours per week are considered full-time if registered for five or more graduate credits.

To receive financial aid, students must be enrolled at least half-time (i.e. 5 credits). Loan deferment may also require full- or half-time status. Eligibility varies with financial aid programs; students should contact their lender for requirements.

Time Limitations

Graduate credit for any course work that is more than seven (7) calendar years old at the time of the final examination cannot be used to satisfy a master's degree program. The analogous time limitation for a doctoral degree is 10 years.

The student will have one (1) year from the date of the final examination to complete the Graduate School disquisition review process and all other degree requirements. Should the disquisition not receive final approval or any other degree requirements not be completed within this time limit, the student must repeat the final examination.

Continuous Enrollment

Students are required to register for at least one credit each semester (fall and spring) until all degree requirements are completed, including Graduate School approval of the thesis, paper, or dissertation. The graduate dean will not approve the degree until the student has registered for the number of credits of research for any semesters not covered by either registration or leave of absence, but not more than four (4) credits total.

A student who has not registered for longer than a continuous two-year period must also reapply for admission and is subject to the degree requirements at the time of readmission.

Leave of Absence

Students who interrupt their graduate program prior to the completion of all degree requirements must obtain a leave of absence, using the Request for Leave of Absence from Graduate Studies form (http://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Forms/Student_Forms/Leave_of_Absence.pdf).

NOTE: Leaves of absence do not amend in any way the seven and ten-year time limitations.

Family and Medical Accommodation Policy for Graduate Students

The Graduate School at NDSU is committed to promoting an environment where students can successfully balance their academic and family responsibilities. The goal of this policy is to provide consistent, equitable treatment to all graduate students, regardless of family status, by providing timeline extensions for completing preliminary/qualifying examinations and by offering modified duties to students experiencing a serious health condition or needing to provide care to a new child or a seriously ill family member.

1. Extensions for Completing Preliminary/Qualifying Examinations, Final Examinations, and/or Disquisitions

Eligibility:

A graduate student is eligible to apply for a time extension on completing preliminary/qualifying examination, final examination, and/or disquisition upon a showing that they are:

1. In good academic standing and making progress toward degree completion, and
2. Undergoing childbirth, caring for their newborn, caring for their child with a serious medical condition, adopting a child, accepting foster placement of a child, experiencing their own serious medical condition, or experiencing a serious medical condition of a spouse/partner or parent for which they have caretaker responsibilities (medical certification may be required).

Length of Extensions:

While each extension granted under this policy will be assessed on a case-by-case basis, absent extraordinary circumstances, the additional time granted by this policy will not exceed two years.

A graduate student undergoing childbirth, adopting a child, or accepting foster placement of a child shall be entitled to receive an extension of up to one extra year for completing preliminary/qualifying examination, final examination, and/or submitting a disquisition.

A graduate student experiencing their own serious medical condition, caring for their child with a serious medical condition, or experiencing a serious medical condition of a spouse/partner or parent for which they have caretaker responsibilities shall be entitled to receive an extension of up to six extra months for completing a preliminary/qualifying examination, a final examination, and/or submitting a disquisition.

Application/Approval Process:

Graduate students who wish to obtain an extension under this policy must document their eligibility in writing to their academic unit prior to the effective date of the extension – retroactive requests will not be considered, absent extraordinary circumstances. The student's academic unit and the Graduate School will then assess the student's eligibility and approve/deny the extension. Additionally, international students on a visa must have their extension approved by the Office of International Programs.

Leave of Absence

Students requesting an extension may also choose to take a leave of absence from their graduate program. International students will need to consult with the Office of International Student and Study Abroad Services to determine if they are eligible for a leave of absence.

2. Modified Duties for Graduate Assistants

Eligibility:

A graduate assistant is eligible for "modified duties" if the graduate assistant:

1. Becomes a parent through childbirth, adoption, or foster placement of a child;
2. Has a health condition that makes him or her unable to perform regular duties but does not necessitate a reduction in workload; or
3. Will be caring for a child, spouse/partner or parent who has a serious health condition.
4. Must have served as a graduate assistant for at least one academic term.

Definition and Length of Modified Duties:

"Modified duties" means a change to duties and goals without reduction of stipend for a limited period of time. A graduate assistant taking modified duties will still be at a 100% workload and 100% stipend; however, the nature of the responsibilities for this time period will be adjusted. Modified duties will include a revision of workload for up to the equivalent of a semester. If warranted and supported by appropriate medical documentation, graduate students can be excused from most, if not all, of their regular duties for up to six weeks without a reduction in pay. All eligible students will be granted a Parental Accommodation period for up to six weeks immediately following the birth of a child or the adoption of a child under the age of 6 for which the student has parental responsibilities. (Additional time may be granted based on medical documentation of exceptional medical circumstances experienced by the student or his/her child, spouse, partner, or dependent parent.)

Regardless of circumstances, modified duties agreements must conclude within 12 months.

Application/Approval Process

A graduate assistant requesting modified duties shall document their request in writing to their supervisor and department chair/head. The graduate assistant and the department will engage in an interactive process to determine how the graduate assistant's duties will be modified and the duration of the modified duties. In the event that an agreement cannot be reached between the graduate assistant and the department, the Dean of the Graduate School shall assist in reaching an agreement. To ensure that all parties are operating under the same understanding, the agreement for modified duties shall be put in writing. Graduate assistants accepting modified duties are subject to the regular evaluation procedures used in the program; however, such evaluations shall be based on the agreed upon modified duties.

Master's Degree Policies

Degrees Offered

Master of Arts (M.A.)/Master of Science (M.S.)

North Dakota State University offers master's degrees in three categories. A program need not offer all three types of master's degrees. The types of degrees offered should be justified based on relevant criteria such as pedagogy or principles appropriate to the field. Programs wishing to grant a Master of Science degree or a Master of Arts degree typically need to satisfy the requirements of either the Plan A or the Plan B option. Candidates for the Master of Arts degree will meet the general requirements and those specific requirements in the humanities or social and behavioral science; these typically include two years of a foreign language.

The Plan C degree is primarily intended for professional degree programs. In addition, the three plans differ in the composition of the student's supervisory committee and required submissions to the Graduate School upon degree completion.

Plan A: Thesis-based Master's

The thesis would typically include a problem statement, a review of existing literature relevant to that problem, and the creation and presentation of new knowledge in providing a solution to the problem. Each student would assemble a supervisory committee as described on the next tab. Each candidate is required to pass a final oral examination in which the supervisory committee serves as the examining committee. Following a successful defense, the candidate will submit an electronic copy of their thesis to the Graduate School for review.

Plan B: Master's Paper/Comprehensive Study-based Master's

The Plan B master's student will develop a thorough understanding of existing knowledge and the ability to apply that existing knowledge to a problem of interest. Note that under this degree, the new knowledge being created is limited, and this is the primary difference between the Plan A and Plan B degrees. The precise nature of the individual creative component is defined by the program. Examples of possible creative components include a comprehensive paper, a portfolio, or an integrated field experience. Candidates for the Master of Arts degree will meet the general requirements and those specific requirements in the humanities or social and behavioral sciences; these typically include two years of a foreign language.

Each candidate would assemble a supervisory committee and pass a final oral examination. Following a successful defense, the candidate will compose an executive summary or assemble other appropriate documentation as defined by the program to be submitted to the Graduate School. This submission to the Graduate College is to be approved by the student's supervisory committee.

Plan C: Culminating Experience-based Master's

Plan C is designed for programs in which a well-defined culminating experience is more important than is an individual creative component. This degree will most frequently be available in professional degree programs. Each program will define a culminating experience such as a capstone course, a written examination, or some other approach to measure the candidate's understanding of the relevant material in the area. The student's supervisory committee would generally consist of faculty solely from within that discipline. The supervisory committee may specify that a certain level of performance (i.e., a minimum GPA) be obtained in specified courses or in the program itself.

Upon completion of the appropriate course work and culminating experience, the candidate must submit to the Graduate School examination documentation (if required by program) and an Application for Graduate Degree.

Professional/Non-Thesis Degree Programs

Master of Accountancy (M.Acc.)

The Master of Accountancy (M.Acc.) program at North Dakota State University is a non-thesis, professional program structured to advance the knowledge of qualified students with an undergraduate accounting degree. The program is designed to have students complete graduate studies

needed to advance their careers whether their career be in public accounting, corporate accounting, or government accounting and prepare them for the Certified Public Accountant (CPA) exam.

Master of Athletic Training (M.A.Trg.)

The Master of Athletic Training is a professional program that is accredited by the Commission on Accreditation of Athletic Training Education (CAATE). The M.A.Trg. will prepare students to take the Board of Certification, Inc. (BOC) examination and earn the 'ATC' credential. Didactic courses and clinical experience courses focus on prevention, assessment, treatment and rehabilitation of injuries resulting from physical activity.

Master of Business Administration (M.B.A.)

The Master of Business Administration degree is a non-disquisition, professional degree program structured to serve qualified students with any undergraduate degree. The program has two general parts: a foundation course requirement involving up to 30 semester credits and an M.B.A. (common body of knowledge) graduate course requirement of 30 semester credit hours.

Master of Construction Management (M.C.M.)

The Master of Construction Management is an online professional program consisting of 30 credits of course work and the Associate Constructor (AC) Exam. The Master of Construction Management is administered through Distance and Continuing Education (DCE) (https://www.ndsu.edu/dce) at NDSU.

Master of Education (M.Ed.)

The Master of Education degree is a non-disquisition, practitioner-oriented degree for teachers and school counselors. Candidates for this degree will meet the general requirements as well as specific requirements established by the School of Education.

Master of Engineering (M.Engr.)

The Master of Engineering in Electrical and Computer Engineering is a course work only program requiring a capstone consisting of a portfolio or written exam. Faculty are experienced researchers in the following areas: Signal Processing Group, Biomedical Engineering, Power/Power Electronics, Integrated Circuit, Electromagnetics, and Computer Engineering. The Department of Electrical and Computer Engineering is also a key contributor to NDSU's Research and Technology Park.

Master of Managerial Logistics (M.M.L.)

The Master of Managerial Logistics is a 36 graduate credit professional degree program targeted specifically at career military officers, Department of Defense civilians, and other logistic professionals.

Master of Music (M.M.)

The Master of Music in performance and conducting is the professional degree in music designed for performers and conductors wishing to augment and refine their skills. The M.M. in Music Education is designed for music teachers who wish to update and increase their practical pedagogical knowledge.

Master of Natural Resources Management (M.N.R.M.)

The Master of Natural Resources Management degree is designed as a professional, non-thesis degree program specifically designed for students holding a Bachelor of Science degree in Natural Resources Management or a closely related field who are seeking an educational opportunity for advanced course work culminating in a professional terminal degree.

Master of Public Health (M.P.H.)

Public health is defined as the practice of helping members of society live healthier, longer lives. More specifically, public health focuses on improving the general health of communities through efforts to monitor the spread of diseases, initiatives (both clinical and policy-oriented) to prevent disease and disability, and by promoting healthy lifestyles through education and community engagement. NDSU offers the M.P.H. degree with specializations in American Indian public health, health promotion, management of infectious disease, and public health in clinical systems.

Master of Software Engineering (M.S.E.)

The Master of Software Engineering degree is a non-thesis, professional degree program for students who want to update or upgrade their credentials in software engineering. The M.S.E. program teaches current skills and knowledge in software engineering, and is offered through on-campus courses or through Distance and Continuing Education.

Master of Transportation and Urban Systems (M.T.U.S.)

The Master of Transportation and Urban Systems is a non-disquisition degree that is primarily intended for professional planners and engineers. Students in the M.S. and M.T.U.S. programs can select from a common set of courses. However, students enrolled in the non-disquisition (M.T.U.S.) program have more opportunities for synthesis of practice and additional course work, with less emphasis on research.

Education Specialist (Ed.S.) in Educational Administration

In addition to offering several Master of Education (M.Ed.) programs preparing candidates for administration credentials in North Dakota, the Educational Leadership program prepares students for Master of Science (M.S.) and Education Specialist (Ed.S.) degrees in Educational Administration. Programs meet certification requirements in the various areas appropriate to elementary and secondary administration.

Supervisory Committee

The supervisory committee should be formed during the term immediately after the major adviser is identified for the student, and members should be identified before the plan of study is formulated so that all committee members have a chance to contribute to the Plan of Study. The supervisory committee agreed upon by the major adviser and student, and approved by the program administrator and the academic dean shall be recommended to the Dean of the Graduate College for final approval.

The supervisory committee will have at least three members. The members consist of:

1. The major adviser, who must be a full or affiliate member of the graduate faculty Level 1 or 2. The student selects the adviser with approval of the program administrator and the Dean of the Graduate College. The major adviser-student relationship must be a mutually acceptable one. The major adviser will act as the chair of the student's supervisory committee and will be in charge of the Plan of Study. The remaining members of the committee must be agreed upon by the student, the major adviser, and the Dean of the Graduate College.
2. A second member, who must be a full or affiliate member of the graduate faculty.
3. A third member, who could be either a faculty member from outside the student's program or a qualified off-campus expert in the field.

If the third member, or additional committee member(s) is not a full or affiliate member of the graduate faculty, the approval of the Dean of the Graduate College is required. To request approval, the Plan of Study must include 1). a memo from the program/department chair explaining the qualifications of and rationale for this person to serve on the committee and 2). curriculum vitae.

Plan of Study

The Plan of Study shall include the specific courses the student is expected to complete and any other special requirements of the particular master's degree that the student is seeking. The Plan of Study must be filed with the Graduate School by the end of the student's second semester of study.

Each program has the responsibility of defining the requirements for a major in its disciplinary area. This information should be made available to students electronically and/or in the program handbook.

Didactic, Greek for "to teach", credits are courses numbered 601-689, 691; 700-789, 791; 800-889 and 891.

Plan A Master's Degree

- Minimum 30 credits total
- 16 of the 30 must be didactic credits
- 6-10 credits of research (798 Master's Thesis)

Plan B Master's Degree

- Minimum 30 credits total
- 21 of the 30 must be didactic credits
- 2-4 credits of research (797 Master's Paper)

Once these minimum requirements have been met, any other graduate courses can be used to satisfy the remaining Plan of Study requirements.The various programs determine which approved graduate courses may be used. For specific requirements, the student should consult the programs.

A student may use up to 10 credits taken as a non-degree NDSU graduate student toward the degree.

Revisions may be made, with the Request for Change form, later as advisable and necessary, but must be approved by the student, adviser, the administrator of the student's program, and the graduate dean.

Time Limitation

Graduate credit for any course work that is more than seven (7) calendar years old at the time of the final examination cannot be used to satisfy degree requirements. The final examination is valid for one year. Should a student not have his/her disquisition approved by the Graduate College or fail to meet other degree requirements, the final examination must be retaken.

If a period of time two years or greater lapses before the disquisition is approved by the Graduate School, the student must reapply, re-defend the thesis and must register for a minimum of two (2) credits. The student's degree will post at the end of the semester in which the disquisition is approved by the Graduate School.

Multiple Graduate Degrees

On occasion, a student may be allowed to work at satisfying the requirements of two graduate degrees concurrently. In completing all program and Graduate College requirements for two degrees, a maximum of nine (9) graduate credits of course work can be applied to both programs of study as approved by all members of both supervisory committees, the two program administrators, the academic dean(s), and the Dean of the Graduate College. *A student pursuing multiple graduate degrees must maintain continuous enrollment in each program.*

The disquisitions must differ substantially and must result from substantial work completed independently in each discipline. There are two final examinations. The appropriate time limitation applies to all course work.

Master's Degree with Two Major Areas

Under special circumstances, a student may pursue one master's degree with two major areas. Such a program must have the concurrent recommendation of the administrators of the two programs. The Plan of Study shall clearly delineate the course work required for each major area. A minimum of 40 credit hours is required, including at least 14 graduate course credits in each of the two major areas. No more than 10 of the required 40 credits shall be research credits under the Plan A master's, while no more than three of the required 40 credits shall be paper credits under the Plan B master's. The student is required to conduct interdisciplinary scholarly work culminating in a disquisition acceptable in both major areas.

Transfer of Credit

All graduate credits used to meet the requirements of a master's degree must be approved by the supervisory committee, the program administrator, and the Dean of the Graduate College. A candidate for the master's degree must petition in order to transfer up to a maximum of 10 semester hours of graduate credit from another institution to satisfy course requirements on the Plan of Study. Credits are transferred at the time the Plan of Study is approved.

Transfer credits

1. Graduate-level course work from regionally accredited colleges or universities (or equivalent for international institutions) is eligible for acceptance in transfer (credits from international institutions can be transferred only if approved by a committee from the student's program);
2. must carry only grades of A or B on a 4.0 scale;
3. must have been earned within a 7-year period at the time of the final examination;
4. must be graduate level;
5. must not be a continuing education, correspondence, extension, or workshop course;
6. must not be internship, individual study, special problem, or research (disquisition) courses, or courses graded Pass/Fail or Satisfactory/Unsatisfactory;
7. must not have been used to fulfill the requirements of a baccalaureate degree;
8. must be verified by an official transcript; and
9. will not be used in calculation of the grade point average.

It is the responsibility of the student to provide official transcripts of graduate courses taken elsewhere to the Graduate College.

NOTE: The Special Problem credits of item (6) above are equivalent to North Dakota State University's 696/796 Special Topic credits.

Final Examination (Plan A and B)

The candidate shall pass a final examination (either oral or written as specified for the degree) before being awarded the master's degree. The supervisory committee shall serve as the examining committee of which the major adviser shall serve as chair.

The final examination shall cover the course work taken by the candidate and also the disquisition, seminar papers, or oral examination paper and fundamental knowledge. Once a date is finalized with the student's supervisory committee, the Notification of Scheduled Examination (https://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Forms/Student_Forms/Request_to_Schedule.pdf) form must be filed with the Graduate College at least two (2) weeks prior to the examination.

The disquisition in a near final form must be given to the committee members no fewer than seven (7) days prior to the examination. If this seven 7-day stipulation cannot be met, the student must either secure the concurrence of all committee members or reschedule the examination. At the conclusion of the examination, the examining committee shall record, in writing, approval or disapproval. The Report of Final Exam (http://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Forms/Student_Forms/Report_of_Final_Examination.pdf) must be filed with the Graduate College within 14 days of the exam.

A negative vote by more than one member of the student's committee will signify failure of the final examination. The student may repeat the examination only upon permission from a majority of the supervisory committee. The committee will set a date at least one month after the failed examination. Exceptions to this time limit will be considered by the graduate dean upon presentation of written justification from the chair of the committee in consultation with the committee.

Should the examination be failed twice, the student will not be given a third examination except by recommendation of the examining committee, program administrator, and special approval of the Dean of the Graduate College following consultation with the Graduate Council.

Continuous enrollment is required (fall and spring semester) until all degree requirements are completed, including Graduate School approval of the thesis or paper. Students defending in the summer semester must register for summer semester. To participate in commencement, the student must have passed the final examination seven (7) days prior to the commencement ceremony.

IRB, IBC, and/or IACUC Approval

If a proposed graduate research project involves human, animal, or biohazard subjects, it must be submitted for review and approval by the Institutional Review Board (IRB), the Institutional Animal Care and Use Committee (IACUC), and/or the Institutional Biosafety Committee (IBC). This process should be initiated by the student after his or her supervisory committee has approved the final research design, because IRB, IBC, and/or IACUC approval must be obtained **before** the research project commences and cannot be granted retroactively. A copy of the appropriate approval letters is required when the dissertation is submitted for editing.

Disquisitions that involve research using humans or animals as subjects or using biohazard materials will not be approved by the Graduate College if such research has not been previously approved by the Institutional Review Board (IRB), Institutional Animal Care and Use Committee (IACUC), or Institutional Biosafety Committee (IBC) as appropriate. Every effort should be made by advisers to see that students are aware of these University requirements.

Filing the Thesis or Paper

After the final examination, the student incorporates all revisions into the disquisition as required by the supervisory committee. Once the corrections are made, students must submit the following items to the Graduate School:

- signed approval page
- IRB/IACUC/IBC Compliance Notification
- disquisition
- disquisition processing fee

The student will have **one (1) year from the date of the final examination** to complete the Graduate School disquisition review process and all other degree requirements. Should the disquisition not receive final approval or any other degree requirements not be completed within this time limit, the student must repeat the final examination. If a period of time two (2) years or greater lapses before the final copy is submitted, the student must reapply to the Graduate College, retake the final examination, register for a minimum of two (2) credits and request an extension.

A degree posts at the end of the semester in which the disquisition is approved and other degree requirements are completed.

Plan of Study

Students in Plan C (professional programs) must submit a Plan of Study (https://www.ndsu.edu/gradschool/current_students/forms/#c225106) by the end of their second semester of course work. Some programs have set curriculum and their own Plan of Study. The chair of the student's supervisory committee/adviser must be a full or affiliate member of the graduate faculty.

Master's course work is valid for seven (7) calendar years after a student matriculates. A leave of absence does not change this 7-year time limit.

Degree Completion

Students in programs not requiring a thesis or paper must complete the Graduation Application (https://www.ndsu.edu/gradschool/graduating_students/non_thesis_masters_programs/#c294203) form and submit it to the Graduate College the semester in which the degree will be completed. There is a $25 processing fee that may be paid online. No transcript or diploma will be issued until this fee is paid.

Doctoral Degree Policies

Degrees Offered

Doctor of Musical Arts (D.M.A.)

The D.M.A. is the terminal professional practical degree in music, designed for performers and conductors wishing to acquire the highest performance abilities.

Doctor of Nursing Practice (D.N.P)

The Doctor of Nursing Practice degree is a clinical doctorate offered for post baccalaureate nurses with specialization as a Family Nurse Practitioner. An individually-tailored program of study for the D.N.P. is also available for the certified advanced practice nurse with a master's degree.

Doctor of Education (Ed.D.)

The Doctor of Education (Ed.D.) is available with two options: 1) Institutional Analysis and 2) Occupational and Adult Education. The degree requires extensive field service involving qualitative and/or quantitative research, leading to a dissertation that will apply a theory at an institution.

Doctor of Philosophy (Ph.D.)

The Doctor of Philosophy degree is awarded in recognition of high scholarly attainment as evidenced by a period of successful advanced study, the satisfactory completion of prescribed examinations, and the development of an acceptable dissertation covering some significant aspect of a major field of learning.

Residence Requirements

Graduate study for the Doctor of Philosophy degree normally requires a minimum of three (3) years of full-time study beyond the baccalaureate degree. A student who has a master's degree or equivalent must devote at least one of the two remaining academic years of study in residence at North Dakota State University.

Language Requirements

Some graduate programs have a language requirement and, if so, the program will determine the language or languages applicable to the candidate's field of study. International students whose native language is not English may satisfy the language requirement in their native language, providing their graduate program approves. In these cases, the basis for proficiency will be the candidate's use of English, rather than the foreign language.

Language proficiency is certified by the Department of Modern Languages.

Supervisory Committee

The supervisory committee should be formed during the term immediately after the major adviser is identified for the student, and members should be identified before the plan of study is formulated, so that all committee members have a chance to contribute to the Plan of Study.

The supervisory committee will have at least four members. The members consist of:

1. The major adviser, who must be a full or affiliate member of the graduate faculty Level 1. The student selects the adviser with approval of the program administrator and the Dean of the Graduate College. The major adviser-student relationship must be a mutually acceptable one. The major adviser will act as the chair of the student's supervisory committee and will be in charge of the Plan of Study. The remaining members of the committee must be agreed upon by the student and the major adviser.
2. A second member, who must be a full or affiliate member of the graduate faculty.
3. A third member, who could be either a faculty member or a qualified off-campus expert in the field. If this committee member is not a full or affiliate member of the graduate faculty, the approval of the Dean of the Graduate College is required. To request approval, the Plan of Study must include 1). a memo from the program/department chair explaining the qualifications of and rationale for this person to serve on the committee and 2). curriculum vitae.
4. The Graduate School Representative (GSR) is chosen by the student, in consultation with the committee chair, at the time of the supervisory committee formation.

   Eligibility Requirements

   The GSR must be

   - a full member of the graduate faculty, AND
   - be either a tenured faculty member outside the committee chair's/co-chairs' home department(s) OR
   - a faculty member outside the primary college of the committee chair/co-chairs.
   - If the student is in an interdisciplinary program, the GSR must also be outside of that program.

- be clear of any conflicts of interest with either the student or the committee chair/co-chairs. Examples of possible conflicts of interest may include budgetary relationships, family or financial, personal relationships, or research and/or publication relationships between the GSR and either the student or the committee chair.

The role of the GSR is to ensure that

- Graduate College policies are followed,
- expectations for the student's performance are reasonable,
- interactions with the supervisory committee are conducted on a professional basis.
- The GSR will sign the exam form as a confirmation that these conditions have been met.

Graduate School Representatives serving on a committee for a program that has been approved by the Graduate College to use an outcomes-based approach to assess doctoral student performance also have the responsibility to document that the process and assessment of the student's performance in the doctoral program match the defined program outcomes.

NOTE: Other qualified individuals may participate as committee members following approval by the graduate dean upon a recommendation accompanied by rationale and curriculum vitae by the appropriate program administrator and academic dean. The supervisory committee agreed upon by the major adviser and student, and approved by the program administrator and the academic dean shall be recommended to the Dean of the Graduate College for final approval.

Each committee member shall have an equal vote in committee decisions. The committee is to assist the student in the preparation of a plan of study and to advise him or her during the period of graduate work. The supervisory committee is encouraged to convene at least once per semester and meet at least once per year to review the progress of the student.

Plan of Study

The Plan of Study should be submitted to the Graduate College for approval at the end of the first year of graduate study and at least one month prior to scheduling the comprehensive/preliminary examination. Revisions may be made, with the Request for Change form, later as advisable and necessary, but must be approved by the student, adviser, the administrator of the student's program, and the graduate dean.

Each program has the responsibility of defining the requirements for a major in its disciplinary area. This information should be made available to students electronically and/or in the program handbook.

Didactic Credit-Based Doctoral Degrees

Didactic, Greek for "to teach", credits are courses numbered 601-689, 691; 700-789, 791; 800-889 and 891.

Bachelor's to Doctoral Degree

- Minimum 90 credits total
- 27 of the 90 must be didactic credits
- 15 of the 27 must be should be 700 or 800 level course work

Master's to Doctoral Degree

- Minimum 60 credits total completed at NDSU
- 15 of the 60 credits must be 700-800 level didactic courses
- Specific programs may required completion of additional credits

Outcomes-Based Doctoral Degrees

Ph.D. programs using an outcome-based curriculum are not expected to include a minimum number of didactic credits. The total number of credits required for a degree is the same as didactic credit based programs, but the credits can be earned through any credit-based academic activity.

Programs must have an approved statement of expected program outcomes and a strategy for measuring the desired outcomes. The program outcomes must include, but are not limited to:

1. Ability to synthesize information
2. Demonstrated ability to think critically
3. Effective written and oral communication skills
4. Mastery of major methods or analytical approaches of the field
5. Ability to contribute creatively to the discipline

6. Professional and ethical behavior standards consistent with the expectations of the discipline
7. Professional and workplace skills necessary to succeed in chosen career path

Changes in curriculum must be submitted through the proper curriculum approval channels (https://www.ndsu.edu/facultysenate/acadaffairs/channels).

Transfer of Credit

All graduate credits used to meet the requirements of a doctoral degree must be approved by the supervisory committee, the program administrator, the academic dean, and the Dean of the Graduate School.

Bachelor's to Doctoral students: the doctorate requires 27 credits of course work, and of these, no more than 12 may be transferred by the petition process.

All transfer credits

1. must be graduate-level course work from regionally accredited colleges or universities (or equivalent for international institutions) is eligible for acceptance in transfer (credits from international institutions can be transferred only if approved by a committee from the student's program);
2. must carry only grades of A or B on a 4-point scale;
3. must have been earned within a 10-year period at the time of the final examination;
4. must be clearly graduate level (a course listed as both graduate and/or undergraduate level will not be transferred);
5. must not be a continuing education, correspondence, extension, or workshop course;
6. must not be internship, individual study, special problem, or research (disquisition) courses, or courses graded Pass/Fail or Satisfactory/Unsatisfactory;
7. must not have been used to fulfill the requirements of a baccalaureate or master's degree;
8. must be verified by an official transcript; and
9. will not be used in calculation of the grade point average.

It is the responsibility of the student to provide official transcripts of graduate courses taken elsewhere to the Graduate College.

NOTE: The special problem credits in item (6) above are equivalent to North Dakota State University 696/796 Special Topic credits.

Time Limitation

Graduate credit for any course work that is more than 10 calendar years old at the time of the final examination cannot be used to satisfy degree requirements. The final examination is valid for one year. Should a student not have his/her disquisition approved by the Graduate College or fail to meet other degree requirements, the final examination must be retaken.

If a period of time two years or greater lapses before the disquisition is approved by the Graduate School, the student must reapply, re-defend the dissertation and must register for a minimum of two (2) credits. The student's degree will post at the end of the semester in which the disquisition is approved by the Graduate School.

IRB, IBC, and/or IACUC Approval

If a proposed graduate research project involves human, animal, or biohazard subjects, it must be submitted for review and approval by the Institutional Review Board (IRB), the Institutional Animal Care and Use Committee (IACUC), and/or the Institutional Biosafety Committee (IBC). This process should be initiated by the student after his or her supervisory committee has approved the final research design, because IRB, IBC, and/or IACUC approval must be obtained **before** the research project commences and cannot be granted retroactively. A copy of the appropriate approval letters are to be included when the dissertation is submitted for editing.

Disquisitions that involve research using humans or animals as subjects or using biohazard materials will not be approved by the Graduate College if such research has not been previously approved by the Institutional Review Board (IRB), Institutional Animal Care and Use Committee (IACUC), or Institutional Biosafety Committee (IBC) as appropriate. Every effort should be made by advisers to ensure that students are aware of these University requirements.

Examinations

The supervisory committee shall serve as the examining committee of which the major adviser shall serve as chair.

A **comprehensive/preliminary examination** will be required of each student after the greater portion of courses has been completed. This examination consists of a written part and an oral part. After passing the comprehensive/preliminary examination, the student will be formally admitted to candidacy for the Doctor of Philosophy degree. At least one academic semester must elapse between the comprehensive/preliminary examination and the final examination.

The **final examination** will be taken after the candidate has completed the course work and dissertation. This oral examination will be concerned primarily with the dissertation, but it may also cover material from course work, especially those courses fundamental to the dissertation. The dissertation in a near final form must be given to the committee members at least seven (7) days prior to the final examination.

Once a date is finalized with the student's supervisory committee, the Notification of Scheduled Examination form (http://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Forms/Student_Forms/Request_to_Schedule_01.pdf) must be filed with the Graduate College at least two (2) weeks prior to the examination.

At the conclusion of each oral examination, the examining committee shall record, in writing, its approval or disapproval of the candidate and file the appropriate report of examination form to the Graduate College within 14 days of the exam.

A negative vote by more than one member of the student's committee will signify failure of either the comprehensive/preliminary examination or the final examination. Upon permission of a majority of the supervisory committee members, a candidate is allowed to take each examination twice. The supervisory committee will set a date at least one month after the failed examination. Exception to this time limit will be considered by the Dean of the Graduate College upon presentation of written justification from the chair of the supervisory committee in consultation with the committee members. Should both attempts to pass an examination result in failure, the candidate may request to take the examination a third time. A request for a third examination requires the support of the supervisory committee and program administrator, and the approval of the Dean of the Graduate College after consultation with the Graduate Council.

Continuous enrollment is required (fall and spring semester) until all degree requirements are completed, including Graduate School approval of the dissertation. Students defending in the summer semester must register for summer semester. To participate in commencement, the student must have passed the final examination seven days prior to the commencement ceremony.

Dissertation Video

Doctoral students are required to submit a three-minute video summarizing their dissertation research for a lay audience. The video should be produced during the final semester of study (specific timing varies by program). Some programs require these videos to be shown to the supervisory committee at the time of final defense, while others do not. Students should consult with their adviser regarding program policies. At a minimum, a student cannot successfully produce the video until the results of his or her research are known.

Dissertation

The dissertation must show originality and demonstrate the student's capacity for independent research. It must embody results of research that constitute a definitive contribution to knowledge.

Filing the Dissertation

After the final examination, the student incorporates all revisions into the disquisition as required by the supervisory committee. Once the corrections are made, students must submit the following items to the Graduate School:

- signed approval page
- IRB/IACUC/IBC Compliance Notification
- disquisition
- disquisition processing fee

The student will have one (1) year from the date of the final examination to complete the Graduate School disquisition review process and all other degree requirements. Should the disquisition not receive final approval or any other degree requirements not be completed within this time limit, the student must repeat the final examination. If a period of time two (2) years or greater lapses before the final copies are submitted, the student must reapply to the Graduate College, retake the final examination, register for a minimum of two (2) credits and request an extension.

A degree posts at the end of the semester in which the disquisition is approved and other degree requirements are completed.

Graduate Certificate Policies

The goal of Graduate Certificate programs at NDSU is to provide course experiences that form a distinct knowledge or skill set identified as a named certificate.

Admission

Students who are currently in a degree program who wish to pursue a certificate program must complete the Add a Certificate to a Degree (http://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Forms/Student_Forms/Add_Certificate.pdf) form available on the Graduate School webpage.

Applicants not currently in a degree program must:

1. Have a baccalaureate degree from an educational institution of recognized standing.
2. Provide official transcripts from each college or university in which they have been enrolled or are currently enrolled (including both undergraduate and graduate course work).
3. Be approved for admission by the program administrator hosting the graduate certificate program and by the Dean of the College of Graduate and Interdisciplinary Studies.
4. Provide a TOEFL (Test of English as a Foreign Language) or IELTS (International English Language Testing System) score equivalent to that needed for the degree programs in the unit. This is required of ALL applicants whose native language is not English.

*NOTE: Admission into a Graduate Certificate program does not guarantee admission into a graduate degree program nor imply the waiver of any requirements for admission into a graduate degree program. A separate application is required for admission to another degree granting program.

Completion

1. Only grades of C or higher will satisfy requirements for course completion. Cumulative GPA on all credits taken at NDSU must be 3.0 or better.
2. Candidates apply for certificate issuance using a form provided by the Graduate College.
3. Courses used to satisfy the Graduate Certificate program requirements cannot be older than seven (7) years at the time the certificate completion is verified.
4. Transcripts will list Graduate Certificate as the name of the completed certificate program.
5. Credits earned toward completion of a certificate also may be used toward the completion of a master's degree.

Origination and planning of each certificate will occur within Graduate Certificate program committees hosted by an academic program. Interdisciplinary programs are encouraged to create certificate programs, and in such cases, primary contributors will be listed as host programs.

Administration of Certificates

The Graduate College oversees the administration of all graduate certificate programs.

1. Certificate programs may be housed in an academic department or be part of a graduate interdisciplinary program. The department chair or the program director may administer the certificate program or may designate a certificate program coordinator. The program coordinator will be responsible for all aspects of the program, including admission, student tracking, and signing the student's Verification of Certificate. Programs are encouraged to have a coordinating committee oversee program assessment, curriculum, and other matters. The student's Verification of Certificate form must be signed by at least two individuals associated with the program, such as the program coordinator and the chair or director. One of the individuals signing the Verification of Certificate form must be a full member of the Graduate Faculty.
2. The program coordinator will provide outcome or descriptive information to the Graduate College that will establish and maintain a website to advertise and explain NDSU graduate certificate programs to potential candidates. The site will list admission requirements and courses for each certificate. The Graduate College must be sure that the site is updated at least annually.
3. Since a certificate is not a degree track, federal Title IV student financial assistance and tuition waivers will not be available for certificate students.
4. Current students may also pursue Graduate Certificate programs.
5. Program administrators will monitor and report certificate completions in program reviews, annual reports, and other summative documents. Faculty should be given credit for certificate participation in merit/tenure considerations.

Approval Process for Graduate Certificate Programs

The approval process will be the same as that of degree programs. The usual supporting documentation is outlined at www.ndsu.edu/facultysenate/acadaffairs/.

Signatures are required from:

1. Program administrator(s) of the host academic program(s)
2. College Curriculum Committee
3. Academic Dean
4. Graduate Council and Dean of the College of Graduate and Interdisciplinary Studies
5. University Academic Affairs Committee
6. Faculty Senate
7. State Board of Higher Education

Curriculum Development

1. Committees will develop programs with a minimum of eight (8)* credits in specific graduate-level courses which can be completed preferably within one year but no more than three years.
   *Different certificates may have higher credit requirements.
2. Transfer credit may not be applied to a certificate program.

Graduate Assistantship Policy

Graduate assistants are typically full-time graduate students who participate in teaching, research, or administrative activities in exchange for financial support at North Dakota State University. Graduate assistantships contribute to student professional development with the primary purpose of assisting students in the successful completion of their academic program. Students placed on Academic Warning may retain their assistantship. Students placed on Probation may no longer receive an assistantship.

Graduate assistantships may be awarded outside of the student's home program. These assistantships require the continued approval of the graduate program administrator of the student's program, the student's adviser and the Dean of the College of Graduate and Interdisciplinary Studies.

Assistantship appointments may vary in length and are contingent upon the availability of funding. Some assistantships are granted for one academic term or year with reappointment dependent upon performance review. Other assistantships are for multiple years with annual performance reviews. A graduate assistantship can also involve research or teaching experiences conducted at an off-campus entity, such as a university, agency, or business. In these instances, the experience should be clearly linked to the student's program of study and involve a collaborative relationship between NDSU and the outside entity.

Fellowships may be awarded by NDSU or by an outside entity (e.g., a foundation, a government, etc.). Fellowships may require some specific activities, including work in a laboratory or teaching. If a fellowship includes specific activities, the guidelines established in this policy apply.

Eligibility for Assistantships

Recommendations for assistantships are made to the Dean of the College of Graduate and Interdisciplinary Studies and are subject to the dean's approval. Graduate programs may have specific requirements for eligibility.

Before any assistantship can be awarded, students must be admitted to the Graduate School as a degree-seeking student. The tuition waiver may be reduced by other financial awards directed specifically to pay tuition.

- Students must be registered for credit each semester (fall and spring) they receive an assistantship, and must be in good academic standing and maintaining satisfactory progress toward their degree. In addition, international students must maintain the appropriate residency status.
- Teaching assistants whose native language is not English must demonstrate English proficiency (refer to section titled "English Language Proficiency Procedures for Graduate Teaching Assistants").
- Students offered a graduate teaching or graduate service assistantship must consent to a criminal background check.
- Students placed on Academic Warning may retain their assistantship. Students placed on Probation may no longer receive an assistantship.

Expectations of Program/Assistantship Supervisor

Each graduate program must develop a procedure for the awarding of graduate assistantships. The Graduate College requires that a contract be provided to all graduate assistants. This document would specify expectations for the assistantship, including number of hours of work, stipend amount, activities, etc. Programs/assistantship supervisors must provide periodic oral and written assessment and feedback regarding a graduate assistant's performance. This feedback should document areas where improvement is needed, and graduate assistants should be given adequate time to improve in those areas. Feedback should be provided annually at a minimum.

Expectations of Graduate Assistant

Students must dedicate the required number of hours assigned to work each week. Graduate assistants must work a minimum of 10 hours per week for 16 weeks, and must receive at least minimum wage. Graduate assistantships cannot exceed 20 hours per week. Students on full-time assistantships are generally discouraged from having additional off-campus employment.

Students receiving a graduate assistantship or fellowship are expected to maintain good academic standing and satisfactory progress toward their degrees. Please refer to the section on Graduate College Policies for more information.

Students receiving a graduate assistantship are expected to complete required trainings annually (e.g., Baseline Safety Training, Sexual Harassment Prevention Training, Title IX Training) within 30 days of accepting their appointment. Failure to complete training can lead to sanctions, including revocation of the tuition waiver and termination of the assistantship.

Students receiving a graduate assistantship are expected to fulfill their responsibilities adhering to the professional and academic expectations of their discipline and in compliance with NDUS and NDSU policies. Violations of these policies and expectations may result in sanctions, including loss of the assistantship and/or termination from the Graduate College. Adjudication of these violations will occur using NDSU Policy 335.1.

Students on research assistantships may also do related research for course credit. The number of hours of work per credit may vary depending on the discipline/department.

Stipend Levels and Tuition Waivers

Graduate assistantship stipends vary by discipline. A full-time assistantship consists of 20 hours/week. For information on the current minimum stipend level for a full assistantship, refer to graduate student handbooks for the specific department and/or departmental website information. Departments may award stipends of less than the full-time amount, but they must reduce the workload accordingly.

The responsibilities associated with a graduate assistantship may vary in nature. The hour commitment defined by an assistantship may be averaged across a given time period. For example, a teaching assistantship of 20 hours/week should total to 320 hours across the 16 weeks of the academic term. In these cases, students should be given adequate advance notice of these variable expectations so that they can adjust their schedules to meet the requirements of the assistantship. Supervisors must also remain sensitive to the academic demands faced by graduate students.

Students receiving graduate assistantships also receive tuition waivers to cover base tuition for regular NDSU graduate credits only. Students are responsible for any differential tuition, student fees, and tuition for other types of credits taken, such as undergraduate credits, Distance and Continuing Education credits or Cooperative Education credits. To be eligible for a tuition waiver, the assistantship must be at least 160 hours per semester and must pay at least the federal minimum wage. Partial tuition waivers are not given when a graduate assistant works less than 160 hours in the semester. Students who, for any reason, do not complete a minimum of 160 hours in a given semester will not be eligible for that semester's waiver and will be billed for the tuition. The tuition waiver may have limitations depending on the assistantship appointment.

To be eligible for a summer tuition waiver, a student must have department approval and have received a tuition waiver for the preceding or the following academic term (spring or fall semester).

Students eligible for a graduate assistantship waiver may not also receive other NDSU tuition waivers. If a student is eligible for more than one waiver, the waiver which results in the highest tuition to be waived will be applied.

Additional Employment at NDSU or in the NDUS

Graduate assistants on full assistantships are not allowed to work on a second assistantship, as part-time instructors, as student workers, or in any other capacity for NDSU, any other campus in the North Dakota University System, or State of North Dakota agency or office while working as a graduate assistant, unless an exception is approved by the Dean of the College of Graduate and Interdisciplinary Studies ***prior to the work being performed***.

Exceptions may be granted for up to six (6) additional hours (a total of no more than 26 total hours for the assistantship plus additional work). Additional work performed during the winter or spring breaks is allowed. Additional hours may also be appropriate during the summer term, depending upon the student's credit load for the summer term. Any of these exceptions must be recommended in writing by the student's supervisor, approved by the student's adviser and the student's department or program administrator, and forwarded to the Graduate College PRIOR to submission of the payroll form. The approval should then be attached to the payroll form. These steps must be completed in the order described and before the student begins work.

Rights and Privileges of Graduate Assistants

Graduate assistants have certain rights and privileges specific to the assistantship experience:

- The right to be notified in writing of all decisions that affect their status as a graduate assistant. This includes advance notification of evaluation procedures and a summary of their performance evaluation.
- The right to be notified of any complaints received by a supervisor or department chair concerning their performance of duties.
- The right to respond in writing to such complaints.
- The right, depending on the availability of departmental and university resources, to be supported in pursuing additional activities that pertain to their professional development.
- The right to balance their assistantship responsibilities with their responsibilities to their academic program so that they can complete their degree in a timely manner.
- The privilege of being treated as a professional in their chosen field of study.

Termination

Graduate assistants may have their assistantship terminated by the Dean of the College of Graduate and Interdisciplinary Studies, upon recommendation by their supervisor, with documentation of probable cause. Early termination for cause may occur when:

- A student does not abide by the appointment conditions.
- A student fails to perform tasks as assigned.
- A student does not make adequate degree progress.
- A student is placed on Academic Probation.
- A student does not make satisfactory research progress.
- A student fails to maintain minimum registration.
- A student persistently refuses to follow reasonable advice and counsel of faculty in carrying out assistantship obligations.
- A student fails to comply with responsibilities as an employee set forth in the *Graduate Bulletin*, department rules and regulations governing assistantships, or the terms of sponsored research agreements that fund the assistantship.
- A student's personal conduct is seriously prejudicial to the university, including violation of the NDSU Code of Student Behavior, state or federal law, and general university regulations.

Appeals Process

The North Dakota State University philosophy is to encourage and seek resolution of problems at the level most closely related to the origin of the specific disputes. This means:

- The first step should be an informal conference to first discuss and attempt to resolve the problem(s) with the person(s) directly involved.
- When a mutually satisfactory resolution cannot be reached or if discussion of the problem(s) seems inappropriate because of the nature of the student's complaint, the student should seek advice from the director of the program, chair of the department, or the graduate coordinator.
- Depending on the nature of the problem(s), the department chair or student's graduate committee chair may deal with the situation directly, advise the student to discuss the problem(s) with the appropriate academic dean and/or the Dean of the College of Graduate and Interdisciplinary Studies, or advise the student of the appropriate grievance procedure to pursue.
- If the graduate assistant wishes to challenge the termination decision, a written appeal to the Dean of the College of Graduate and Interdisciplinary Studies must be made within two weeks of notification of the mediation results (refer to section titled "Graduate Student Appeals").

Students should not carry more than a full-time load. Individual departments will determine a minimum and a maximum number of credit hours.

English Language Proficiency Procedure for Graduate Teaching Assistants

1. All students awarded a Graduate Teaching Assistantship (GTA) involving any type of teaching responsibility, including lectures, labs, or tutoring shall be evaluated with respect to overall communication proficiency during the 3rd week of the first semester of his or her teaching duties. While the format may be determined by individual units, the evaluation must be documented and it must address the comprehensive English proficiency of the teaching assistant, including speaking and listening ability, commensurate with his or her assigned duties. A copy of the evaluation instrument and the results for each teaching assistant shall be made available to the Graduate Dean upon request. In addition to the above evaluation, the following requirements must be met:
2. Domestic GTAs and international GTAs possessing a US bachelor's degree or higher are not required to present a TOEFL score, provided that the degree included a minimum of two years in residence. In all other cases, the requirements in the bullet below apply.
3. International GTAs whose first language is not English and who do not meet the criteria in the bullet above must meet minimal requirements on measures of general English language proficiency, spoken English language proficiency, and written English language proficiency. At the present time, the accepted measure of language proficiency will be the TOEFL ibT, IELTS or the PTE Academic.

   There will be two recognized categories:

   - Graduate Teaching Assistants (who have direct contact with students) must have a minimum TOEFL ibT score of 81 (IELTS of 7; PTE Academic equivalent of 54), a TOEFL ibT Speaking subscale score of 23 or above and a TOEFL ibT Writing subscale score of 21 or above. The IELTS equivalent scores are 6.0 for both, and the PTE Academic equivalent scores are 62 and 56, respectively.
   - Graders (who have no direct contact with students) must have a minimum TOEFL ibT score of 79 (IELTS of 6.5; PTE Academic of 53) and must score at or above the 40th percentile on the TOEFL ibT Speaking and Writing subscales (19 and 21, respectively). The IELTS equivalent scores are 5.5 and 6.0 respectively, and the PTE Academic equivalent scores are 51 and 56. Individuals may serve in this capacity for no more than one (1) calendar year. To continue as a GTA, students must meet the GTA requirements listed in the bullet point above OR successfully complete LANG 701 English Language and Classroom Skills for International GTAs and LANG 702 English Language Tutorial for International GTAs.

Test Score Requirements

Total Score

	Grader	Teaching Assistant
ibT	79	81
IELTS	6.5	7
PTE Academic	53	54

Speaking

	Grader	Teaching Assistant
ibT	19	23
IELTS	5.5	6.0
PTE Academic	51	62

Writing

	Grader	Teaching Assistant
ibT	21	21
IELTS	6.0	6.0
PTE Academic	56	56

Graduate Student Appeals

The philosophy of the Graduate College at North Dakota State University is to encourage and seek resolution of problems at the level most closely related to the origin of the specific disputes. This means:

1. the student is to first discuss the problem(s) with the person(s) directly involved;
2. if the student is not satisfied after discussing the problem with the person(s) directly involved or if discussion of the problem(s) seems inappropriate because of the nature of the student's complaint, the student should seek advice from the administrator of the program; and
3. depending on the nature of the problem(s), the program administrator or student's supervisory committee chair may deal with the situation directly, advise the student to discuss the problem(s) with the appropriate academic dean and/or the Dean of the Graduate College, or advise the student of the appropriate grievance procedure to pursue.

Areas of possible graduate student appeal include equal opportunity, suspension or dismissal from an academic program or the Graduate College, sanctions for academic dishonesty, and degree-acquisition processes that are unique to graduate education. The burden of proof by a preponderance of the evidence is on the graduate student making the appeal.

Equal Opportunity

North Dakota State University's general and specific commitment to being an equal opportunity institution is expressed elsewhere in this bulletin. As stated there, inquiries concerning compliance may be directed to the Vice Provost and Title IX Coordinator (201 Old Main, 701-231-7708, 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 has the authority to hear charges of inequitable or biased academic evaluations and to provide redress for any improper evaluations as it may find to have actually taken place. This is for course grades assigned by instructors in charge of the courses. This includes grades of disquisition courses. The "Rights & Responsibilities of Community: A Code of Student Behavior," (https://www.ndsu.edu/fileadmin/policy/601.pdf) Section 337 of the NDSU Policy Manual, has the procedural details. Salient points repeated here are that the student must initiate a request for a change of grade with the instructor within 15 instructional days of the first day of the semester immediately following the semester in which the grade was awarded. During an actual appeal, the burden of proof is on the student. The Grade Appeals Board procedures are for student grievances against instructors over course grades assigned.

Academic Dishonesty

All other appeals are addressed through the Graduate College appeal process. These appeals may address suspension or dismissal from a graduate program or the Graduate College, sanctions for academic misconduct or dishonesty, and degree-acquisition processes that are unique to graduate education.

Procedures dealing with issues of academic dishonesty in meeting course requirements, such as cheating, plagiarism, or other academic improprieties brought by instructors against students enrolled in their course(s) or other NDSU course(s) or persons not enrolled at NDSU but viewed by the instructor as involved in the academic dishonesty are detailed in both the "Rights & Responsibilities of Community: A Code of Student Behavior" and Section 335 of the NDSU Policy Manual referenced in the preceding paragraph. A substantial range of penalties to the student(s) is available to the instructor(s) and academic dean(s) of the college(s) involved, i.e., the college offering the course(s) and the college of which the student(s) is (are) a member. One option available to the deans is to recommend suspension or expulsion from the university. A student may choose to appeal the assignment of a grade in a course in which academic misconduct has occurred to the Grade Appeals Board. The decision to impose any additional penalty or disciplinary sanction for prohibited academic conduct against a graduate student in meeting the requirements of either an undergraduate or graduate course may be appealed by said graduate student to a graduate student appeals committee, provided there is documentation in writing of consultation with instructor(s), program administrator(s), and dean(s), in sequence, to resolve the conflict. This appeal starts with a written notice to the Dean of the Graduate College. The written notice must be accompanied by the aforementioned documentation and must be received by the Dean of the Graduate College within two weeks of the most recent date on the documentation.

There are processes and activities that are intrinsic to the acquisition of a graduate degree. The processes include specification of degree requirements, preliminary and qualifying examinations, disquisition writing and approval, and possible suspension or dismissal from the program or the Graduate College. The activities for which faculty have primary responsibility include instructing students enrolled in courses; mentoring students; collecting, analyzing, and presenting for public consumption the subsequent results and conclusions; and possibly working with proprietary information. Problems in these areas are to be discussed with the chair of the graduate student supervisory committee and administrator of the program, in that order. Normally, these faculty members will attempt to work out a resolution of any problem by bringing the parties involved together in an informal, non-adversarial manner. Inquiry at this stage is usually limited to a determination of 1) whether the graduate student has been treated in an arbitrary or capricious manner or in some way not consistent with previously announced policy guidelines or 2) whether the graduate student has acted in a manner inconsistent with formal or traditional standards of academic conduct.

Conflicts not satisfactorily resolved at the program level are to be brought to the academic dean who will discuss the problem(s) with all interested parties. If resolution does not result at the academic dean level, an appeal can be brought to a graduate student appeals committee, as long as there is documentation in writing that the graduate student has consulted the graduate student's supervisory committee chair, the program administrator, and the academic dean in attempts to resolve the conflict. This appeal starts with a written notice to the Dean of the Graduate College. This written notice must be accompanied by the aforementioned documentation and must be received by the Dean of the Graduate College within six weeks of the most recent date on the documentation.

Graduate Student Appeals Committee

The Dean of the Graduate College is responsible for forming graduate student appeals committees and informing the committee members of their duties. The Dean of the Graduate College will serve as an ex-officio and nonvoting member. A graduate student appeals committee has five members, all of whom must be graduate faculty or currently enrolled graduate students. Four graduate faculty members will be selected at random from the membership of the Graduate Council. A graduate student member of the committee will be selected from a pool of graduate students that includes the student members of the Graduate Council and four students nominated by the Graduate Student Council (this pool will be created at the start of each academic year). The administrator(s) and dean(s) of the program(s) and college(s) involved cannot be members of the committee. The five committee members elect the chair of the committee from its membership. The graduate student and the party or parties against whom the complaint has been brought each have the right to challenge, with cause, to the Dean of the Graduate College one member of the graduate student appeals committee.

The burden of proof shall be with the appealing graduate student. The appealing graduate student has the right to 1) be given due notice in sufficient detail that the accusation is clear and the circumstances of the accusation are detailed enough for meaningful response by the accused and 2) be heard by an impartial body. Each contending party may, if it wishes, be accompanied by one counsel, but any counseling is restricted to 1) what to ask, 2) when not to respond to a question, and 3) how to answer a question. Counsel may not intrude on the hearing. The appeals committee is not bound by rules of legal evidence or procedure and may develop procedures that its members consider to be fair and equitable to the particular circumstance(s).

The chair of the committee will preside over the hearing. The hearing will include an opening statement by both the student and the party or parties against whom the complaint has been brought, questioning by the appeals committee, and brief closing statements by the student and the party or parties against whom the complaint has been brought.

Committee members make decisions on available information; non-response to questions is available information, i.e., a negative inference can be drawn from the lack of a response. The hearing will be closed unless the student signs a release waiving his or her rights to a closed hearing. The hearing, but not the appeals committee's deliberations, will be tape-recorded.

The decisions and recommendations of the appeals committee shall be by majority vote and will be advisory to the Dean of the Graduate College, who will then be responsible for taking appropriate action(s). Any further appeal shall be directed to the President of the University.

Graduate Faculty

Full Graduate Faculty

Graduate education is dedicated to the continued scholarship and professional development of our students. The Graduate College at NDSU sets as the defining principle of graduate education the formation of a special professional relationship between students and program faculty. This professional relationship culminates through mentorship that is developed between a student and a faculty mentor.

In recognition of the role of graduate education, and the importance of mentorship, the Graduate College identifies individuals as being members of the Graduate faculty. This faculty should teach and mentor graduate students. Programs should strive to have courses taught by Graduate Faculty members and student advisory committees composed of Graduate Faculty members. Graduate Faculty status confers certain rights, privileges, and responsibilities to individuals holding this status. The following sections define the various recognized levels of Graduate Faculty membership and the rights pertaining to each.

Full Member of the Graduate Faculty

Full-status members of the Graduate Faculty of North Dakota State University (NDSU) consist of all persons who hold a probationary (tenure-track) or tenured appointment and have been appointed to the rank of Assistant Professor, Associate Professor, or Professor in an academic unit or program area at NDSU.

A full-status member of the Graduate Faculty of NDSU may teach graduate courses, serve as a member of supervisory committees, chair supervisory committees, serve as the Graduate College appointee to supervisory committees, serve as a member of graduate student appeals committees, serve as a member of the Graduate Council, vote at graduate faculty meetings, and serve in any other capacity as required.

Ahmadov, Azar, Associate Professor of Mathematics
Ph.D., 2004, Yale University
Albrecht, Nicholas, Assistant Professor of Performing Arts
M.F.A., 2012, University of North Carolina
Aldrich-Wolfe, Laura, Assistant Professor of Biological Sciences
Ph.D., 2006, Cornell University
Alfonseca Cubero, Maria, Associate Professor of Mathematics
Ph.D., 2003, Universidad Autonoma de Madrid
Aly Ahmed, Bakr, Associate Professor of Architecture & Landscape Architecture
Ph. D., 2001, Virginia Polytechnic Institute and State University
Ambrosio, Thomas, Professor of Criminal Justice & Political Science
Ph.D. 2000, University of Virginia
Andersen, Margaret, Professor of Accounting & Information Systems
Ph.D., 1989, Indiana University
Andrianova, Anastassiya, Assistant Professor of English
Ph.D., 2011, City University of New York
Archbold, Carol, Professor of Criminal Justice & Political Science
Ph.D., 2002, University of Nebraska-Omaha
Arnold, Lisa, Assistant Professor of English
Ph.D., 2011, University of Louisville
Asa, Eric, Associate Professor of Construction Management & Engineering
Ph.D., 2000, University of Alberta
Asperin, Amelia Adora, Associate Professor of Apparel, Design & Hospitality Management
Ph.D., 2007, Kansas State University
Ayebo, Abraham, Assistant Professor of Mathematics
Ph.D., 2010, University of Nevada
Azarmi, Fardad, Associate Professor of Mechanical Engineering
Ph.D., 2008, University of Toronto
Baggett, Ashley, Assistant Professor of History, Philosophy & Religious Studies
Ph.D., 2014, Louisiana State University
Bajwa, Dilpreet, Professor of Mechanical Engineering
Ph.D., 2000, University of Illinois at Urbana-Champaign
Bajwa, Sreekala, Professor of Agricultural & Biosystems Engineering
Ph.D., 2000, University of Illinois at Urbana-Champaign
Balas, Benjamin, Associate Professor of Psychology
Ph.D., 2007 Massachusetts Institute of Technology
Banerjee, Somnath, Assistant Professor of Management and Marketing
Ph.D., 2015, University of Central Florida

Barabanov, Nikita, Professor of Mathematics
Ph.D., 1979, Leningrad University
Barrett, Tracy, Associate Professor of History, Philosophy & Religious Studies
Ph.D., 2007, Cornell University
Battocchi, Dante, Assistant Professor of Coatings & Polymeric Materials
Ph.D., 2002, University of Trento
Bauer, Marc, Associate Professor of Animal Science
Ph.D., 1996, University of Kentucky
Bauroth, Nicholas, Associate Professor of Criminal Justice & Political Science
Ph.D., 2003, Loyola University
Beck, Stephenson, Associate Professor of Communication
Ph.D., 2008, University of Kansas
Benton, Bradley, Associate Professor of History, Philosophy & Religious Studies
Ph.D., 2012, University of California Los Angeles
Berg, Eric, Professor of Animal Science
Ph.D., 1996, Purdue University
Berg, Erika, Associate Professor of Animal Science
Ph.D., 2006, University of Missouri
Bergholz, Peter, Assistant Professor of Microbiological Sciences
Ph.D., 2007, Michigan State University
Bergholz, Teresa, Assistant Professor of Microbiological Sciences
Ph.D., 2007, Michigan State University
Berry, Eugene, Associate Professor of Microbiological Sciences
Ph.D., 1983, Northeastern University
Berti, Marisol, Professor of Plant Sciences
Ph.D., 2007, North Dakota State University
Bertolini, Charles, Professor of Architecture & Landscape Architecture
Ph.D., 2008, Temple University
Beseler Thompson, Erika, Assistant Professor, School of Education
Ph.D., 2017, North Dakota State University
Bezbaruah, Achintya, Associate Professor of Civil & Environmental Engineering
Ph.D., 2002, University of Nebraska-Lincoln
Bilen-Green, Canan, Professor of Industrial and Manufacturing Engineering
Ph.D., 1998, University of Wyoming
Bitzan, John, Professor of Management and Marketing
Ph.D., 1997, University of Wisconsin-Milwaukee
Blankenship, Anne, Assistant Professor of History, Philosophy & Religious Studies
Ph.D., 2012, University of North Carolina at Chapel Hill
Blodgett Salafia, Elizabeth, Associate Professor of Human Development and Family Science
Ph.D., 2008, University of Notre Dame
Boetel, Mark, Professor, School of Natural Resource Sciences
Ph.D., 1996, South Dakota State University
Booker, Darryl, Associate Professor of Architecture & Landscape Architecture
M.Arch., 1980, University of Colorado
Boonstoppel, Sarah, Assistant Professor of Criminal Justice & Political Science
Ph.D., 2014, University of Maryland, College Park
Borr, Mari, Associate Professor, School of Education
Ph.D., 2005, University of North Dakota
Boudjouk, Philip, Professor of Chemistry and Biochemistry
Ph.D., 1971, University of Wisconsin
Bowsher, Julia, Associate Professor of Biological Sciences
Ph.D., 2007, Duke University
Boynton, Jason, Associate Professor of Mathematics
Ph.D., 2006, Florida Atlantic University
Braaten, Benjamin, Associate Professor of Electrical & Computer Engineering
Ph.D. 2009, North Dakota State University
Brekke, Jeremy, Associate Professor of Music
D.A., 2004, University of North Colorado
Briggs, Steven, Associate Professor of Criminal Justice & Political Science
Ph.D., 2007, University of Nebraska-Omaha
Bromley, Kimble, Professor of Visual Arts
M.F.A., 1986, Southern Illinois University

Brooks, Amanda, Assistant Professor of Pharmaceutical Sciences
Ph.D., 2006 University of Wyoming
Brotherson, Sean, Professor of Human Development and Family Science
Ph.D., 2000, Oregon State University
Brueggeman, Robert, Associate Professor of Plant Pathology
Ph.D., 2009, Washington State University
Brunt, Ardith, Professor of Health, Nutrition & Exercise Science
Ph.D., 1999, Iowa State University
Buchholz Holland, Carol, Associate Professor, School of Education
Ph.D., 2005, Kansas State University
Buettner-Schmidt, Kelly, Associate Professor of Nursing
Ph.D., 2013, University of New Mexico
Bumgarner, Jeffrey, Professor of Criminal Justice & Political Science
Ph.D., 2000, University of Minnesota
Burghaus, Uwe, Associate Professor of Chemistry and Biochemistry
Ph.D., 1995, Free University of Berlin
Burnett, Ann, Professor of Women & Gender Studies
Ph.D., 1986, University of Utah
Burt, Sean, Assistant Professor of History, Philosophy & Religious Studies
Ph.D., 2009, Duke University
Butler, Malcolm, Professor of Biological Sciences
Ph.D., 1980, University of Michigan
Cai, Xiwen, Professor of Plant Sciences
Ph.D., 1998, Washington State University
Cannayen, Igathinathane, Associate Professor of Agricultural & Biosystems Engineering
Ph.D., 1997,Indian Institute of Technology
Cao, Dong, Assistant Professor of Electrical & Computer Engineering
Ph.D., 2012, Michigan State University
Carlson, Thomas, Professor of Human Development and Family Science
Ph.D., 2000, Iowa State University
Casey, Francis, Professor, School of Natural Resource Sciences
Ph.D., 2000, Iowa State University
Caton, James, Assistant Professor of Agribusiness and Applied Economics
Ph.D., 2016, James Mason University
Caton, Joel, Professor of Animal Science
Ph.D., 1987, New Mexico State University
Chai, Linlin, Assistant Professor of Management and Marketing
Ph.D., 2016 Iowa State University
Chatterjee, Amitava, Associate Professor, School of Natural Resource Sciences
Ph.D., 2007, University of Wyoming
Chen, Bingcan, Assistant Professor of Plant Sciences
Ph.D., 2012 University of Massachusetts Amherst
Chen, Jun, Assistant Professor of Accounting & Information Systems
Ph.D., 2014, University of North Carolina at Charlotte
Choi, Yongki, Assistant Professor of Physics
Ph.D., 2010, The City University of New York
Christensen, Bryan, Professor of Health, Nutrition & Exercise Science
Ph.D., 2000, University of Kansas
Christensen, Warren, Associate Professor of Physics
Ph.D., 2007, Iowa State University
Christenson, Michael, Professor of Architecture & Landscape Architecture
M.Arch, 1997, University of Minnesota
Christoffers, Michael, Associate Professor of Plant Sciences
Ph.D., 1998, University of Missouri-Columbia
Chu, Xuefeng, Professor of Civil & Environmental Engineering
Ph.D., 2002, University of California, Davis
Cihacek, Larry, Professor, School of Natural Resource Sciences
Ph.D., 1979, Iowa State University
Ciuperca, Catalin, Associate Professor of Mathematics
Ph.D., 2001, University of Kansas
Clark, Jeffrey, Professor of Sociology and Anthropology
Ph.D., 1987, University of Illinois

Clark, Mark, Professor of Biological Sciences
Ph.D., 1996, University of Tennessee
Cohen, Michael, Assistant Professor of Mathematics
Ph.D., 2013, University of North Texas
Colbert, Christopher, Associate Professor of Chemistry and Biochemistry
Ph.D., 2000, Purdue University
Collins, Ross, Professor of Communication
Ph.D., 1992, University of Cambridge
Comez, Dogan, Professor of Mathematics
Ph.D., 1983, University of Toronto
Conwell, Erin, Assistant Professor of Psychology
Ph.D., 2009, Brown University
Cook, Gregory, Professor of Chemistry and Biochemistry
Ph.D., 1973, Stanford University
Cooley, Dennis, Professor of History, Philosophy & Religious Studies
Ph.D., 1995, University of Rochester
Cox, John, Professor of History, Philosophy & Religious Studies
Ph.D., 1995, Indiana University
Crawford Jackson, Elizabeth, Associate Professor of Communication
Ph.D., 2007, University of Tennessee
Creese, John, Assistant Professor of Sociology and Anthropology
Ph.D., 2011, University of Toronto
Croll, Andrew, Associate Professor of Physics
Ph.D., 2009, McMaster University
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Ph.D., 1998, University of Nebraska, Lincoln
Sharma, Anupa, Assistant Professor of Agribusiness & Applied Economics
Ph.D., 2016, Virginia Polytechnic Institute and State University
Shen, Gang, Associate Professor of Statistics
Ph.D., 2009, Purdue University
Shetty, Kalidas, Professor of Plant Sciences
Ph.D., 1989, University of Idaho
Shume, Teresa, Assistant Professor, School of Education
Ph.D., 2013, University of North Dakota
Sibi, Mukund, Professor of Chemistry and Biochemistry
Ph.D., 1980, City University of New York
Simsek, Halis, Assistant Professor of Agricultural & Biosystems Engineering
Ph.D., North Dakota State University
Simsek, Senay, Professor of Plant Sciences
Ph.D., 2006, Purdue University
Singh, Jagdish, Professor of Pharmaceutical Sciences
Ph.D., 1982, Banaras Hindu University, Varanasi, India
Sinha, Sangita, Professor of Chemistry and Biochemistry
Ph.D., 2000, Purdue University
Sirotiak, Todd, Associate Professor of Construction Management & Engineering
Ph.D., 2008, Iowa State University
Slator, Brian, Professor of Computer Science
Ph.D., 1988, New Mexico State University
Smith, Angela, Assistant Professor of History, Philosophy & Religious Studies
Ph.D., Middle Tennessee University
Smith, Gary, Professor of Construction Management & Engineering
Ph.D., 1986, Purdue University
Smith, Scott, Professor of Electrical & Computer Engineering
Ph.D., 2001, University of Central Florida
Snyder, Herbert, Professor of Accounting & Information Systems
Ph.D., 1994, Syracuse University
Song, Yang, Assistant Professor of Architecture and Landscape Architecture
Ph.D., Clemson University
Srinivasan, Sudarshan, Associate Professor of Electrical & Computer Engineering
Ph.D., 2007, Georgia Institute of Technology
Srivastava, D, Professor of Chemistry and Biochemistry

Ph.D., 1980, Banaras Hindu University
Srivastava, Malini, Assistant Professor of Architecture & Landscape Architecture
M.Arch., 1998, University of Minnesota
Stastny, Sherri, Professor of Health, Nutrition & Exercise Science
Ph.D., 2007, North Dakota State University
Steele, Dean, Associate Professor of Agricultural & Biosystems Engineering
Ph.D., 1991, University of Minnesota
Steffen, Kristine, Professor of Pharmaceutical Sciences
Ph.D., 2007, North Dakota State University
Stevens, Charles, Professor of Management and Marketing
Ph.D., 1998, University of Kansas
Stichman, Amy, Associate Professor of Criminal Justice
Ph.D., 2003, University of Cincinnati
Stickney, Gwen, Associate Professor of Modern Languages
Ph.D., 2004, Indiana University
Stockwell, Craig, Professor of Biological Sciences
Ph.D., 1995, University of Nevada-Reno
Stokka, Gerald, Associate Professor of Animal Science
DVM, 1982, Iowa State University
Stone, Matthew, Assistant Professor of Construction Management & Engineering
Ph.D., 2013, University of Alabama
Strand, Bradford, Professor of Health, Nutrition & Exercise Science
Ph.D., 1988, University of New Mexico
Strand, Mark, Professor of Pharmacy Practice
Ph.D., 2004, University of Colorado at Denver
Strand, Michael, Professor of Visual Arts
M.F.A., 1999, University of Nebraska
Straub, Jeremy, Assistant Professor of Computer Science
Ph.D., 2015 University of North Dakota
Striker, Jessica, Assistant Professor of Mathematics
Ph.D., 2008, University of Minnesota
Sun, Chengwen, Associate Professor of Pharmaceutical Sciences
Ph.D., 1996, Norman Bethune University of Medical Sciences
Sun, Wenfang, Professor of Chemistry and Biochemistry
Ph.D., 1995, Institute of Photographic Chemistry, Chinese Academy of Sciences
Suzen, Yildirim, Associate Professor of Mechanical Engineering
Ph.D., 1998, Wichita State University
Swanson, Kendall, Professor of Animal Science
Ph.D., 2000, University of Kentucky
Sweetman, Jon, Assistant Professor of Biological Sciences
M.F.A., 1992, University of Minnesota
Swenson, David, Associate Professor of Visual Arts
Ph.D., 2006, Queens University
Szmerekovsky, Joseph, Professor of Management and Marketing
Ph.D., 2003, Case Western Reserve University
Tackett, Lydia, Assistant Professor of Geosciences
Ph.D., 2014, University of Southern California
Tangen, Jodi, Assistant Professor, School of Education
Ph.D., 2015, University of North Carolina at Greensboro
Tangpong, Chanchai, Professor of Management and Marketing
Ph.D., 2002, Southern Illinois University, Carbondale
Tangpong, Xiangqing, Associate Professor of Mechanical Engineering
Ph.D., 2006, Carnegie-Mellon University
Terbizan, Donna, Professor of Health, Nutrition & Exercise Science
Ph.D., 1982, The Ohio State University
Theile, Verena, Associate Professor of English
Ph.D., 2006, Washington State University
Thomas, Laura, Associate Professor of Psychology
Ph.D., 2008, University of Illinois at Urbana-Champaign
Thompson, Asunta, Associate Professor of Plant Sciences
Ph.D., 1998, University of Idaho
Thompson, Kevin, Professor of Criminal Justice & Political Science

Ph.D., 1986, University of Arizona
Tian, Ruilin, Associate Professor of Accounting & Information Systems
Ph.D., 2008, Georgia State University
Traub, Rodney, Associate Professor of Management and Marketing
Ph.D., 1994, Purdue University
Travers, Steven, Associate Professor of Biological Sciences
Ph.D., 1998, University of California, Santa Barbara
Ubhaya, Vasant, Professor of Computer Science
Ph.D., 1971, University of California-Berkeley
Ulven, Chad, Professor of Mechanical Engineering
Ph.D., 2005, University of Alabama, Birmingham
Ungar, Abraham, Professor of Mathematics
Ph.D., 1973, Tel-Aviv University
Urness, Cindy, Associate Professor of Architecture & Landscape Architecture
M.Arch., 1988, Pratt Institute
Varland, Rooth, Professor of Theatre Arts
M.F.A, 1989, Northwestern University
Varma, Amiy, Associate Professor of Civil & Environmental Engineering
Ph.D., 1993, Purdue University
Venkatachalem, Sathish, Assistant Professor of Pharmaceutical Sciences
Ph.D., 2003, University of Madras
Vettern, Rachelle, Associate Professor, Extension Center for 4-H Youth Development
Ph.D., 2006, North Dakota State University
Voldseth, Deirdre, Associate Professor, School of Natural Resource Sciences
Ph.D., 2005, Washington State University
Voronov, Andriy, Professor of Coatings & Polymeric Materials
Ph.D., 1994, Lviv Polytechnic Institute, Lviv, Ukraine
Wachenheim, Cheryl, Professor of Agribusiness & Applied Economics
Ph.D., 1994, Michigan State University
Wageman, Justin, Associate Professor, School of Education
Ph.D., 1999, University of North Dakota
Wagner, Carsten, Associate Professor of Physics
Ph.D., 1997, Oxford University
Wagner, Sarah, Professor of Animal Science
Ph.D., 2003, Iowa State University
Wahl, Thomas, Professor of Agribusiness and Applied Economics
Ph.D., 1989, Iowa State University
Walden, Justin, Assistant Professor of Communication
Ph.D., 2013, Penn State University
Walia, Gursimran, Associate Professor of Computer Science
Ph.D., 2009, Mississippi State University
Wang, Danling, Assistant Professor of Electrical & Computer Engineering
Ph.D., 2003, Peking University
Ph.D., 2013, University of Washington
Wang, Jinhui, Assistant Professor of Electrical & Computer Engineering
Ph.D., 2006, University of Rochester and Beijing University of Technology
Wang, Xinnan, Associate Professor of Mechanical Engineering
Ph.D., 2008, University of South Carolina
Wang, Yechun, Associate Professor of Mechanical Engineering
Ph.D., 2007, University of Maryland at College Park
Ward, Alison, Assistant Professor of Animal Science
Ph.D., 2011, University of Saskatchewan
Warne, Donald, Professor of Public Health
M.D., 1995, Stanford University School of Medicine
Weber, Michael, Professor of Music
D.M.A., 1990, University of Arizona
Weber Knopp, Christina, Associate Professor of Sociology and Anthropology
Ph.D., 2005, State University of New York, Buffalo
Webster, Dean, Professor of Coatings & Polymeric Materials
Ph.D., 1984, Virginia Polytechnic Institute and State University
Wells, David, Professor of Industrial & Manufacturing Engineering
Ph.D., 1996, University of Missouri-Rolla

West, Todd, Professor of Plant Sciences
Ph.D., 2004, Southern Illinois University
Westerman, David, Associate Professor of Communication
Ph.D., 2007, Michigan State University
Whitsel, Christopher, Associate Professor of Sociology and Anthropology
Ph.D., 2009, Indiana University
Wick, Abbey, Assistant Professor, School of Natural Resource Sciences
Ph.D., 2007, University of Wyoming
Wicktor, Emily, Assistant Professor of English
Ph.D., 2010, University of Kansas
Wiesenborn, Dennis, Professor of Agricultural & Biosystems Engineering
Ph.D., 1989, Rice University
Wilkinson, John, Assistant Professor of Chemistry and Biochemistry
Ph.D., 2001, Vanderbilt University
Wilson, William, Professor of Agribusiness & Applied Economics
Ph.D., 1980, University of Manitoba
Wing, Heath, Assistant Professor of Modern Languages
Ph.D., 2015, Texas Tech University
Wischer, Stephen, Associate Professor of Architecture & Landscape Architecture
M. Arch., 2004, University of Calgary
M.F.A., 2004, University of Calgary
Wittrock, David, Professor of Psychology
Ph.D., 1990, State University of New York at Albany
Wood, Nathan, Associate Professor, School of Education
Ph.D., 2006, University of Minnesota
Woods, Rebecca, Associate Professor of Human Development and Family Science
Ph.D., 2006, Texas A &M University
Wottrich, Tyler, Assistant Professor of Music
D.M.A., Stony Brook University
Wright, Newell, Professor of Management and Marketing
Ph.D., Virginia Polytechnic Institute and State University
Wu, Xiangfa, Associate Professor of Mechanical Engineering
Ph.D., 2003, University of Nebraska
Xu, Yiwen, Assistant Professor of Industrial & Manufacturing Engineering
Ph.D., 2015, University of Arizona
Yadav, Om, Professor of Industrial & Manufacturing Engineering
Ph.D., 2002, Wayne State University
Yan, Changhui, Associate Professor of Computer Science
Ph.D., 2005, Iowa State University
Yan, Guiping, Assistant Professor of Plant Pathology
Ph.D., Washington State University
Yang, Huojun, Assistant Professor of Construction Management & Engineering
Ph.D., 2012, University of Nebraska-Lincoln
Yang, Mijia, Associate Professor of Civil & Environmental Engineering
Ph.D., 2006, University of Akron
Yang, Zhongyu, Assistant Professor of Chemistry and Biochemistry
Ph.D,, 2010, University of Pittsburgh
Yellavajjala, Ravi Kiran, Assistant Professor of Civil & Environmental Engineering
Ph.D., 2014, University of Notre Dame
Yellow Bird, Michael, Professor of Sociology and Anthropology
Ph.D., 1987, University of New Mexico
Young, Alex, Assistant Professor of Accounting & Information Systems
Ph.D., 2015, Duke University
Yu, Yao, Assistant Professor of Construction Management & Engineering
Ph.D., 2014, North Carolina Agricultural and Technical State University
Zarak, Jenny, Assistant Professor of Health, Nutrition & Exercise Science
Ph.D., 2011, University of Illinois at Urbana-Champaign
Zhang, Lei, Associate Professor of Agribusiness & Applied Economics
Ph.D., 2011, University of Texas at Dallas
Zhang, Limin, Associate Professor of Accounting & Information Systems
Ph.D., 2006, University of Arizona
Zhang, Qi, Associate Professor of Plant Sciences

Ph.D., 2007, Kansas State University
Zhang, Qifeng, Assistant Professor of Electrical & Computer Engineering
Ph.D., 2001, Peking University
Zhang, Wei, Associate Professor of Accounting & Information Systems
Ph.D., 2001, Syracuse University
Zhang, Yan, Assistant Professor of Mechanical Engineering
Ph.D., 2013, Iowa State University
Zhao, Pinjing, Associate Professor of Chemistry and Biochemistry
Ph.D., 2003, Cornell University
Zhong, Shaobin, Associate Professor of Plant Pathology
Ph.D., 2000, North Dakota State University
Ziejewski, Mariusz, Professor of Mechanical Engineering
Ph.D., 1986, North Dakota State University
Zuber, Jill, Associate Professor of Accounting & Information Systems
Ph.D., 2007, University of Arkansas
Zuk, Alan, Associate Professor of Plant Sciences
Ph.D., 2005, Kansas State University

Other qualified individuals who are not Full Graduate Faculty Members may contribute to the scholarship and professional development of our graduate students. Affiliate Members of the Graduate Faculty are qualified by educational background and experience to effectively teach and mentor students in graduate programs at NDSU. An appointment for Affiliate Graduate Faculty status is initiated by a graduate program. The chair, head, or director of the academic unit in which the program resides will submit the Affiliate Graduate Faculty Nomination form (https://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Forms/Faculty_Staff_Documents/Affiliate_Faculty.pdf) and a current curriculum vita. The request should include the level of Affiliate Faculty Membership the program proposes the applicant should be given. This request is forwarded to the dean of the academic college in which the program resides for approval. If approved, the request is submitted to the College of Graduate and Interdisciplinary Studies. The request will be reviewed by a subcommittee of the Graduate Council which will make a recommendation to the Dean of the College of Graduate and Interdisciplinary studies, who will determine whether an appointment will be granted. A reappointment may be granted using the process described above.

Members of the Graduate Faculty who have left the institution may be granted Affiliate Faculty status as outlined below:

- Emeritus Faculty. Persons who are granted emeritus faculty status are eligible for Affiliate Faculty Level 1 status for a period of three years. Membership as an Affiliate Faculty may be renewed upon approval of the Graduate Council and the Dean of the College of Graduate and Interdisciplinary Studies.
- Individuals who have retired or left NDSU for other employment opportunities are eligible serve as chair of supervisory committees for one year. This is not renewable. A department may nominate the individual for Affiliate Faculty status as outlined below.

There are three levels of Affiliate Graduate Faculty Members, the appointment level will be determined by the qualifications of the applicant.

Affiliate Graduate Faculty Level 1

Duties

- Chair committees for graduate students
- Serve on committees for all students
- Teach graduate courses

Criteria

- Terminal degree
- Sustained record of scholarly and/or creative accomplishment
- Demonstrated competence in instruction including classroom, advising, or mentoring
- Full-time Employment at an NDSU on-campus unit or a Research and Extension Center

Term

- 6 years
- Must demonstrate sustained record of scholarly and/or creative accomplishment
- Demonstrated competence in graduate instruction including classroom, advising, or mentoring

Affiliate Graduate Faculty Level 2

Duties

- Chair committees for all master's students
- Serve as co-chair for all doctoral students (the other co-chair must be a full member of the graduate faculty)
- Serve on committees for all students
- Teach graduate courses

Criteria

- Terminal degree
- Record of scholarly or creative accomplishment
- Demonstrated experience in teaching, mentoring, or advising

Term

- 3 years
- Must demonstrate sustained record of scholarly or creative accomplishment
- Demonstrated competence in graduate teaching, advising, or mentoring

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Affiliate Graduate Faculty Level 3

Duties

- Chair committees for students not required to complete a dissertation, thesis, or scholarly paper
- Serve on committees for all students
- Teach graduate courses (but no higher than his/her earned degree)

Criteria

- Record of professional achievement in an area related to the program
- Demonstrated competence in teaching

Term

- 3 years
- Must demonstrate sustained record of professional achievement in an area related to the program
- Active involvement in graduate teaching and work with graduate students (but no higher than his/her earned degree)

Graduate Teaching Waivers

Graduate teaching waivers may be granted to individuals who do not meet the requirements for either full or associate graduate faculty status. Teaching waivers only allow individuals to serve as the instructor of record for graduate level courses and carry none of the other privileges of graduate faculty status. Waivers may be granted to qualified individuals who are not students in the department for which the waiver is sought. Graduate teaching waivers may be granted to individuals who do not meet the requirements for either full or associate graduate faculty status. Graduate teaching waivers should be granted sparingly. A request for a waiver should include a rationale for why the individual nominated is the best choice for teaching the particular course. Teaching waivers are most appropriate for elective courses or courses in applied/professional programs for which experiences gained by professionals will provide a valuable educational opportunity for the students. Teaching waivers should not be requested for required courses in a program, unless no other viable alternative exists. The request for teaching waivers should not be seen as a long-term solution to inadequate numbers of tenure-track faculty members. Thus departments will also be asked to explain their long-term plan to fill any deficiencies in their ability to offer courses for which a waiver is requested.

The burden of proof lies with the applying graduate program to show that the nominee holds qualifications that merit the granting of a graduate teaching waiver. A Graduate Teaching Waiver Request form (http://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Graduate_Council_Documents/Graduate_Teaching_Waiver_Request.pdf) must be completed with a current copy of the nominee's curriculum vitae and any other pertinent documentation attached.

Graduate teaching waivers are approved by the Graduate Council and the Dean of the Graduate College. Waivers are granted for one academic year and may be renewed twice at the discretion of the Dean of the Graduate College.

Course Descriptions

Course Definitions and Format

Courses approved at the time of publication are listed in this bulletin. Not all courses are offered every term. Refer to the online schedule of courses (https://www.ndsu.edu/onestop/connect/schedule) and the student information system, Campus Connection, for course offerings. Credit cannot be earned twice by repeating a course unless the course description indicates otherwise.

Definitions

Course descriptions frequently include additional information about enrollment, such as prerequisites and co-requisites. Students are responsible for complying with restrictions or expectations related to course enrollment listed herein or in any supplementary information.

Course credits: Credits are stated in semester units as defined in the academic policies section in this bulletin.

Course prerequisites (Prereq): Prerequisites indicate the academic background, academic level, or other requirements considered necessary for enrollment in the course. Most prerequisites are specific courses, however, equivalent preparation is usually acceptable. Instructor or department permission may override a prerequisite.

Course co-requisites (Coreq): Co-requisites indicate courses to be taken concurrently with the course described. Instructor or department permission may override a co-requisite.

Cross-listed courses: A cross-listed course means the same course is offered by two or more departments or under another course prefix. Cross-listed courses are noted and the full description appears under the department responsible for the course. Credit may only be earned for the course under one prefix.

Dual-listed courses: Dual-listed courses with 400- or 500- and 600-level course numbers permit undergraduate and graduate students in the same class. The same amount of credit for the course is earned by all students, but additional work is required of students enrolled under the graduate level number. Credit may only be earned for the course at one of the levels.

Format of Course Listings

All university course offerings, listed alphabetically by areas of study, are described in the section titled Course Catalog Descriptions (p. 1131). Course information and course availability is subject to change. The heading, which precedes the brief description of each course, includes the current course number; course title; and the number of fixed or variable semester credit hours. The frequency the course is offered may appear at the end of the description. F = Fall, S = Spring, SS = Summer Session. Terms presented in a fraction indicate course is offered alternate years. F/2 = every other Fall semester.

Course Numbers

Course numbers indicate the student classification for which the course is primarily intended. Some course numbers end with a letter suffix: L - laboratory course; R - recitation (undergraduate) or research continuation (graduate); S - graduate project. The number system is as follows:

- 0-99 series courses - developmental; non-degree eligible
- 100 series courses - primarily for freshmen
- 200 series courses - primarily for sophomores
- 300 series courses - primarily for juniors
- 400 series courses - primarily for seniors
- 500-599 series courses - post-baccalaureate professional courses
- 601-699 series courses - graduate courses taught concurrently in the same classroom with advanced undergraduates at the 400 or 500 level
- 700-799 series courses - open to graduate students
- 800-899 series courses - predominantly intended for doctoral level graduate students
- 2000 numbered courses - Continuing Education post-baccalaureate courses, not applicable toward graduate degrees

Graduate standing is required for 600-700 level courses unless prior approval to use the course for an undergraduate program of study is granted by the department/instructor.

Uniform Course Numbers

The following courses may be offered by departments but are described here because of their uniform numbers and descriptions.

(Prefix) 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
Study Abroad, 1-15
Pre-arranged study at accredited foreign institutions or in approved study abroad programs. Prerequisite*:* Sophomore standing and prior approval by 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) 179, 279, 379, 479, and 679
Study Tour Abroad, 1-6
NDSU faculty directed, part-term experience or field study in a foreign country. Conducted in English for residence credit. Prerequisite*:* Prior approval by the Office of International Programs and major department. May be repeated. Graded 'P' or 'F' (undergraduate) or 'S' or 'U' (graduate).

(Prefix) 592
Case Studies, 1-3
Critical review, analysis, and evaluation of selected topics by individual presentations and group discussions. Case study topics are indicated by title on the student's transcript. Graded 'S' or 'U'.

(Prefix) 593, 793, 893
Individual Study/Tutorial, 1-5
Directed study allowing an individual student under faculty supervision to undertake selected, independent work in topics of special interest or a limited experience in research. Requires departmental approval.

(Prefix) 594, 794, 894
Internship, 1-8
Course designed to provide practical participation under professional supervision in selected situations to gain experience in the application of concepts, principles, and theories related to the student's area of specialization. Requires approved program and consent of instructor. Graded 'S' or 'U'.

(Prefix) 791, 891
Temporary/Trial Topics, 1-5
University-wide course focused on group study involving critical examination and discussion of subject matter selected for proposal as a temporary or trial course.

(Prefix) 792, 892
Student Teaching, 1-6

Graduate student teaching experiences for professional development. Graded 'S' or 'U'.

(Prefix) 797
Master's Paper, 1-3
Literature review, research, and preparation for paper required for the comprehensive study option. Graded 'S' or 'U'.

(Prefix) 797S
Comprehensive Project, 1-6
An in-depth research study/project in a graduate student's field of study. Prerequisite*:* Graduate standing.

(Prefix) 798
Master's Thesis, 1-10
Original investigation under the supervision of a major adviser and a supervisory committee. Graded 'S' or 'U'.

(Prefix) 798S
Specialist Field Study, 1-6

(Prefix) 799
Master's Examination, 1-6
Literature review, research, and preparation for the master's examination option.

(Prefix) 799S
Clinical Dissertation, 1-15
The clinical dissertation is a scholarly work that focuses on practice issues. It involves identification, development, implementation, and evaluation and/or dissemination of an evidence-based project addressing a current clinical issue. Graded 'S' or 'U'.

(Prefix) 899
Doctoral Dissertation, 1-15
Original investigation under the supervision of a major adviser and an advisory committee. Graded 'S' or 'U'.

Course Descriptions

Accounting (ACCT)

ACCT 102. Fundamentals of Accounting. 3 Credits.
Introduces financial statements and other accounting information to make personal and business decisions. Not available to majors and accounting minors in the College of Business Administration. Student may not have previously passed or be concurrently enrolled in ACCT 201.

ACCT 194. Individual Study. 1-3 Credits.

ACCT 196. Field Experience. 1-15 Credits.

ACCT 199. Special Topics. 1-5 Credits.

ACCT 200. Elements of Accounting I. 3 Credits.
Study of the basic concepts of accounting applied to businesses, and the use of accounting information as a basis for decision-making. The focus is on operating activities of companies. Prereq: Sophomore standing. Coreq: MIS 116.

ACCT 201. Elements of Accounting II. 3 Credits.
Study of the basic concepts of accounting applied to businesses, and the use of accounting information as a basis for decision-making. The focus is on the investing and financing activities of a company. Prereq: Sophomore standing, ACCT 200.

ACCT 291. Seminar. 1-3 Credits.

ACCT 292. Study Abroad. 1-15 Credits.

ACCT 294. Individual Study. 1-3 Credits.

ACCT 299. Special Topics. 1-5 Credits.

ACCT 311. Intermediate Accounting I. 4 Credits.
Intensive study of accounting theories, corporate accounting problems, financial statements and disclosures, problems in income determination, and other evolving issues in accounting. Prereq: ACCT 201. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

ACCT 312. Intermediate Accounting II. 4 Credits.
Intensive study of accounting theories, corporate accounting problems, financial statements and disclosures, problems in income determination, and other evolving issues in accounting. Prereq: ACCT 311 with a grade of C or better. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 318. Taxation in Management Decisions. 3 Credits.
Study of the fundamental concepts of tax implications that result from common business transactions. Prereq: ACCT 102 or ACCT 201. Cross-listed with BUSN 318. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 320. Cost Management Systems. 3 Credits.
Study of cost management methods used to assign costs, and plan and evaluate business activities. Prereq: ACCT 201. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 342. Fundamentals of Financial Planning. 3 Credits.
Introduction to the concepts of personal financial planning: investing, budgeting, insurance, taxes, retirement and estate planning. Prereq: ACCT 201. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 379. Study Tour Abroad. 1-6 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 391. Seminar. 1-3 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 392. Study Abroad. 1-15 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 394. Individual Study. 1-5 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 397. Fe/Coop Ed/Internship. 1-4 Credits.

ACCT 399. Special Topics. 1-5 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 410. Fraud Examination. 3 Credits.
Study of the pervasiveness and causes of fraud in society; examination of methods of fraud detection and prevention, and on the investigation of financial statement fraud. Prereq: ACCT 201. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 610.}.

ACCT 411. Advanced Fraud Examination. 3 Credits.
Advanced application of fraud examination principles that encompass the investigation and prevention of fraudulent financial transactions. Coursework is focused on the analysis of fraudulent financial statements and fieldwork involving actual organizations. Prereq: ACCT 410. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 611.}.

ACCT 412. Computer Crime, Forensics, and Investigation. 3 Credits.
Introduction to the technical and legal aspects of obtaining and analyzing digital information for use as evidence in civil, criminal, or administrative cases. Prereq: MIS 320 and ACCT 410 or MIS 376 or CSCI 372 and students must be College of Business students who have been admitted to the professional program and have a cumulative GPA of 2.5 or higher. Cross-listed with MIS.

ACCT 413. Accounting Internship. 3 Credits.
Supervised professional experience in a non-paid position. May be repeated.

ACCT 415. Advanced Accounting. 3 Credits.
Study of advanced topics including consolidated statements, international operations, and derivative financial instruments. Prereq: ACCT 312 with a grade of C or better. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 615.}.

ACCT 418. Tax Accounting I. 3 Credits.
Study of the theory and principles related to the determination of taxable income and computation of federal income taxes for individuals. Prereq: A grade of C or better in ACCT 311. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 618.}.

ACCT 419. Tax Accounting II. 3 Credits.
Study of the theory and principles related to the determination of taxable income and computation of federal income taxes for partnerships, corporations, trusts and estates, and other specialized tax issues. Prereq: ACCT 418. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.{Also offered for graduate credit - see ACCT 619.}.

ACCT 420. Accounting Information Systems. 3 Credits.
Study of conceptual and practical aspects of accounting information systems with a focus on business processes. Practical application includes use of software in a lab setting. Prereq: ACCT 311 with a grade of C or better and MIS 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 620.}.

ACCT 421. Auditing I. 3 Credits.
Study of audit principles and practices including evidence gathering, internal controls, sampling and testing, report writing, ethics and legal liabilities. Prereq: ACCT 311 with a grade of C or better . Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.{Also offered for graduate credit - see ACCT 621.}.

ACCT 425. Government and Not-For-Profit Accounting. 3 Credits.
Study of accounting standards and procedures applicable to government and not-for-profit institutions. Prereq: ACCT 311 with a grade of C or better. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 625.}.

ACCT 430. Tax Practice & Research. 3 Credits.
Study of the fundamental concepts of tax practice and tax research methods. Prereq: ACCT 418. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 440. Management Control Systems. 3 Credits.
Study of the role of cost management analysts in the design, implementation, and use of management control systems. Prereq: ACCT 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 640.}.

ACCT 491. Seminar. 1-5 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 492. Study Abroad. 1-15 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 494. Individual Study. 1-5 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 496. Field Experience. 1-15 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 499. Special Topics. 1-5 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 595. Field Experience. 1-15 Credits.

ACCT 596. Special Topics. 1-5 Credits.

ACCT 610. Fraud Examination. 3 Credits.
Study of the pervasiveness and causes of fraud in society; examination of methods of fraud detection and prevention, and on the investigation of financial statement fraud. {Also offered for undergraduate credit - see ACCT 410.}.

ACCT 611. Advanced Fraud Examination. 3 Credits.
Advanced application of fraud examination principles that encompass the investigation and prevention of fraudulent financial transactions. Coursework is focused on the analysis of fraudulent financial statements and fieldwork involving actual organizations. {Also offered for undergraduate credit - see ACCT 411.}.

ACCT 615. Advanced Accounting. 3 Credits.
Study of advanced topics including consolidated statements, international operations, and derivative financial instruments. {Also offered for undergraduate credit - see ACCT 415.}.

ACCT 618. Tax Accounting I. 3 Credits.
Study of the theory and principles related to the determination of taxable income and computation of federal income taxes for individuals. Students will prepare manual and computerized tax returns. {Also offered for undergraduate credit - see ACCT 418.}.

ACCT 619. Tax Accounting II. 3 Credits.
Study of the theory and principles related to the determination of taxable income and computation of federal income taxes for partnerships, corporations, trusts and estates, and other specialized tax issues. Prereq: ACCT 618. {Also offered for undergraduate credit - see ACCT 419.}.

ACCT 620. Accounting Information Systems. 3 Credits.
Study of conceptual and practical aspects of accounting information systems with a focus on business processes. Practical application includes use of software in a lab setting. {Also offered for graduate credit - see ACCT 420 .}.

ACCT 621. Auditing I. 3 Credits.
Study of audit principles and practices including evidence gathering, internal controls, sampling and testing, report writing, ethics and legal liabilities. {Also offered for undergraduate credit - see ACCT 421.}.

ACCT 625. Government and Not-for-Profit Accounting. 3 Credits.
Study of accounting standards and procedures applicable to government and not-for-profit institutions. {Also offered for undergraduate credit - see ACCT 425.}.

ACCT 640. Management Control Systems. 3 Credits.
Study of the role of cost management analysts in the design, implementation, and use of management control systems. {Also offered for undergraduate credit - see ACCT 440.}.

ACCT 695. Field Experience. 1-15 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.

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.

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.

ACCT 720. Strategic Cost Management. 3 Credits.
Study of the role of cost management methods in aiding managers in all of their planning, controlling and evaluating activities; focus on the role of managerial accounting information for decision-making throughout organizational activities.

ACCT 722. Auditing II. 3 Credits.
Advanced application of audit principles in organizational situations through case studies and the investigation of current issues in auditing. Prereq: ACCT 621 and approval of the MAcc Program Director.

ACCT 725. International Financial Reporting Standards. 3 Credits.
Introduces the conceptual framework of International Financial Reporting Standards (IFRS) and compares the differences in accounting standards between U.S. GAAP and IFRS. Available to accounting major graduate students with intermediate accounting background.

ACCT 730. Legal Aspects of Business. 3 Credits.
This course will study law related to business in the areas of agency, accountant legal liability, business organizations, contracts, debtor-creditor relationships, government regulations of business transactions, real property, sales, and the Uniform Commercial Code.

ACCT 735. Applied Professional Research. 3 Credits.
This course will emphasize substantive accounting questions and issues that arise in practice. Professional research methods will be used to solve cases addressing these questions. Teamwork, communication skills, and analytical skills required of contemporary accounting practitioners will be developed.

ACCT 750. Accounting Theory. 3 Credits.
This course will examine the conceptual underpinnings of accounting, the development of those concepts, and accounting issues as related to contemporary financial reporting.

ACCT 755. Financial Statement Analysis. 3 Credits.
This course is the study of conceptual and practical aspects of the financial information in corporate annual reports. The course focuses on the interpretation and critical evaluation of financial information, rather than the mechanics of preparing financial reports.

ACCT 793. Individual Study/Tutorial. 1-5 Credits.

ACCT 795. Field Experience. 1-15 Credits.

ACCT 796. Special Topics. 1-5 Credits.

Aerospace Studies (AS)

AS 110. Air Force ROTC Fitness. 0 Credits.
Physical Training classes are designed to make students aware of the benefits of being physically fit and participating in lifetime fitness programs. May be repeated. F, S.

AS 111. The Air Force Today I. 1 Credit.
Introduces students to the United State Air Force and provides an overview of the basic character, missions, and organization of the Air Force. F.

AS 112. The Air Force Today II. 1 Credit.
Continuation of AS 111; provides an overview of the basic characteristics, missions and organization of the Air Force. S.

AS 194. Individual Study. 1-3 Credits.

AS 196. Field Experience. 1-15 Credits.

AS 199. Special Topics. 1-5 Credits.

AS 210. Leadership Laboratory. 0 Credits.
Introduction to Air Force customs and courtesies, drill and ceremonies, and military structure. May be repeated. F, S.

AS 211. Evolution of USAF Air and Space Power I. 1 Credit.
Introduction to Air Force heritage and leaders, Air Force concepts, ethics and values, leadership, and the application of both oral and written communication skills. Course content covers air power history from 1783-1960. F.

AS 212. Evolution of USAF Air and Space Power II. 1 Credit.
Continuation of AS 211, includes an introduction to Air Force heritage and leaders, Air Force concepts, ethics and values, leadership, and the application of both oral and written communication skills. Prepares cadets for Field Training. Course content covers air power history from 1960 to the intermediate future. S.

AS 291. Seminar. 1-3 Credits.

AS 292. Study Abroad. 1-15 Credits.

AS 294. Individual Study. 1-5 Credits.

AS 299. Special Topics. 1-5 Credits.

AS 321. Air Force Leadership Management I. 3 Credits.
Introduction to leadership and management within the USAF, in both theory and practical application emphasizing communication skills (in both oral and written Air Force formats) and interpersonal skills. F.

AS 322. Air Force Leadership Management II. 3 Credits.
Study of leadership from the military perspective emphasizing situational leadership and contemporary issues including change management and professional ethics. Case studies are used to illustrate leadership concepts. Officer professional development topics are discussed. S.

AS 379. Study Tour Abroad. 1-6 Credits.

AS 391. Seminar. 1-3 Credits.

AS 392. Study Abroad. 1-15 Credits.

AS 394. Individual Study. 1-5 Credits.

AS 399. Special Topics. 1-5 Credits.

AS 410. Leadership Laboratory. 0 Credits.
Development of leadership skills in a practical, supervised laboratory. Students must instruct, supervise, and lead junior cadets participating in AS 210, and perform high-level management functions with the cadet corps organization. May be repeated. F, S.

AS 441. Preparation For Active Duty I. 3 Credits.
A study of the national security process, regional studies, advanced leadership ethics and Air Force doctrine. Topics include the military as a profession, officership, military justice, civilian control of the military, and current issues. Application of communication skills is included. F.

AS 442. Preparation for Active Duty II. 3 Credits.
A continuation of AS 441. Topics include the military as a profession, officership, military justice, civilian control of the military, and current issues. Continued application of communication skills and preparation for a new officer's first active duty assignment. S.

AS 491. Seminar. 1-5 Credits.

AS 492. Study Abroad. 1-15 Credits.

AS 494. Individual Study. 1-5 Credits.

AS 496. Field Experience. 1-15 Credits.

AS 499. Special Topics. 1-5 Credits.

Agribusiness & Applied Economics (AGEC)

AGEC 194. Individual Study. 1-3 Credits.

AGEC 196. Field Experience. 1-15 Credits.

AGEC 199. Special Topics. 1-5 Credits.

AGEC 220. World Agricultural Development. 3 Credits.
Introduction to theories, policies, and practices to increase food production and agricultural development in developing countries. 2 lectures. Prereq: ECON 201.

AGEC 242. Introduction to Agricultural Management. 3 Credits.
Economic and managerial concepts related to farm or agribusiness production process, development of cost data, enterprise analysis, organization and management of production inputs. 3 lectures.

AGEC 244. Agricultural Marketing. 3 Credits.
Study of the agricultural marketing system to include cash marketing, commodity futures trading, branded products merchandising and the interrelationship of the government and international trade. 3 lectures.

AGEC 246. Introduction to Agricultural Finance. 3 Credits.
Introduction to agricultural finance; provides background in farm and agribusiness credit use and evaluation. Discussion of specific financial conditions on farms and in agribusiness. A financial calculator will be required for this course. 3 lectures.

AGEC 292. Study Abroad. 1-15 Credits.

AGEC 294. Individual Study. 1-5 Credits.

AGEC 299. Special Topics. 1-5 Credits.

AGEC 339. Quantitative Methods & Decision Making. 3 Credits.
Application of basic probability concepts to decision analysis, introduction to linear programming models, forecasting, and project management. 3 lectures. Prereq: ECON 201 and MATH 144 or higher and CSCI 116 or MIS 116.

AGEC 342. Farm and Agribusiness Management II. 3 Credits.
Application of production economics principles to farm and agribusiness operations. Economic input-output principles and profit maximization. 3 lectures. Prereq: AGEC 242.

AGEC 344. Agricultural Price Analysis. 3 Credits.
Introduction to price analysis in agricultural markets. 3 lectures. Prereq: AGEC 244.

AGEC 346. Applied Risk Analysis. 3 Credits.
Development of tools to analyze business and financial risk problems unique to farms and agribusinesses. 3 lectures. Prereq: STAT 330.

AGEC 347. Principles of Real Estate. 3 Credits.
Principles and techniques of real estate appraisals, practical application of appraisal principles, and techniques to real property evaluation. Prereq: ECON 201. Cross-listed with BUSN 347.

AGEC 350. Agrisales. 3 Credits.
The principles of salesmanship applied to the agricultural business. Topics include attitudes and value systems, basic behavioral patterns, relationship of sales to marketing, selling strategies, preparing for sales calls, making sales presentations, and closing sales. 3 lectures.

AGEC 356. Advanced Agricultural Lending. 3 Credits.
Application of credit analysis principles including loan structure, financial analysis, borrower-lender relationship, legal aspect of lending, collateral valuation, and role of financial intermediaries in agriculture. Prereq: ECON 201 and AGEC 246 or FIN 320.

AGEC 360. International Agribusiness Experience. 3 Credits.
Provides students an applied context for analyzing international agribusiness. Students participate in a self- or pre-arranged experience and research an agribusiness topic in depth prior to and while studying in a foreign country.

AGEC 371. Export Management. 3 Credits.
Survey of practices that facilitate increasing a business' export activities, with emphasis on how a business plans to expand its import opportunities.

AGEC 375. Applied Agricultural Law. 3 Credits.
Study of laws affecting agriculture and agribusiness including property ownership, financial relations, and environmental regulation.

AGEC 378. Introduction to Transportation & Logistics. 3 Credits.
Presents the role and importance of transportation, with detailed discussion of the various modes and their specific characteristics. Covers basic logistics concepts in addition to transportation, including inventory, warehousing, and location decisions. Prereq: ECON 201.

AGEC 379. Study Tour Abroad. 1-6 Credits.

AGEC 393. Undergraduate Research. 1-5 Credits.

AGEC 394. Individual Study. 1-5 Credits.

AGEC 396. Field Experience. 1-15 Credits.

AGEC 397. Fe/Coop Ed/Internship. 1-4 Credits.

AGEC 399. Special Topics. 1-5 Credits.

AGEC 420. Integrated Farm and Ranch Management. 3 Credits.
Intended for persons who will advise or manage farm and ranch operations. Application of all phases of management (including marketing, finance) to crop and livestock production practice. 2 lectures, 1 laboratory. Prereq: AGEC 242, AGEC 244, or AGEC 246.

AGEC 444. Commodity Trading. 3 Credits.
Capstone course for commodity marketing option. Advanced work on topics related to marketing of crops. 2 lectures. Prereq: STAT 331 or ECON 410. Coreq: AGEC 339.{Also offered for graduate credit - see AGEC 644.}.

AGEC 445. Agribusiness Industrial Strategy. 3 Credits.
The course integrates industrial organization topics with specific applications to agribusiness strategy problems. Focus is on industry analysis and issues in competition, strategy, and rivalry from an agribusiness perspective. Prereq: AGEC 344. Coreq: AGEC 339.

AGEC 446. Agribusiness Finance. 3 Credits.
Application of financial theory to investment and liability management problems of agribusiness and farm firms. Characteristics, operations, and management of agricultural financial institutions. 3 lectures. Prereq: AGEC 339, AGEC 346. {Also offered for graduate credit - see AGEC 646.}.

AGEC 450. National AgriMarketing Association (NAMA) I. 1 Credit.
Learn the components of an agribusiness marketing plan and apply this knowledge in the development of a marketing plan for a selected product. 1 lecture. May be repeated for credit.

AGEC 451. National AgriMarketing Association (NAMA) II. 1 Credit.
Review the components of an agribusiness marketing plan. Work in teams to prepare written and oral marketing plans for the National NAMA student chapter competition. 1 lecture. May be repeated for credit. Recommended prereq: AGEC 450.

AGEC 452. Food Laws & Regulations. 3 Credits.
Regulations, laws, and dynamics governing development of food policy. Prereq: SAFE 470. Cross-listed with CFS 452 and SAFE 452.

AGEC 472. Advanced Logistical Analysis. 3 Credits.
Presents major analytical tools and methods used in analyzing logistical strategies. Course emphasis is on application of analytical tools used in quantifying logistical problems by manufacturing, trading, and shipping firms. Prereq: 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. F, S, Su.{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. Study Abroad. 1-15 Credits.

AGEC 494. Individual Study. 1-5 Credits.

AGEC 496. Field Experience. 1-15 Credits.

AGEC 499. Special Topics. 1-5 Credits.

AGEC 644. Commodity Trading. 3 Credits.
Capstone course for commodity marketing option. Advanced work on topics related to marketing of crops. 2 lectures. {Also offered for undergraduate credit - see AGEC 444.}.

AGEC 646. Agribusiness Finance. 3 Credits.
Application of financial theory to investment and liability management problems of agribusiness and farm firms. Characteristics, operations, and management of agricultural financial institutions. 3 lectures. {Also offered for undergraduate credit - see AGEC 446.}.

AGEC 652. Food Laws & Regulations. 3 Credits.
Regulations, laws, and dynamics governing development of food policy. Cross-listed with CFS 652 and SAFE 652. {Also offered for undergraduate credit - see AGEC 452.}.

AGEC 674. Cooperatives. 3 Credits.
Theory, practice, and evaluation of cooperatives including principles, management, marketing, finance, taxes, legal issues, and adjusting to change. Cross-listed with BUSN 674. F, S, Su. {Also offered for undergraduate credit - see AGEC 474.}.

AGEC 690. Graduate Seminar. 1-3 Credits.

AGEC 695. Field Experience. 1-15 Credits.

AGEC 696. Special Topics. 1-5 Credits.

AGEC 701. Research Philosophy. 1 Credit.
Role of the scientist, reasoning, values, and decisions. Problem formulation, literature review, hypothesis development, data collection, analysis, and interpretation. 1 lecture.

AGEC 711. Applied Risk Analysis I. 3 Credits.
Conceptual foundations of risk, stochastic simulation using @Risk and Model Risk, finance, trading, and strategy are presented. Emphasis is placed on financial instruments, planning for agribusiness firms, trading and risk management in agricultural commodities.

AGEC 712. Applied Risk Analysis II. 3 Credits.
Conceptual foundations of risk are presented and applied to production, financial and institutional risk problems. Emphasis is placed on the development and understanding of risk theory; risk assessment and measures, response to risk and risk management tools - with emphasis on portfolio diversification principles/theory of insurance. Prereq: AGEC 711.

AGEC 720. Food Safety Costs and Benefits Analysis. 3 Credits.
Theoretical and empirical impacts of food safety costs and benefits. Three lectures. Prereq: SAFE 670, AGEC 741. Cross-listed with SAFE 720.

AGEC 725. Food Policy. 3 Credits.
Provides quantitative tools and models used to analyze general food safety policies. Three lectures. Prereq: SAFE 670. Cross-listed with SAFE 725 and CFS 725.

AGEC 739. Analytical Methods for Applied Economics. 3 Credits.
Study and application of operations research techniques and other decision methods to problems in agriculture, transportation, and resource management. 3 lectures.

AGEC 741. Advanced Microeconomics. 3 Credits.
Advanced analysis of demand, production, and costs; pricing output and resource allocation under various market structures.

AGEC 743. Advanced Macroeconomics. 3 Credits.
Advanced analysis of macroeconomic theories; economic growth, business fluctuations, and inflation.

AGEC 744. Agribusiness I: Agricultural Product Marketing and Agribusiness Strategy. 3 Credits.
Conceptual foundations of agribusiness strategy, food product marketing, and strategic planning are presented. Emphasis is placed on quantitative strategic decision making for the agribusiness firm.

AGEC 771. Economics of Transportation Systems. 3 Credits.
The course will provide an understanding of transportation economics and policy issues facing society. Topics include transportation demand, model costs, transportation competition and market power, transportation regulation, transportation investment, and the economics of transportation safety. Cross-listed with CE 771.

AGEC 790. Graduate Seminar. 1-3 Credits.

AGEC 791. Temporary/Trial Topics. 1-5 Credits.

AGEC 793. Individual Study/Tutorial. 1-5 Credits.

AGEC 794. Practicum/Internship. 1-15 Credits.

AGEC 795. Field Experience. 1-15 Credits.

AGEC 796. Special Topics. 1-5 Credits.

AGEC 797. Master's Paper. 1-3 Credits.

AGEC 798. Master's Thesis. 1-10 Credits.

Agricultural & Biosystems Engineering (ABEN)

ABEN 110. Introduction to Agricultural and Biosystems Engineering. 3 Credits.
Introduction to agricultural and biosystems engineering (ABEN) for students interested in pursuing the major and profession. Content emphasizes ABEN sub-disciplines through engineering problem solving and introductory design. 2 lectures. 1 laboratory. Prereq: MATH 103 or MATH 107.

ABEN 189. Skills for Academic Success. 1 Credit.
This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation. Cross-listed with AGRI 189, BUSN 189, HD&E 189, ME 189 and UNIV 189. F, S.

ABEN 194. Individual Study. 1-3 Credits.

ABEN 196. Field Experience. 1-15 Credits.

ABEN 199. Special Topics. 1-5 Credits.

ABEN 255. Computer Aided Analysis & Design. 3 Credits.
Application and use of software for engineering design, analysis, and graphical communication. 2 lectures. F.

ABEN 263. Biological Materials Processing. 3 Credits.
Quantitative analysis of processing systems for food, biofuels and bioproducts using principles of mass and energy balances, fluid flow, steam properties and heat and mass transfer. 2 lectures, 1 three-hour laboratory. Prereq: ABEN 255. Co-req: ME 221. S.

ABEN 291. Seminar. 1-3 Credits.

ABEN 292. Study Abroad. 1-15 Credits.

ABEN 294. Individual Study. 1-3 Credits.

ABEN 299. Special Topics. 1-5 Credits.

ABEN 358. Electric Energy Application in Agriculture. 3 Credits.
Electrical distribution/services. Electrical control units, solid state and digital electronics, electromagnetic sensors, and sensing techniques with applications to food, agricultural, and biological systems. 2 lectures, 1 three-hour laboratory. Prereq: PHYS 252. F.

ABEN 377. Numerical Modeling in Agricultural and Biosystems Engineering. 3 Credits.
Numerical modeling using finite element and other techniques. Engineering applications include modeling of stress/strain, heat, and mass transfer in physical, natural resource, and biological systems such as grain and food products. 3 lectures. Prereq: MATH 266, ME 223. S.

ABEN 379. Study Tour Abroad. 1-6 Credits.

ABEN 383. Structural Design for Biosystems. 3 Credits.
Study of framing systems, building materials, and load requirements. Analysis and design of structures for biosystems. 3 lectures. Prereq: ME 223. F.

ABEN 391. Seminar. 1-3 Credits.

ABEN 392. Study Abroad. 1-15 Credits.

ABEN 394. Individual Study. 1-5 Credits.

ABEN 397. Fe/Coop Ed/Internship. 1-4 Credits.

ABEN 399. Special Topics. 1-5 Credits.

ABEN 444. Transport Processes. 3 Credits.
Topics covered include modes and equations of energy and mass transport processes, transport properties of biomaterials and porous media, formulations of and solutions to energy and mass transfer problems, and engineering design considerations. Prereq: MATH 266 and CE 309 or ME 352 and ABEN 263. {Also offered for graduate credit - see ABEN 644.}.

ABEN 452. Bioenvironmental Systems Design. 3 Credits.
Study of psychrometrics, heat and mass transfer, and physiological requirements for livestock and bioproducts. Design of environmental modifications, livestock wastes and control systems. 3 lectures. Prereq: CE 309 or ME 350. F {Also offered for graduate credit - see ABEN 652.}.

ABEN 456. Biobased Energy. 3 Credits.
Topics to be addressed include: benefits and limitations of biobased energy development; resource potential; biomass production, harvest, storage, and transportation issues; and conversion technologies (e.g. combustion, pyrolysis, gasification, starch and cellulosic ethanol production; biodiesel production; and anaerobic digestion). Prereq: Junior standing in science or engineering. {Also offered for graduate credit - see ABEN 656.}.

ABEN 458. Process Engineering for Food, Biofuels and Bioproducts. 3 Credits.
Analysis and design of processing systems to preserve, purify and/or transform biological materials and products, especially through refrigeration, freezing, sterilization, aseptic processing, dehydration, extraction, distillation and chemical reaction. 3 lectures. Prereq: ABEN 263. F {Also offered for graduate credit - see ABEN 658.}.

ABEN 464. Resource Conservation and Irrigation Engineering. 4 Credits.
Engineering principles and design of systems for soil and water resource management and environmental protection. 3 lectures, 1 three-hour laboratory. Prereq: CE 309. {Also offered for graduate credit - see ABEN 664 .}.

ABEN 473. Agricultural Power. 3 Credits.
Theory, analysis, and testing of internal combustion engines, traction, power trains, hydraulic systems, vehicle dynamics, stability, and ergonomics in tractor design. Electrical power units including motors. Alternative energy systems. 2 lectures, 1 three-hour laboratory. Prereq: ME 350. F {Also offered for graduate credit - see ABEN 673 .}.

ABEN 478. Machinery Analysis & Design. 3 Credits.
Principles of design, development, and testing of agricultural machines and machine systems. Applications of computer aided design and FMEA. Prereq: ME 223. S {Also offered for graduate credit - see ABEN 678 .}.

ABEN 479. Fluid Power Systems Design. 3 Credits.
Fluid dynamics principles and fluid properties are applied to the study of function, performance, and design of system components and system for power transmission and control purposes. Prereq: ME 352. Cross-listed with ME 479. {Also offered for graduate credit - see ABEN 679.}.

ABEN 482. Instrumentation & Measurements. 3 Credits.
Application of instrumentation and sensor concepts to measurement and control of environmental, biological, and mechanical parameters. Includes sensor principles, signal conditioning, data collection, and data analysis methods. 2 lectures, 1 three-hour laboratory. Prereq: PHYS 252. S {Also offered for undergraduate credit - see ABEN 682.}.

ABEN 484. Drainage and Wetland Engineering. 3 Credits.
Drainage and wetland engineering principles, design, and water quality for agricultural and natural resources applications. Topics include soil, water, and plant relationships, water movement in soils, water quality (nitrogen and salinity), surface drainage, subsurface drainage and its modeling, and wetlands. Prereq CE 309 or SOIL 433. {Also offered for graduate credit - see ABEN 684.}.

ABEN 486. Design Project I. 2 Credits.
Capstone learning experience involving principles of design, project management, and evaluation. Student teams define a capstone project in their area of interest. 2 lecture/laboratory. Prereq: Senior standing. F.

ABEN 487. Design Project II. 2 Credits.
Continuation and completion of the capstone learning experience begun in ABEN 486. Communication in oral, written, and graphic forms is emphasized. 2 lectures/laboratories. Prereq: ABEN 486. S.

ABEN 491. Seminar. 1-5 Credits.

ABEN 492. Study Abroad. 1-15 Credits.

ABEN 494. Individual Study. 1-5 Credits.

ABEN 496. Field Experience. 1-15 Credits.

ABEN 499. Special Topics. 1-5 Credits.

ABEN 644. Transport Processes. 3 Credits.
Topics covered include modes and equations of energy and mass transport processes, transport properties of biomaterials and porous media, formulations of and solutions to energy and mass transfer problems, and engineering design considerations. {Also offered for undergraduate credit - see ABEN 444.}.

ABEN 652. Bioenvironmental Systems Design. 3 Credits.
Study of psychrometrics, heat and mass transfer, and physiological requirements for livestock and bioproducts. Design of environmental modifications, livestock wastes and control systems. 3 lectures. F {Also offered for undergraduate credit - see ABEN 452.}.

ABEN 656. Biobased Energy. 3 Credits.
Topics to be addressed include: benefits and limitations of biobased energy development; resource potential; biomass production, harvest, storage, and transportation issues; and conversion technologies (e.g. combustion, pyrolysis, gasification, starch and cellulosic ethanol production; biodiesel production; and anaerobic digestion). Prereq: Junior standing in science or engineering. {Also offered for undergraduate credit - see ABEN 456.}.

ABEN 658. Process Engineering for Food, Biofuels and Bioproducts. 3 Credits.
Analysis and design of processing systems to preserve, purify and/or transform biological materials and products, especially through refrigeration, freezing, sterilization, aseptic processing, dehydration, extraction, distillation and chemical reaction. F {Also offered for undergraduate credit - see ABEN 458.}.

ABEN 664. Resource Conservation and Irrigation Engineering. 4 Credits.
Engineering principles and design of systems for soil and water resource management and environmental protection. 3 lectures, 1 three-hour laboratory. {Also offered for undergraduate credit - see ABEN 464.}.

ABEN 673. Agricultural Power. 3 Credits.
Theory, analysis, and testing of internal combustion engines, traction, power trains, hydraulic systems, vehicle dynamics, stability, and ergonomics in tractor design. Electrical power units including motors. Alternative energy systems. 2 lectures, 1 three-hour laboratory. F {Also offered for undergraduate credit - see ABEN 473 .}.

ABEN 678. Machinery Analysis & Design. 3 Credits.
Principles of design, development, and testing of agricultural machines and machine systems. Applications of computer aided design and FMEA. S {Also offered for undergraduate credit - see ABEN 478 .}.

ABEN 679. Fluid Power Systems Design. 3 Credits.
Fluid dynamics principles and fluid properties are applied to the study of function, performance, and design of system components and system for power transmission and control purposes. Cross-listed with ME 679. {Also offered for undergraduate credit - see ABEN 479 .}.

ABEN 682. Instrumentation & Measurements. 3 Credits.
Application of instrumentation and sensor concepts to measurement and control of environmental, biological, and mechanical parameters. Includes sensor principles, signal conditioning, data collection, and data analysis methods. 2 lectures, 1 three-hour laboratory. S {Also offered for undergraduate credit - see ABEN 482.}.

ABEN 684. Drainage and Wetland Engineering. 3 Credits.
Drainage and wetland engineering principles, design, and water quality for agricultural and natural resources applications. Topics include soil, water, and plant relationships, water movement in soils, water quality (nitrogen and salinity), surface drainage, subsurface drainage and its modeling, and wetlands. {Also offered for undergraduate credit - see ABEN 484.}.

ABEN 690. Graduate Seminar. 1-3 Credits.

ABEN 696. Special Topics. 1-5 Credits.

ABEN 747. Numerical Modeling of Environmental and Biological Systems. 3 Credits.
Numerical methods of systems analysis will be taught through real-world case studies. Topics covered include simplification and mathematical description of real systems; the finite-difference methods for solving differential equations; and parameter estimation sensitivity analysis, and uncertainty analysis methods. S (even years).

ABEN 750. Bioprocess Engineering. 3 Credits.
Application of biological, biochemical, and engineering fundamentals for industrial bioprocessing. Topics include bioprocessing kinetics (enzymes, cell growth, substrate utilization, and product formation); bioenergetics; bioreactor selection and scale-up; and product recovery.

ABEN 758. Applied Computer Imaging and Sensing for Biosystems. 3 Credits.
Sensors and non-destructive sensing principles (e.g., computer vision, spectroscopy, imaging, fiber optic sensing) for bioproduction and processing applications. Data/signal acquisition, signal conditioning/analysis techniques, signal interpretation, and pattern recognition using statistical, neural networks, and fuzzy logic techniques.

ABEN 763. Theory of Drying Biological Products. 3 Credits.
Theory used to describe the drying processes of biological products. 3 lectures. F.

ABEN 765. Small Watershed Hydrology and Modeling. 3 Credits.
Study and representation of hydrologic processes on small watersheds. Application of hydrologic models for surface flow, subsurface flow, nutrient and sediment transport, and water quality. Prereq: ABEN 664. F (odd years).

ABEN 773. Advanced Agricultural Power and Machinery. 3 Credits.
Theory and design of agricultural power units and field machines. 3 lectures. Prereq: ABEN 673. F.

ABEN 783. Advanced Structures and Environmental Systems. 3 Credits.
Detailed analysis of building components and advanced design problems relating to agricultural and environmental systems. 3 lectures. S.

ABEN 790. Graduate Seminar. 1-3 Credits.

ABEN 791. Temporary/Trial Topics. 1-5 Credits.

ABEN 793. Individual Study/Tutorial. 1-5 Credits.

ABEN 795. Field Experience. 1-15 Credits.

ABEN 796. Special Topics. 1-5 Credits.

ABEN 797. Master's Paper. 1-3 Credits.

ABEN 798. Master's Thesis. 1-10 Credits.

ABEN 899. Doctoral Dissertation. 1-15 Credits.

Agricultural Systems Management (ASM)

ASM 115. Fundamentals of Agricultural Systems Management. 3 Credits.
Overview of agricultural systems management; engines, machinery, structures, electricity, processing, and conservation. 3 lectures. Prereq: MATH 103 or MATH 104 or MATH 107 or placement.

ASM 125. Fabrication & Construction Technology. 3 Credits.
Introduction to materials, methods, and tools used in fabrication, installation, and maintenance of agricultural production and processing facilities. 2 lectures, 1 three-hour laboratory.

ASM 194. Individual Study. 1-3 Credits.

ASM 196. Field Experience. 1-15 Credits.

ASM 199. Special Topics. 1-5 Credits.

ASM 225. Computer Applications in Agricultural Systems Management. 3 Credits.
Application and use of software for problem solving, reporting, and graphical communication. 2 lectures. Prereq: CSCI 114 or CSCI 116 or MIS 116, MATH 105, MATH 107 or MATH 146.

ASM 264. Natural Resource Management Systems. 3 Credits.
General principles of natural resource management, including soil and water conservation, soil and wind erosion, use of tillage and vegetation for conservation, drainage, irrigation, and soil and water quality. 3 lectures. Prereq: MATH 103, MATH 104 or MATH 107. Cross-listed with NRM 264 and SOIL 264.

ASM 264L. Natural Resource Management Systems Laboratory. 1 Credit.
Laboratory to complement concepts introduced in ASM 264. Topics include land survey, maps, rainfall and runoff, erosion control, drainage and irrigation, and costs and returns. Co-req: ASM 264 or NRM 264 or SOIL 264. Prereq: Students must be ASM majors only.

ASM 291. Seminar. 1-3 Credits.

ASM 292. Study Abroad. 1-15 Credits.

ASM 294. Individual Study. 1-5 Credits.

ASM 299. Special Topics. 1-5 Credits.

ASM 323. Post-Harvest Technology. 3 Credits.
Principles and management of crop and feed storage, handling, drying, processing, and crop/feed systems siting, planning, and development. 3 lectures. Prereq: MATH 103 or MATH 104.

ASM 354. Electricity and Electronic Applications. 3 Credits.
Fundamentals and applications of electricity, power distribution, controls, motors, and solid-state electronics. For non-engineering majors. 2 lectures, 1 three-hour laboratory. Prereq: Junior standing, MATH 103 or MATH 104.

ASM 368. Structures and Environment Systems. 3 Credits.
Study of environmental needs of animals and bioproducts, control of building environments, construction materials, framing systems, and functional planning for biosystem structures. 3 lectures. Prereq: MATH 103 or MATH 104.

ASM 373. Tractors & Power Units. 3 Credits.
Theory and principles of operation, use, maintenance, repair, and selection of tractors and power systems. Includes engines, transmissions, fuel, lubrication, hydraulics, traction, and electrical systems. 3 lectures. Prereq: MATH 103 or MATH 104.

ASM 374. Power Units Laboratory. 1 Credit.
Laboratory to complement concepts introduced in ASM 373. Topics include engine systems, operation, adjustment, maintenance, repair, measurement, and testing. 1 three-hour laboratory. Prereq: MATH 103 or 104.

ASM 378. Machinery Principles and Management. 3 Credits.
Principles of agricultural machinery manufacture, sales, operation, and management. Topics include selection, replacement, operation, application, and maintenance. 2 lectures, 1 three-hour laboratory. Prereq: MATH 103 or MATH 104.

ASM 379. Study Tour Abroad. 1-6 Credits.

ASM 391. Seminar. 1-3 Credits.

ASM 392. Study Abroad. 1-15 Credits.

ASM 394. Individual Study. 1-5 Credits.

ASM 396. Field Experience. 1-15 Credits.

ASM 397. Fe/Coop/Internship. 1-4 Credits.

ASM 399. Special Topics. 1-5 Credits.

ASM 423. Agricultural Waste Management and Utilization. 3 Credits.
This course is designed to provide the fundamentals in livestock and other agricultural waste management and the concepts involved in the design of waste management systems that are environmentally sound. Topics include: Animal production and waste characterization, ventilation, manure collection and storage design considerations, manure processing and utilization, Animal Feeding Operation/Confined Animal Feeding Operation siting, regulations, and Comprehensive Nutrient Management Planning (CNMP), ventilation, animal waste and environmental concerns, computer software and models for nutrient assessment and air quality, management and utilization of other agricultural wastes. Prereq: MATH 103 or higher and CHEM 117 or higher. {Also offered for graduate credit - see ASM 623.}.

ASM 429. Hydraulic Power Principles and Applications. 3 Credits.
Study of fluid power principles, components, schematics, and systems. Emphasis is on proper use, maintenance, and applications of hydraulic power equipment. Prereq: PHYS 211, Junior standing.

ASM 454. Principles and Application of Precision Agriculture. 3 Credits.
Principles and application of precision agriculture including yield monitoring systems, variable rate technology, GIS, GPS, sensors, auto guidance, data acquisition and management, mapping and equipment management. 2 lectures, 1 three-hour laboratory. Prereq: MATH 103, MATH 104, or MATH 107. {Also offered for graduate credit - see ASM 654.}.

ASM 455. Data Management in Precision Agriculture. 3 Credits.
This course demonstrates the importance of data management in precision agriculture including data sources, acquisition, analysis and interpretation. Sources include yield monitoring, imagery, soil and crop sensors and machine performance through telemetry. Storage, display, mapping and data use. 3 lectures. Prereq: MATH 103 or higher. {Also offered for graduate credit - See ASM 655.}.

ASM 468. Landscape Irrigation Design. 2 Credits.
Students will learn the basic issues of water resources, water management, and irrigation system design. 2 lectures. Prereq: Junior standing. Cross-listed with PLSC 468. F (odd years).

ASM 469. Landscape Irrigation Installation and Management. 2 Credits.
Irrigation system installation, winterization, start-up, troubleshooting, renovation, and drainage. 2 lectures. Prereq: Junior standing. Cross-listed with PLSC 469. S (even years).

ASM 475. Management of Agricultural Systems. 2 Credits.
Capstone learning experience involving team solution to problems in agricultural systems management. Oral and written communications are emphasized. 2 lectures. Prereq: Senior standing. {Also offered for graduate credit - see ASM 675.}.

ASM 491. Seminar. 1-5 Credits.

ASM 492. Study Abroad. 1-15 Credits.

ASM 494. Individual Study. 1-5 Credits.

ASM 496. Field Experience. 1-15 Credits.

ASM 499. Special Topics. 1-5 Credits.

ASM 623. Agricultural Waste Management and Utilization. 3 Credits.
This course is designed to provide the fundamentals in livestock and other agricultural waste management and the concepts involved in the design of waste management systems that are environmentally sound. Topics include: Animal production and waste characterization, ventilation, manure collection and storage design considerations, manure processing and utilization, Animal Feeding Operation/Confined Animal Feeding Operation siting, regulations, and Comprehensive Nutrient Management Planning (CNMP), ventilation, animal waste and environmental concerns, computer software and models for nutrient assessment and air quality, management and utilization of other agricultural wastes. {Also offered for undergraduate credit - see ASM 423.}.

ASM 654. Principles and Application of Precision Agriculture. 3 Credits.
Principles and application of precision agriculture including yield monitoring systems, variable rate technology, GIS, GPS, sensors, auto guidance, data acquisition and management, mapping and equipment management. 2 lectures, 1 three-hour laboratory. {Also offered for undergraduate credit - see ASM 454.}.

ASM 655. Data Management in Precision Agriculture. 3 Credits.
This course demonstrates the importance of data management in precision agriculture including data sources, acquisition, analysis and interpretation. Sources include yield monitoring, imagery, soil and crop sensors and machine performance through telemetry. Storage, display, mapping and data use. 3 lectures. {Also offered for undergraduate credit - See ASM 455.}.

ASM 675. Management of Agricultural Systems. 2 Credits.
Capstone learning experience involving team solution to problems in agricultural systems management. Oral and written communications are emphasized. 2 lectures. {Also offered for undergraduate credit - see ASM 475}.

Agriculture General (AGRI)

AGRI 115. Wonders of Weather. 3 Credits.
This class reveals the mystery of the wonders of every-day weather. Through hands-on experimentation, observations, and discussion of day-to-day weather, students curious about weather and its impacts will come to understand the natural forces structuring the Earth's atmosphere and its weather patterns that directly impact lives of all sharing the Mother Earth.

AGRI 150. Agriculture Orientation. 1 Credit.
Introduction to opportunities and professional advancement in agricultural careers. Overview of majors offered in the College of Agriculture, Food Systems, & Natural Resources, activities, and support services.

AGRI 189. Skills for Academic Success. 1 Credit.
This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation. Cross-listed with ABEN 189, BUSN 189, HD&E 189, ME 189 and UNIV 189. F.

AGRI 291. Seminar. 1-3 Credits.

AGRI 292. Study Abroad. 1-15 Credits.

AGRI 294. Individual Study. 1-5 Credits.

AGRI 379. Study Tour Abroad. 1-6 Credits.

AGRI 391. Seminar. 1-3 Credits.

AGRI 392. Study Abroad. 1-15 Credits.

AGRI 394. Individual Study. 1-5 Credits.

AGRI 397. Coop/Internship. 1-4 Credits.

AGRI 492. Study Abroad. 1-15 Credits.

AGRI 496. Field Experience. 1-15 Credits.

Animal Sciences (ANSC)

ANSC 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 123. Feeds and Feeding. 3 Credits.
Principles of feeding livestock including digestive systems, nutrient requirements, nutrient characteristics, and sources utilized in the formulation of balanced rations. 2 lectures, 1 two-hour laboratory.

ANSC 150. Animal Science Orientation. 1 Credit.
Students will be introduced to opportunities and professional advancement in the animal sciences. Overview of majors, minors, and options offered in the Department of Animal Sciences, activities, and support services.

ANSC 194. Individual Study. 1-5 Credits.

ANSC 196. Field Experience. 1-15 Credits.

ANSC 199. Special Topics. 1-5 Credits.

ANSC 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 220. Livestock Production. 3 Credits.
General production and management of major meat and dairy animal species. Topics include production systems, feeding, facilities, health, economics, and marketing. 2 lectures, 1 two-hour laboratory.

ANSC 223. Introduction to Animal Nutrition. 2 Credits.
Principles of feeding livestock and pets including digestive systems, nutrient characteristics, nutrient requirements, and feed sources used in formulating balanced rations.

ANSC 230. Meat Grading and Evaluation. 2 Credits.
Evaluation and grading of carcasses and wholesale cuts of beef, pork, and lamb. Written explanation of decisions and comparisons. 2 three-hour laboratories. Prereq: ANSC 240. F.

ANSC 231. Livestock Evaluation. 2 Credits.
The study of evaluating breeding and market livestock based on records, appearance, and soundness. 2 three-hour laboratories. Prereq: ANSC 240. F.

ANSC 232. Dairy Cattle Evaluation. 2 Credits.
Visual appraisal and evaluation of dairy cattle. Type classification of dairy cattle. 2 three-hour laboratories. F.

ANSC 233. Junior Competitive Livestock Evaluation. 2 Credits.
The study of evaluating breeding and market livestock based upon visual appraisal and performance records. The NDSU Junior Livestock Evaluation Team will be selected from students enrolled in ANSC 233. Students are admitted to the course by instructor approval. 2, three-hour laboratories plus hours arranged. Prereq: ANSC 240.

ANSC 235. Equine Evaluation. 2 Credits.
Detailed study of horse conformation, selection criteria, and judging standards for equine competitions. Emphasis will be placed on development of critical thinking, decision making, and oral presentation skills. 2 three-hour laboratories. May be repeated. Prereq: ANSC 260. F.

ANSC 240. Meat Animal Evaluation and Marketing. 3 Credits.
Relationship between live animal composition and meat product values. Introduction to basic muscle biology and effects of livestock practices on meat quality. 2 lectures, 1 two-hour laboratory.

ANSC 260. Introduction to Equine Studies. 2 Credits.
Introduction to basic aspects of equine studies and general principles surrounding the horse industry. 2 one-hour lectures. F.

ANSC 260L. Equine Care and Management Practicum. 1 Credit.
A laboratory course designed to supplement lecture material covered in ANSC 260. Students will learn management and husbandry skills relevant to modern horse care practices. 1 two-hour laboratory. F,S.

ANSC 261. Basic Equitation & Horsemanship. 1 Credit.
Basic grooming, saddling, bridling, mounting, ground work, correct riding position, and proper coordination of the riding aids will be addressed. Horse behavior will also be discussed throughout the course. 1 two-hour laboratory. Lab fee required. Enrollment priority will be given to Equine Studies Major/Minor/Certificate students.

ANSC 291. Seminar. 1-5 Credits.

ANSC 292. Study Abroad. 1-15 Credits.

ANSC 294. Individual Study. 1-5 Credits.

ANSC 296. Field Experience. 1-15 Credits.

ANSC 299. Special Topics. 1-5 Credits.

ANSC 300. Domestic Animal Behavior and Management. 3 Credits.
Discussion of animal behavior, with an emphasis on physiology, as it relates to management, handling and housing of domestic animals. Basic methods of measuring behavior are explored. Prereq: ANSC 114, VETS 135.

ANSC 310. Principles of Therapeutic Horsemanship Instruction. 3 Credits.
This course is focused on theoretical knowledge and application of therapeutic horsemanship instruction through experiential learning and teaching techniques of peers, and includes evaluation and training techniques for therapy horses, lesson plan development, and critical reviews of the literature. Prereq: ANSC 210, ANSC 261. S.

ANSC 312. Bovine Pregnancy Diagnosis and Ultrasonography. 1 Credit.
The course will involve the anatomy and physiology of the bovine. Utilization of techniques to determine pregnancy and ultrasonography will be instructed. Prereq: ANSC 463.

ANSC 314. Animal Biotechnology. 3 Credits.
Animal biotechnology, biotechnology in human health, biotechnology in reproduction, and biotechniques. Prereq: BIOL 126 or BIOL 150.

ANSC 323. Fundamentals of Nutrition. 3 Credits.
Fundamentals of nutrition emphasizing digestion, metabolism, function, requirements, and sources of specific nutrients. 3 lectures. Recommended Prereq: ANSC 123, BIOC 260. S.

ANSC 324. Applied Animal Nutrition. 3 Credits.
The application of nutrition principles in feed management systems for livestock, poultry, and pets. Prereq: ANSC 323.

ANSC 330. Competitive Meat Grading and Evaluation. 2 Credits.
Senior meat judging team. Team members will travel to intercollegiate meat judging contests. May be repeated. Prereq: ANSC 230.

ANSC 331. Competitive Livestock Evaluation. 2 Credits.
Evaluation of breeding and market livestock with an emphasis on preparing students for judging competition. 3 three-hour laboratories plus additional times to be arranged. May be repeated. Prereq: ANSC 231.

ANSC 332. Competitive Dairy Cattle Evaluation. 2 Credits.
Visual appraisal and evaluation of dairy cattle for competition at national dairy evaluation contests. 2 three-hour laboratories plus time to be arranged. Prereq: ANSC 232 and a minimum cumulative 2.0 GPA. May be repeated for credit.

ANSC 335. Competitive Equine Evaluation. 2 Credits.
Evaluation of horse conformation, selection criteria, and judging standards for national equine judging competitions. 2 three-hour laboratories plus time to be arranged. Prereq: ANSC 235. May be repeated for credit.

ANSC 340. Principles of Meat Science. 3 Credits.
Introduction to the anatomical, physiological, developmental, and biochemical aspects conversion of muscle to meat and aspects of fresh and processed meat technology, preservation, microbiology, and current issues. 2 lectures, 1 two-hour laboratory.

ANSC 343. Humane Slaughter and Meat Cutting. 3 Credits.
This course will teach the principles and procedures of meat animal humane slaughter, carcass fabrication, and meat processing. You will be required to help in all processes of slaughter, fabricating, processing, and cleaning.

ANSC 344. Fundamentals of Meat Processing. 2 Credits.
Chemical and physical relationships in meat preservation, sausage production, and other meat product preparation. 1 lecture, 1 three-hour laboratory.

ANSC 350. Graduate Experience Program. 1 Credit.
This course is designed to give undergraduate students the opportunity to explore graduate studies in the Animal Sciences. Undergraduates are paired with a graduate student mentor and participate in data collection, lab work, departmental seminars, journal article presentations, and scientific meetings.

ANSC 357. Animal Genetics. 3 Credits.
Genetic and statistical principles applied to livestock improvement. 2 lectures, 1 two-hour laboratory. Prereq: PLSC 315, STAT 330. S.

ANSC 358. Equine Genetics. 2 Credits.
Genetic principles applied to horses including: genetic improvement programs, genetic defects, color inheritance, inbreeding, domestication and breeds. Prereq: BIOL 315 or BOT 315 or PLSC 315 or ZOO 315. F.

ANSC 360. Equine Nutrition. 3 Credits.
This course focuses on basic equine nutrition fundamentals while integrating concepts in an applied and practical manner. Recommended Prereq: ANSC 223 or ANSC 323.

ANSC 361. Intermediate Horsemanship. 1 Credit.
A continuation of ANSC 261. Further emphasis will be placed on development of the balanced seat and coordinated aids necessary to complete more advanced maneuvers. 1 two-hour laboratory. Lab fee required. Enrollment priority will be given to Equine Studies Major/Minor/Certificate students. Prereq: ANSC 261.

ANSC 362. Colts in Training. 2 Credits.
Principles and application of techniques required to train a young horse to ride. Three two-hour laboratories. Enrollment priority will be given to equine studies major/minor students. Lab fee required. Recommended prereq: ANSC 261, ANSC 361. S.

ANSC 364. Equine Anatomy and Physiology. 3 Credits.
This course focuses on a practical understanding of equine anatomy and physiology as they relate to management, conditioning, and reproduction. Prereq: VETS 135.

ANSC 370. Fundamentals/Animal Disease. 3 Credits.
Basic principles of disease processes and prevention. Comparative review emphasizing infectious and management related diseases in production and companion species. An emphasis will be placed on public health. Prereq: VETS 135 or BIOL 220. Recommended prereq: ANSC 114 and MICR 202 or MICR 350.

ANSC 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: VETS 135.

ANSC 375. Methods of Horsemanship Instruction. 2 Credits.
In this experiential learning course, students will study methods of instruction, lesson plan development, and demonstrate integration of their knowledge through practical teaching situations, both mounted and unmounted. Prereq: ANSC 361. F (even years).

ANSC 378. Animal Health Management. 1 Credit.
This course introduces the student to learning through a case-based approach to animal disease. Case material highlights health problems seen in the Midwest. Case questions encourage students to think about disease prevention, management and eradication. May be repeated for credit. Prereq: VETS 135. Recommended Prereq: ANSC 114.

ANSC 379. Study Tour Abroad. 1-6 Credits.

ANSC 380. Livestock Sales and Marketing. 2 Credits.
Students will learn the importance of livestock marketing, catalog development, livestock photography, sale advertising, and animal management, and will hold a sale at the end of the semester. Prereq: Junior or Senior standing.

ANSC 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. Study Abroad. 1-15 Credits.

ANSC 393. Undergraduate Research. 1-5 Credits.

ANSC 394. Individual Study. 1-5 Credits.

ANSC 396. Field Experience. 1-15 Credits.

ANSC 397. Fe/Coop Ed/Internship. 1-15 Credits.

ANSC 399. Special Topics. 1-5 Credits.

ANSC 410. Therapeutic Horsemanship Teaching Practicum. 1 Credit.
In this practical teaching course, students will team teach for 6 to 12 weeks with a North American Riding for the Handicapped Association (NARHA) certified instructor at a local therapeutic program, assisting with lesson plan and program plan development, mounting and dismounting of riders, as well as instruction and evaluation of riders. Prereq: ANSC 210, ANSC 310.

ANSC 426. Feed Technology. 2 Credits.
This course is a comprehensive introduction to feed production technology; the science of feeds, feeding, feed additives and feed optimization; and management and legal aspects in providing quality livestock, poultry, aquatic and companion animal feeds. Prereq: ANSC 223 or ANSC 324 or ANSC 360.

ANSC 435. Nutrition Laboratory Techniques. 3 Credits.
Theory and basic laboratory techniques associated with nutritional research and current information regarding advanced techniques and developments. 2 lectures, laboratory by arrangement. Prereq: CHEM 260. F (even years) {Also offered for graduate credit - see ANSC 635.}.

ANSC 444. Livestock Muscle Physiology. 3 Credits.
Basic concepts in muscle growth and development of livestock, evaluating the effects of environment, welfare, nutrition and genetics regarding muscle metabolism and physiology, and how this ultimately affects the nature of muscle as food. Prereq: CHEM 260. {Also offered for graduate credit - see ANSC 644.}.

ANSC 457. Genetic Improvement of Livestock. 3 Credits.
Principles and applications of technologies for the genetic improvement of livestock including both quantitative and molecular techniques. Prereq: ANSC 357.

ANSC 458. Evaluation and Use of Breeds of Livestock. 3 Credits.
Evaluation of breeds of cattle, sheep and swine with emphasis of breed comparison research and breed history. Examination of appropriate use of existing breed resources and development of new breeds. Prereq: ANSC 357. {Also offered for graduate credit - see ANSC 658.}.

ANSC 461. Advanced Horsemanship and Equitation. 1 Credit.
Advanced emphasis on horsemanship techniques to develop the finished rider. 1 two-hour laboratory. Lab fee. Prereq: ANSC 361.

ANSC 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 663L.}.

ANSC 464. Reproduction Management Procedures. 2 Credits.
Demonstration and utilization of the new technology in large animal reproductive management including embryo and semen collection, pregnancy diagnosis, and estrous control. 1 lecture, 1 three-hour laboratory. Prereq: ANSC 463. F.

ANSC 470. Applied Nutrition. 4 Credits.
Application of nutrition principles in feed management systems for livestock with emphasis on energy and protein (ruminants) and energy and amino acids (non-ruminants). 4 lectures. Prereq: ANSC 323. S.

ANSC 478. Research and Issues in Animal Agriculture. 3 Credits.
Examination of the role of animal agriculture in society, research pertaining to the animal sciences and current issues facing animal agriculture. Prereq: Senior standing with a primary interest in animal agriculture.

ANSC 480. Equine Industry and Production Systems. 3 Credits.
A capstone course that incorporates genetics, nutrition, exercise physiology, reproduction, health care, and industry practices into management of the equine enterprise. 2 lectures, 1 two-hour laboratory. Prereq: ANSC 360, ANSC 364. F.

ANSC 482. Sheep Industry and Production Systems. 3 Credits.
A capstone course that incorporates genetics, nutrition, reproduction, disease control, and marketing into sustainable flock enterprises. 2 lectures, 1 two-hour laboratory. Prereq: ANSC 324, ANSC 357 and ANSC 463.

ANSC 484. Swine Production/Pork Industry Systems. 3 Credits.
Capstone course includes breeding systems, disease control, applied economics, housing, marketing, pork quality, and nutrition in a systems approach. 2 lectures, 1 two-hour laboratory. Prereq: ANSC 324, ANSC 357, ANSC 463.

ANSC 486. Beef Industry and Production Systems. 3 Credits.
Capstone course includes the management, systems, selection, record keeping, merchandising, and production testing of beef. 2 lectures, 1 two-hour laboratory. Prereq: ANSC 324, ANSC 357 and ANSC 463.

ANSC 487. Growing and Finishing Cattle Management. 3 Credits.
Integrated management of cattle fed for slaughter with emphasis on nutrition, health, marketing, and risk management; covers the beef enterprise from weaning to market. Prereq: Junior or Senior standing. {Also offered for graduate credit - see ANSC 687 .}.

ANSC 488. Dairy Industry and Production Systems. 3 Credits.
Capstone course: United States dairy industry including terminology, dairy stock management, economics and finance, facilities, waste management, nutrition, milk quality and animal health. 2 lectures, 1 two-hour laboratory. Prereq: ANSC 324, ANSC 463.

ANSC 491. Seminar. 1-5 Credits.

ANSC 492. Study Abroad. 1-15 Credits.

ANSC 494. Individual Study. 1-5 Credits.

ANSC 496. Field Experience. 1-15 Credits.

ANSC 499. Special Topics. 1-5 Credits.

ANSC 635. Nutrition Laboratory Techniques. 3 Credits.
Theory and basic laboratory techniques associated with nutritional research and current information regarding advanced techniques and developments. 2 lectures, laboratory by arrangement. F (even years) {Also offered for undergraduate credit - see ANSC 435.}.

ANSC 644. Livestock Muscle Physiology. 3 Credits.
Basic concepts in muscle growth and development of livestock, evaluating the effects of environment, welfare, nutrition and genetics regarding muscle metabolism and physiology, and how this ultimately affects the nature of muscle as food. {Also offered for undergraduate credit - see ANSC 444.}.

ANSC 657. Genetic Improvement of Livestock. 3 Credits.
Principles and applications of technologies for the genetic improvement of livestock including both quantitative and molecular techniques. {Also offered for undergraduate credit - see ANSC 457.}.

ANSC 658. Evaluation and Use of Breeds of Livestock. 3 Credits.
Evaluation of breeds of cattle, sheep and swine with emphasis of breed comparison research and breed history. Examination of appropriate use of existing breed resources and development of new breeds. {Also offered for undergraduate credit - see ANSC 458.}.

ANSC 663. Physiology of Reproduction. 3 Credits.
Comparative anatomy, physiology, and endocrinology of reproduction in mammals. {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 677. Animal Preventive Medicine. 3 Credits.
Course incorporates factors that contribute to development of animal medical conditions/diseases and how these factors can be manipulated to prevent or control the condition or disease. Emphasis will be placed on undergraduate preventive medicine. {Also offered for undergraduate credit - see ANSC 477.}.

ANSC 687. Growing and Finishing Cattle Management. 3 Credits.
Integrated management of cattle fed for slaughter with emphasis on nutrition, health, marketing, and risk management; covers the beef enterprise from weaning to market. {Also offered for undergraduate credit - see ANSC 487.}.

ANSC 690. Graduate Seminar. 1-5 Credits.

ANSC 695. Field Experience. 1-15 Credits.

ANSC 696. Special Topics. 1-5 Credits.

ANSC 701. Writing and Communicating in the Animal Sciences. 3 Credits.
Studying and practicing scientific writing and communication in the animal science discipline.

ANSC 721. Biology of Lactation. 2 Credits.
Mammary gland development and mechanisms controlling lactation. 2 lectures.

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 736. Experimental Nutrition Methods. 1 Credit.
Design, conductance, analysis, and reporting of experiments taken in conjunction with ANSC 773, ANSC 774, ANSC 775, or ANSC 776.

ANSC 740. Data Analyses and Designs of Experiments. 3 Credits.
Experimental design principles, introductory statistical theory, and commonly used data analyses of animal science data are taught and practiced with practical applications using the computer. 3 lectures. Prereq: STAT 725.

ANSC 750. Quantitative Genetics Applications of Matrix Algebra. 1 Credit.
Principles in matrix algebra to describe and solve problems in the agricultural and life sciences, and particularly quantitative genetics. Material includes vocabulary, concepts, and, to a lesser extent, theory of matrix algebra, with application to ecological systems, genotypic transition matrices, selection indices, and the numerator relationship matrix. With matrix algebra, use least squares procedures and canonical transformation to solve problems in biological sciences.

ANSC 751. A Primer to Quantitative Genetics. 1 Credit.
Language and foundational principles of quantitative genetics. Material includes basic model for quantitative genetics (additive and non-additive genetic effects, including Mendelian sampling, and environmental effects), sources of variation, heritability, family resemblance and repeatability, selection response, and family selection. Define expected values and concepts in applied statistics. Prereq: ANSC 750.

ANSC 752. Selection Index Theory and Application. 1 Credit.
Theory and application of selection indices. Material includes design of animal breeding programs, estimating selection response, constructing economic selection indices, and developing multiple-stage selection strategies. Introduces approaches for deriving economic weights, and predicting economic response to selection. Prereq or Co-req: ANSC 751.

ANSC 753. Economic Breeding Programs. 1 Credit.
Principles for developing an economic basis for multiple-trait selection to improve the profitability of production. Material includes review of concepts relevant to the selection index, introduction to the concept of systems analysis, linear programming, and simulation with emphasis on economic values useful for selection index. Critically analyze relevant literature. Prereq or Co-req: ANSC 752.

ANSC 754. Cybersheep: A Genetic Simulation Game. 1 Credit.
Principles of genetic selection and mating strategies applied in livestock breeding programs. Through use of a web-based genetic simulation game (CyberSheep), develop skills in implementing a virtual animal breeding program, assess the outcomes of decision-making in terms of genetic response, inbreeding, and economic returns, and experience stochastic elements inherent to livestock systems.

ANSC 755. Advanced Meat Science. 3 Credits.
An in-depth investigation of the physical and biochemical characteristics of muscle and meat. Students will gain an understanding of advanced meat science topics, and improve their ability to design, conduct, interpret and report meat science research. (even years).

ANSC 756. History and Perspectives in Animal Breeding. 1 Credit.
Historical perspective to the discipline of animal breeding and genetics. Introduction to the contributions of geneticists who have significantly impacted the discipline. Material includes pre-recorded interviews of scientists that have had an international impact in animal breeding and genetics. Critique key papers.

ANSC 758. Molecular Biological Techniques in Animal Sciences. 3 Credits.
The theory and application of molecular biology laboratory techniques to the field of animal sciences.

ANSC 773. Energy Metabolism. 3 Credits.
Methods of measuring energy values and the metabolic processes involved in the production of useful biological energy from organic compounds. 3 lectures. Prereq: BIOC 701. F (odd years).

ANSC 774. Nitrogen Metabolism. 3 Credits.
Detailed overview of nitrogenous compounds including metabolism and function. Considerable emphasis on current research from the literature. 3 lectures. Prereq: BIOC 701. S (even years).

ANSC 776. Digestive Physiology. 3 Credits.
Investigation of digestive and absorptive events occurring within farm animals. Emphasis on enzyme action, nutrient transport, gut motility, gastro-intestinal endocrinology, and current research. 3 lectures. Prereq: BIOC 701. F (odd years).

ANSC 790. Graduate Seminar. 1-5 Credits.

ANSC 791. Temporary/Trial Topics. 1-5 Credits.

ANSC 792. Graduate Teaching Experience. 1-6 Credits.

ANSC 793. Individual Study/Tutorial. 1-5 Credits.

ANSC 795. Field Experience. 1-15 Credits.

ANSC 796. Special Topics. 1-5 Credits.

ANSC 797. Master's Paper. 1-3 Credits.

ANSC 798. Master's Thesis. 1-10 Credits.

ANSC 813. Domestic Animal Endocrinology. 3 Credits.
Detailed overview of the function of hormones and their effects on physiological systems. Considerable emphasis will be placed on experimental approaches, approaches to manipulate endocrine status, and current literature.

ANSC 828. Advanced Reproductive Biology. 3 Credits.
Discussion of reproductive physiology research with emphasis on current topics in cellular and molecular biology. 3 lectures. S (odd years).

ANSC 830. Growth Biology. 3 Credits.
Regulation of growth at the cell/tissue, organ systems, and whole animal levels. 3 lectures. S (even years).

ANSC 850. Linear Models in Animal Breeding. 1 Credit.
Principles of linear models used in animal breeding. Models discussed in the context of the random variable that is to be predicted. Material includes animal models, sire/maternal grandsire models, and sire models, models with a single and repeated records, and models with both direct and maternal effects. Prereq: ANSC 751, ANSC 752.

ANSC 851. Genetic Prediction. 1 Credit.
Principles for using best linear unbiased prediction (BLUP) in genetic prediction. Material includes data integrity diagnosis, contemporary grouping strategies, adjusting for known non-genetic effects, the AWK Programming Language, UNIX/Linux scripting, and use of modern computational tools to perform genetic evaluations. Emphasis on real-world datasets designed to develop applied analytical skills in animal breeding. Prereq: ANSC 752, ANSC 850.

ANSC 852. Applied Variance Component Estimation. 1 Credit.
Principles in the estimation of (co)variance components and genetic parameters required to solve mixed models typical in livestock genetics. Focus on applied knowledge of approaches used to estimate the G and R sub-matrices of the mixed model equations. Demonstrate models commonly used in parameter estimation. Introduce scientific literature concerning implementation, and attributes of the solutions, of variance component estimation strategies. Prereq; ANSC 850, ANSC 851.

ANSC 856. Prediction and Control of Inbreeding in Breeding Programs. 1 Credit.
Principles in the prediction and control of inbreeding in livestock breeding program. Material includes definition of inbreeding and identity by descent, impacts of inbreeding on genotype frequencies, trait means and variances, random drift, computation of inbreeding coefficients in pedigreed populations, prediction of rates of inbreeding in closed populations, and control and management of inbreeding in breeding populations. Prereq: ANSC 751.

ANSC 875. Vitamins and Minerals. 3 Credits.
Metabolism of vitamins and minerals and their application in animal nutrition and the feed industry. 3 lectures. Prereq: BIOC 701. F (even years).

ANSC 892. Graduate Teaching Experience. 1-6 Credits.

ANSC 899. Doctoral Dissertation. 1-15 Credits.

Anthropology (ANTH)

ANTH 111. Introduction to Anthropology. 3 Credits.
Introductory overview to anthropology, the holistic study of humans and the diversity of the human experience over space and time. Covers the major fields of anthropology: cultural and biological anthropology, archaeology, linguistics, applied anthropology.

ANTH 194. Individual Study. 1-3 Credits.

ANTH 196. Field Experience. 1-15 Credits.

ANTH 199. Special Topics. 1-5 Credits.

ANTH 204. Archaeology and Prehistory. 3 Credits.
Introduction to archaeological methods, followed by a survey of world prehistory.

ANTH 205. Human Origins. 3 Credits.
Examination of the evolution of humans through the investigation of fundamental principles of evolution, human variation, comparative primate behavior, and the fossil record.

ANTH 206. Introduction to Cultural Anthropology: Peoples of the World. 3 Credits.
Core concepts, theories, and practices in cultural anthropology and anthropological knowledge application in a globalizing world. Through rich, engaging ethnographic texts and case studies, focuses on selected societies and culture change in deep sociohistorical contexts. Prereq: ANTH 111.

ANTH 209. Introduction to Linguistics. 3 Credits.
Entry-level knowledge for the scientific study of language, including such topics as phonetics, phonology, morphology, semantics, grammar, social and cultural dimensions, acquisition, variation and similarities among languages of the world, and related cultural history. Cross-listed with ENGL 209.

ANTH 291. Seminar. 1-3 Credits.

ANTH 292. Study Abroad. 1-15 Credits.

ANTH 294. Individual Study. 1-5 Credits.

ANTH 299. Special Topics. 1-5 Credits.

ANTH 332. Medical Anthropology. 3 Credits.
Examines cultural conceptions, beliefs, and practices regarding health, illness, disease, and treatment through a cross-cultural and historical perspective. The course includes theoretical, methodological, and case study perspectives from physical anthropology, archaeology, and cultural anthropology.

ANTH 379. Study Tour Abroad. 1-6 Credits.

ANTH 391. Seminar. 1-3 Credits.

ANTH 392. Study Abroad. 1-15 Credits.

ANTH 394. Individual Study. 1-5 Credits.

ANTH 399. Special Topics. 1-5 Credits.

ANTH 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 446. Latin America & Carribean: Afro-Latino/as, Gender, Indigeneity. 3 Credits.
Exploration of Latin America and the Carribean's diverse societies historically and culturally; focus on gender, indigenous groups, and Afro-Latin Americans. Includes case studies covering social justice movements, political and economic processes, indigenous rights, religion. Prereq: ANTH 206. {Also offered for graduate credit - see ANTH 646.}.

ANTH 453. Magic and Religion. 3 Credits.
Comparative religion, religious concepts, practices, and practitioners. In-depth study of selected religious systems with a focus on shamanic religions. Prereq: ANTH 111. Cross-listed with RELS 453. {Also offered for graduate credit - see ANTH 653.}.

ANTH 455. Language and Expressive Culture. 3 Credits.
Examines sociolinguistic and semiotic theories and analysis methods for discourse-centered approaches to communicative culture. Explores the ways in which humans construct and express meaning through written/spoken language, song, folklore, ritual, performance, images, clothing, and food. Prereq: ANTH 111 and at least junior standing. {Also offered for graduate credit - see ANTH 655.}.

ANTH 462. Anthropology and the Environment. 3 Credits.
The environment as understood through anthropological research. Focus on ethnographic texts confronting global environmental issues through specific context (place, cultural, historical) and human-environment interactions as shaped by political, economic, and social relations. Prereq: ANTH 111. {Also offered for graduate credit - see ANTH 662.}.

ANTH 464. Disaster and Culture. 3 Credits.
Examines human-made and natural disasters through cross-cultural and historical perspectives. Addresses cultural variation across and within relevant communities including those of disaster victims, emergency management systems, and a broad public. Prereq: Junior or Senior standing. {Also offered for graduate credit - see ANTH 664.}.

ANTH 470. Analysis & Interpretation in Archaeology. 3 Credits.
This course addresses archaeology as both a scientific and interpretive endeavor through historical context and contemporary problem-based approach. This course also covers basics of a scientific, analytic approach (theories, models, hypotheses, testing) and foundations for interpretation (creativity, preconceptions, contextualization). Prereq: ANTH 204. {Also offered for graduate credit - see ANTH 670.}.

ANTH 471. Archaeological Research Methods. 3 Credits.
Overview of the most often used or potentially useful archaeological methods and their applications in fieldwork, laboratory processing, and specialized analytical techniques. Focus on problem-solving skills through the application of different archaeological methods. Prereq: ANTH 204. {Also offered for graduate credit - see ANTH 671.}.

ANTH 480. Development of Anthropological Theory. 3 Credits.
Focus on major theoretical orientations in anthropology. Emphasis on the ways in which anthropological theories are used to generate explanations for multicultural phenomena. Prereq: ANTH 111. {Also offered for graduate credit - see ANTH 680.}.

ANTH 481. Qualitative Methods in Cultural Anthropology. 3 Credits.
Focuses on qualitative research methods utilized in cultural anthropology and other social sciences. Instruction and application of ethnographic, discourse-centered, visual anthropology, interview/focus group, extended case study, and other qualitative survey methods and forms of analysis. Prereq: ANTH 206 and junior or senior standing. {Also offered for graduate credit - see ANTH 681.}.

ANTH 489. Senior Capstone In Anthropology. 1 Credit.
Synthesis of social research methods, anthropological theory, and sub-discipline content material. Emphasis on integrative skills needed to interrelate the basic concepts of the discipline. Prereq: Senior standing.

ANTH 491. Seminar. 1-5 Credits.

ANTH 492. Study Abroad. 1-15 Credits.

ANTH 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 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 646. Latin America & Carribean: Afro-Latino/as, Gender, Indigeneity. 3 Credits.
Exploration of Latin America and the Carribean'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 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. Analysis & Interpretation in Archaeology. 3 Credits.
This course addresses archaeology as both a scientific and interpretive endeavor through historical context and contemporary problem-based approach. This course also covers basics of a scientific, analytic approach (theories, models, hypotheses, testing) and foundations for interpretation (creativity, preconceptions, contextualization). {Also offered for undergraduate credit - see ANTH 470.}.

ANTH 671. Archaeological Research Methods. 3 Credits.
Overview of the most often used or potentially useful archaeological methods and their applications in fieldwork, laboratory processing, and specialized analytical techniques. Focus on problem-solving skills through the application of different archaeological methods. {Also offered for undergraduate credit - see ANTH 471.}.

ANTH 680. Development of Anthropological Theory. 3 Credits.
Focus on major theoretical orientations in anthropology. Emphasis on the ways in which anthropological theories are used to generate explanations for multicultural phenomena. {Also offered for undergraduate credit - see ANTH 480.}.

ANTH 681. Qualitative Methods in Cultural Anthropology. 3 Credits.
Focuses on qualitative research methods utilized in cultural anthropology and other social sciences. Instruction and application of ethnographic, discourse-centered, visual anthropology, interview/focus group, extended case study, and other qualitative survey methods and forms of analysis. {Also offered for undergraduate credit - see ANTH 481.}.

ANTH 690. Graduate Seminar. 1-3 Credits.

ANTH 695. Field Experience. 1-15 Credits.

ANTH 696. Special Topics. 1-5 Credits.

ANTH 790. Graduate Seminar. 1-5 Credits.

ANTH 793. Individual Study/Tutorial. 1-5 Credits.

ANTH 794. Practicum/Internship. 1-8 Credits.

ANTH 795. Field Experience. 1-15 Credits.

ANTH 797. Master's Paper. 1-3 Credits.

ANTH 798. Master's Thesis. 1-10 Credits.

Apparel, Design & Hospitality Management (ADHM)

ADHM 101. Beginning Apparel Construction. 3 Credits.
Introduction to basic apparel assembly methods and use of a sewing machine.

ADHM 140. Introduction to the Hospitality Industry. 3 Credits.
Overview of the hospitality industry; its history, components, career opportunities, development, and future trends with application to food service, lodging, and travel. 3 lectures. F.

ADHM 141. Tourism and Travel Management. 3 Credits.
Application of management principles and techniques to the tourism and resort industry with emphasis on tourism components, recreational activities, and impact of the travel and tourism industry. 3 lectures. S.

ADHM 151. Design Fundamentals. 3 Credits.
Study and application of elements and principles of design; two- and three-dimensional applications. Co-req: ADHM 160, ADHM 161 Prereq: Interior Design major. F, S.

ADHM 155. Apparel Construction and Fit. 3 Credits.
Principles of apparel construction and analysis. Construction of a fitting sloper and two fashion garments. Prereq: ADHM 101. F.

ADHM 160. Interior Design Careers. 1 Credit.
Survey of the interior design profession and the relationship to allied professionals and organizations. Prereq: Interior Design or Apparel, Retail Merchandising and Design major. F.

ADHM 161. Introduction to Manual Drafting. 3 Credits.
Fundamentals of building construction, materials, and methods. Technical and graphic communication for interior design documentation, with an emphasis placed on lettering and manual drafting. Prereq: Interior Design majors and minors or Apparel, Retail Merchandising and Design majors. Co-req: ADHM 151, ADHM 160. F.

ADHM 162. Intermediate Manual Drafting. 3 Credits.
Continued study of building construction, materials, and methods. Technical and graphic communication for interior design, with an emphasis placed on manual drafting, detailing and document organization. Prereq: ADHM 161 with a grade of C or higher and Interior Design majors only. Co-req: ADHM 261. S.

ADHM 171. Fashion Dynamics. 3 Credits.
Introductory course tracing the development of fashion and its industry that includes consumer demand and fashion change, the development, production, and marketing of goods from concept to consumer, and their interrelationships. F.

ADHM 181. Aesthetics and Visual Analysis of Apparel Products. 3 Credits.
Analysis of aesthetics and design principles and their application to apparel and textiles products, environment and oneself.

ADHM 194. Individual Study. 1-3 Credits.

ADHM 196. Field Experience. 1-15 Credits.

ADHM 199. Special Topics. 1-5 Credits.

ADHM 241. Hospitality Accounting. 3 Credits.
Basic financial hospitality accounting concepts and practices. Interpretation of accounting and financial control systems in management decision making; uniform system of accounts, departmentalized costing procedures; ration analysis; budgeting, financial statement analysis and interpretation. Prereq: ACCT 102, ADHM 140, ADHM 141. F.

ADHM 245. Contemporary Issues of Controlled Beverages. 3 Credits.
The study of historic, social, ethical, physiological and legal issues relating to alcoholic beverage service and use in contemporary America with emphasis on responsible and knowledgeable service of beer, wine, and spirits in hospitality operations.

ADHM 251. Interior Design Studio I-Residential. 3 Credits.
Introduction of design theory and process to analyze interior environments. Emphasis on programming and space planning. Prereq: ADHM 151, ADHM 160, ADHM 162 and ADHM 261 with a grade of C or higher in all prereq courses. Co-req: ADHM 264 and ADHM 365. F.

ADHM 253. Interior Design Studio II-Office Design. 2 Credits.
Application of design theory and process to analyze office environments. Emphasis on programming, schematics, design development, human factors, and construction documentation of business environments. Prereq: Interior Design major, minimum of 3.00 cumulative GPA, ADHM 251, ADHM 264 and ADHM 365 with a grade of C or higher in all prereq courses. Coreq: ADHM 254 and ADHM 368. S.

ADHM 254. Interior Design Studio III. 2 Credits.
Application of design theory and process to analyze small commercial environments. Emphasis on programming, schematics, design development, and construction documentation. Prereq: ADHM 251, ADHM 264, ADHM 365 with a grade of C or higher in all prereq courses, Interior Design major with a 3.0 cumulative GPA. Coreq: ADHM 253 and ADHM 368. S.

ADHM 261. Visual Communications. 3 Credits.
Principles and methods of drawing and sketching, including perspective, with an emphasis on a variety of rendering techniques and media. Prereq: Interior Design major.

ADHM 264. Residential Systems. 2 Credits.
Introduction of basic principles of lighting design and interior systems in residential applications. Prereq: ADHM 151, ADHM 160, ADHM 162, ADHM 261 all with a grade of C or better and Interior Design majors with a minimum cumulative 3.0 GPA or Apparel, Retail Merchandising and Design majors. Coreq: ADHM 251, ADHM 365. F.

ADHM 271. Visual Merchandising and Promotion. 3 Credits.
Principles, procedures and sources of information essential for marketing and promoting retail merchandise sales. Experience in planning, executing and evaluating promotion plans. S.

ADHM 272. Product Development. 3 Credits.
Examination of issues and management strategies necessary to produce a competitively priced product. Understanding the role of technology in design, production, and marketing/sales of products. Prereq: ADHM 171, ADHM 181.

ADHM 291. Seminar. 1-3 Credits.

ADHM 292. Study Abroad. 1-15 Credits.

ADHM 294. Individual Study. 1-5 Credits.

ADHM 299. Special Topics. 1-5 Credits.

ADHM 300. Design Resource Management. 1-3 Credits.
Management of resources used by interior designers, including references, product information, and material samples. May be repeated up to 2 times. Prereq: ADHM 254, ADHM 368 with a grade of C or higher and students must be Interior Design majors with a minimum of 3.00 cumulative GPA.

ADHM 310. History of Fashion. 3 Credits.
Historic view of the evolution of fashion in the Western world through time as it relates to political/sociological/economic change. F.

ADHM 315. History of Interiors I. 3 Credits.
Survey of historical interiors and furnishings beginning with antiquity through the 1800's. F.

ADHM 316. History of Interiors II. 3 Credits.
Survey of historical and contemporary interiors and furnishings beginning with the 1800's to the present day. S.

ADHM 351. Interior Design Studio IV-Advanced Residential. 3 Credits.
Application of design components to an advanced residential project with emphasis on special populations and design focus. Prereq: Interior Design major with a minimum cumulative 3.0 GPA, ADHM 253, ADHM 254 and ADHM 368 with a grade of C or higher. Coreq: ADHM 363 and ADHM 460.

ADHM 353. Interior Design Studio V-Large Scale Contract Design. 3 Credits.
Application of design components to large scale commercial projects with emphasis on systems furniture, interior codes, and building systems. Prereq: ADHM 351, ADHM 363, ADHM 460 with a grade of C or higher in all prereq courses and students must be Interior Design majors with a minimum cumulative GPA of 3.0. Coreq: ADHM 461. S.

ADHM 355. Flat Pattern Design & Draping. 3 Credits.
Developing original patterns through flat pattern design and draping for individual and commercial applications. Prereq: ADHM 155. S.

ADHM 356. Pattern Drafting and Grading. 3 Credits.
Individual and commercial apparel patterns are created with the pattern drafting method. Grading, a system of making a range of sizes for a master pattern, is examined. Prereq: ADHM 155. S.

ADHM 360. Lodging Operations Management. 3 Credits.
This course examines the development of the lodging industry and current trends. Organization and administration of lodging operations including front desk, housekeeping, laundry, sales/marketing, management, and other positions common to lodging operations. Prereq or Co-Req: ADHM 140, ADHM 141. S.

ADHM 363. Commercial Lighting Design and Building Systems. 3 Credits.
Integration of theory, techniques, and the art of lighting design with emphasis on commercial applications. Analysis of commercial building systems. Prereq: ADHM 253, ADHM 254, ADHM 368 with a grade of C or higher in all prereq courses and students must be Interior Design majors with a minimum cumulative GPA of 3.0. Coreq: ADHM 351 and ADHM 460. F.

ADHM 365. CADD for Interiors. 3 Credits.
Computer-aided design and drafting, emphasizing applications in interior design. Includes drawing creation, editing layers, blocks, and attributes. Co-req: ADHM 251, ADHM 264. Prereq: ADHM 162 and ADHM 261 with a grade of C or better and students must be Interior Design majors with a minimum cumulative GPA of 3.0. F, S.

ADHM 366. Textiles. 3 Credits.
Fibers, yarns, fabric construction, finishes, and dyestuffs related to selection, use, and maintenance of textile products. Coreq: ADHM 367. F.

ADHM 367. Textiles Laboratory. 1 Credit.
Textile product characterization through the analysis of yarn type, fabric, construction, finishes, and dyestuffs; care procedures; simple identification of fibers, yarns, and fabrics. Coreq: ADHM 366. F.

ADHM 368. Interior Materials. 2 Credits.
This course examines the characteristics, applications, specifications and sustainability of materials used in interior spaces. S.

ADHM 370. Sewn-Product Manufacturing and Analysis. 3 Credits.
Analysis of the sewn-product manufacturing processes, governmental regulations, sourcing, and technology applications. Focus on evaluating products, quality, performance, and cost. Prereq: ADHM 366, ADHM 367 or departmental approval. S.

ADHM 371. Fashion Trend Analysis and Forecasting. 3 Credits.
Study of techniques and processes of identifying past and present trends and methods for forecasting future trends, with applications in the apparel and home fashion, textiles and retail industries. Prereq: ADHM 171.

ADHM 372. Global Retailing. 3 Credits.
Theoretical approach to management practices and marketing policies for retail soft goods in a complex and changing world market. Prereq: 2.5 cumulative GPA, junior standing and MRKT 320 or ADHM 171. Cross-listed with MRKT 372.

ADHM 375. Professional Development. 1 Credit.
Internship and career planning including professional expectations and responsibilities. Skills gained in resume and portfolio development, writing cover letters, interviewing techniques, and business etiquette. Prereq: ADHM 272 and at least junior standing.

ADHM 379. Study Tour Abroad. 1-6 Credits.

ADHM 381. Hospitality Marketing and Sales. 3 Credits.
Basic marketing theory and contemporary practice as adapted to the hospitality industry. Emphasis on consumer behavior, market opportunities, marketing research and strategies, and marketing plans. Prereq: ADHM 140, ADHM 141, MRKT 320. S.

ADHM 384. Beverage Operations. 3 Credits.
Identification and evaluation of beverages served in hospitality establishments with a focus on making quality decisions. Beverages presented will include alcohol (spirits, wines, liqueurs, and beer), coffee, tea, soft drinks, and mineral waters. Prereq: ADHM 140 or 141 and students must be 21 years of age or older as of August 31st.

ADHM 385. Global Fashion Economics. 3 Credits.
Study of factors affecting production, distribution, and consumption of products in domestic and foreign textile and apparel industries. Prereq: ADHM 171 and ECON 105, ECON 201, or ECON 202. Recommended: junior standing. F.

ADHM 386. Merchandise Planning and Buying. 3 Credits.
This course intends to provide an overview of merchandise planning and buying. This course will introduce students to the principles, mathematical formulas and concepts of retail buying and assortment planning. Prereq: ADHM 171.

ADHM 391. Seminar. 1-3 Credits.

ADHM 392. Study Abroad. 1-15 Credits.

ADHM 394. Individual Study. 1-5 Credits.

ADHM 396. Field Experience. 1-15 Credits.

ADHM 397. Fe/Coop Ed/Internship. 1-4 Credits.

ADHM 399. Special Topics. 1-5 Credits.

ADHM 401. Convention and Meeting Planning. 3 Credits.
The roles and responsibilities of professional meeting planners are examined. Planning or hosting a convention or meeting for a corporation, association, or special group. Emphasis on audio/visual equipment, room layout, and special requests. Prereq or Co-Req: ADHM 381 or ADHM 140 or ADHM 141 and junior standing. S.

ADHM 403. Resort Development and Management. 3 Credits.
Study and application of concepts in the development and management of a successful resort. The course includes discussions on resort planning, marketing, and finance. Prereq: ADHM 140 or ADHM 141. F.

ADHM 404. Restaurant Operations Management. 3 Credits.
Application of food, beverage, and service management principles in a commercial foodservice setting with emphasis on challenges, responsibilities, and current trends associated with operations management. Prereq: HNES 261, HNES 261L. Co-Req: ADHM 404L. S.

ADHM 404L. Restaurant Operations Management Laboratory. 2 Credits.
This course is a student-driven quantity food production experience focusing on practical applications of commercial foodservice management principles in an upscale dining setting. Co-req: ADHM 404. S.

ADHM 405. Casino Operations. 3 Credits.
Methods, procedures, and ethical principles utilized in managing a casino operation. Gaming regulations and taxes, mathematics of casino games, casino management, and marketing are addressed. Prereq: Junior standing. F.

ADHM 406. Professional Club Management. 3 Credits.
Exploration of the topics involved in club management. Topics discussed include history and current trends of public and private clubs, country clubs, food and beverage service, marketing, and event and financial management. Prereq: ADHM 140 or ADHM 141 and at least junior standing.

ADHM 410. Dress in World Cultures. 3 Credits.
Analysis of world dress as related to cultural, technological aesthetic, and social patterns. Concepts illustrated through comparative studies of selected world cultures. F, S.

ADHM 411. Food and World Cultures. 3 Credits.
An integrated approach to the study of foods and cultures. Food influences on demography, habitat, social traditions and settings, social status, religious beliefs, gender, and environmental considerations. History, concepts, and principles of cultures and cuisines. F, S.

ADHM 425. Experiential Retailing. 3 Credits.
Explore experiential retailing of products, services and experiences that encompass utilitarian and hedonic consumption. Apply strategies for planning, developing, and presenting products or services to create a total consumer experience. Prereq: ADHM 140 or ADHM 171 or MGMT 320 or MRKT 320. {Also offered for graduate credit - see ADHM 625.}.

ADHM 435. Cost Controls in Hospitality and Food Service Systems. 3 Credits.
Provides fundamental knowledge of hospitality managerial accounting, cost controls, and financial management. Includes financial statement analysis, cost concepts, cost-volume-profit analysis, calculating and controlling food and beverage costs, pricing, and capital budgeting. Prereq: ADHM 241. {Also offered for graduate credit - see ADHM 635.}.

ADHM 450. Research and Project Development in Interior Design. 3 Credits.
Research, development, and presentation of a programming proposal for a large scale commercial or residential interior. Prereq: ADHM 353 and ADHM 461 with a grade of C or higher and students must be Interior Design majors with a minimum cumulative GPA of 3.0.

ADHM 452. Comprehensive Interior Design Project. 6 Credits.
Capstone design studio. Student defined problem. Synthesis and implementation of previous course work. S.

ADHM 455. Advanced Apparel Assembly. 3 Credits.
Application of the principles and concepts of advanced apparel assembly and their application to finished garments in a particular category of apparel: jackets, dresses, formalwear and casual sportswear. May be repeated. Prereq: ADHM 155.

ADHM 460. Career Development and Professional Practice. 3 Credits.
Overview of professional standards and promotional activities as related to the interior design profession. Prereq: ADHM 254 and ADHM 368 with a grade of C or higher and students must be Interior Design majors with a minimum cumulative GPA of 3.0. Co-req: ADHM 351 and ADHM 363.

ADHM 461. Building Information Modeling. 3 Credits.
Computer-aided design, modeling and rendering emphasizing applications in interior design. Prereq: ADHM 351, ADHM 363 and ADHM 460 with a grade of C or higher and students must be Interior Design majors with a minimum cumulative GPA of 3.0. Co-req: ADHM 353.

ADHM 467. Hospitality Law. 3 Credits.
Legal considerations of hospitality property management and exploration of important legislation. Legal rights, liabilities and responsibilities of the operator in conjunction with management policies. Prereq: Senior standing. F.

ADHM 470. Retail Financial Management and Control. 3 Credits.
Study of retail planning, buying, control, and analysis as it relates to decision-making using computer simulation packages. Prereq: ADHM 171, CSCI 114 or CSCI 116 or MIS 116, MRKT 320, MGMT 320 and ACCT 102. S.

ADHM 479. Hospitality Industry Management Strategies. 3 Credits.
Capstone course for HTM majors. Includes opportunities to analyze hospitality issues, make strategic business decisions, and solve practical problems through case studies and simulations. Prereq: ADHM 360 and ADHM 435, Senior standing. S.

ADHM 481. Capstone in Apparel, Retail Merchandising and Design. 3 Credits.
Critically analyze and propose research-based solutions to problems related to apparel and textiles including production, distribution, and retailing of goods and services. Prereq: ADHM 250 or ADHM 385, ENGL 320, and COMM 216, COMM 271, COMM 308, COMM 315 or COMM 383 and at least junior standing. S.

ADHM 485. Global Consumer Analysis. 3 Credits.
This course provides a comprehensive analysis of today's global consumers in the fashion industry by investigating personal differences and environmental influences. This course focuses on the exploration of diversity in the global fashion market and marketing strategies to deal with the diversity. Prereq: ADHM 171, ADHM 385 and PSYC 111. {Also offered for graduate credit - see ADHM 685.}.

ADHM 486. Dress and Human Behavior. 3 Credits.
Influence of dress and appearance on human behavior throughout the life cycle. F.

ADHM 489. Study Tour. 1-3 Credits.
Faculty-directed tour to key fashion, design, tourism destinations, or business centers in the U.S. and abroad. Visits to off-campus destinations provide students contact with practicing professionals as they are exposed to the fast pace of a changing global industry. May be repeated. Prereq: ADHM 140 or ADHM 160, ADHM 171.

ADHM 491. Seminar. 1-5 Credits.

ADHM 492. Study Abroad. 1-15 Credits.

ADHM 494. Individual Study. 1-5 Credits.

ADHM 496. Field Experience. 1-15 Credits.

ADHM 499. Special Topics. 1-5 Credits.

ADHM 625. Experiential Retailing. 3 Credits.
Explore experiential retailing of products, services and experiences that encompass utilitarian and hedonic consumption. Apply strategies for planning, developing, and presenting products or services to create a total consumer experience. {Also offered for undergraduate credit - see ADHM 425.}.

ADHM 635. Cost Controls in Hospitality and Food Service Systems. 3 Credits.
Provides fundamental knowledge of hospitality managerial accounting, cost controls, and financial management. Includes financial statement analysis, cost concepts, cost-volume-profit analysis, calculating and controlling food and beverage costs, pricing, and capital budgeting. {Also offered for undergraduate credit - see ADHM 435.}.

ADHM 685. Global Consumer Analysis. 3 Credits.
This course provides a comprehensive analysis of today's global consumers in the fashion industry by investigating personal differences and environmental influences. This course focuses on the exploration of diversity in the global fashion market and marketing strategies to deal with the diversity. {Also offered for undergraduate credit - see ADHM 485.}.

ADHM 690. Graduate Seminar. 1-3 Credits.

ADHM 695. Field Experience. 1-15 Credits.

ADHM 705. Environment and Aging. 3 Credits.
Analysis of the built environment and how it impacts the aging population. Prereq: Graduate student standing in HD&E.

ADHM 710. Consumer Behavior in Merchandising. 3 Credits.
Evaluation of psychological, sociological, and cultural theories of consumer behavior through the examination of factors influencing the consumer decision-making process.

ADHM 720. Professional Advancement. 3 Credits.
Analysis of leadership and how it affects organizational culture and change through past and current experiences. Various leadership styles examined and a personal leadership philosophy developed for professional advancement in merchandising.

ADHM 730. Product Design, Develeopment and Evaluation. 3 Credits.
Advanced study of issues and management strategies necessary to design and produce a competitively priced product. Examination of the role of globalization and rapidly changing technology on the development of a successful product.

ADHM 736. Entrepreneurship in Dietetics. 3 Credits.
The economics of entrepreneurship, business plan development, and steps in starting your own business related to hospitality or dietetics, including consultation.

ADHM 740. Promotional Strategies in Merchandising. 3 Credits.
Examination of integrated marketing communications (i.e., promotional strategies and techniques) while fostering cultural and global awareness, social responsibility and ethical decision-making in the field of promotion.

ADHM 750. Retail Theory and Current Practice. 3 Credits.
Theoretical and applied analysis of merchandising strategies; assessment of internal and external environmental forces impacting strategic decisions by retail firms; synthesis of past and present trends in order to forecast probable future patterns.

ADHM 760. Historical and Contemporary Issues in Trade. 3 Credits.
The examination of fiber, textile, and apparel industries in a global context. Historical development of global and U.S. textile and apparel industries and how the economic, political, and social systems affect production and trade. Prereq: ADHM 710, ADHM 720, ADHM 730, ADHM 740, ADHM 750.

ADHM 770. International Retail Expansion. 3 Credits.
Comprehensive understanding of theory, practices, and trends on international merchandise management. An analysis of global retail system and the way goods are distributed to consumers in various countries. Prereq: ADHM 710, ADHM 720, ADHM 730, ADHM 740, ADHM 750.

ADHM 775. Research Methods in Merchandising. 3 Credits.
An overview of the research process used in social science, including an overview and analysis of research methodologies. Also includes a review of current merchandising literature with implications for future research. Prereq: Graduate level statistics course, ADHM 710, ADHM 720, ADHM 730, ADHM 740, ADHM 750.

ADHM 780. Financial Merchandising Implications. 3 Credits.
The advanced study of financial trends in the merchandising industries; implications related to varied organizational structures. Foci will be on the financial implications of recent advances in the field. Prereq: ADHM 710, ADHM 720, ADHM 730, ADHM 740, ADHM 750.

ADHM 785. Strategic Merchandise Planning. 3 Credits.
Examination of the executive planning process utilized to develop successful corporate strategies; emphasis on the importance of a market orientation for building customer value and sustaining a competitive advantage. Prereq: ADHM 710, ADHM 720, ADHM 730, ADHM 740, ADHM 750.

ADHM 790. Graduate Seminar. 1-5 Credits.

ADHM 793. Individual Study/Tutorial. 1-5 Credits.

ADHM 794. Practicum/Internship. 1-8 Credits.

ADHM 797S. Comprehensive Project. 1-6 Credits.
An in-depth research study/project in a graduate student's field of study. Prereq: Graduate standing.

Arabic (ARB)

ARB 101. First-Year Arabic I. 4 Credits.
Basic structures and vocabulary of modern standard Arabic. Practice in the fundamentals of listening, speaking, reading, and writing; introduction to the cultural context of the Arabic-speaking world. No previous knowledge of Arabic required. Not open to native speakers of Arabic.

ARB 102. First-Year Arabic II. 4 Credits.
Basic structures and vocabulary of modern standard Arabic. Practice in the fundamentals of listening, speaking, reading, and writing; introduction to the cultural context of the Arabic-speaking world. Continuation of ARB 101. Not open to native speakers of Arabic.

ARB 201. Second-Year Arabic I. 3 Credits.
Extended practice with grammatical structures and practical vocabulary to develop proficiency in listening and speaking: additional emphasis on development of skills in reading and writing; cultural topics. Prereq: ARB 102 or equivalent.

ARB 202. Second-Year Arabic II. 3 Credits.
Extended practice with grammatical structures and practical vocabulary to develop proficiency in listening and speaking: additional emphasis on development of skills in reading and writing; cultural topics. Prereq: ARB 201 or equivalent.

ARB 299. Special Topics. 1-5 Credits.

Architecture (ARCH)

ARCH 194. Individual Study. 1-3 Credits.

ARCH 196. Field Experience. 1-15 Credits.

ARCH 199. Special Topics. 1-5 Credits.

ARCH 231. Architectural Drawing. 3 Credits.
Instruction in traditional (non-digital) representation of architectural designs: elevations, plans, sections, perspectives. Practice with presentation techniques. Prereq: Admission into the second year of the Architecture or Landscape Architecture program.

ARCH 232. Design Technology. 3 Credits.
Introductory exploration of digital design media and environmental technology in architecture and landscape architecture. Prereq or Co-req: ARCH 271 or LA 271.

ARCH 233. Math for Designers. 1 Credit.
Elementary investigations and applied learning activities focused on mathematical influences on architecture through history, proportioning, geometric modeling, trigonometric identities, fractals, algorithms, and parametric modeling. Prereq: Admission into the second year of the Architecture or Landscape Architecture program.

ARCH 271. Architectural Design I. 6 Credits.
Studio course focused on beginning exercises in basic design, incorporating abstract two-dimensional design, functional response to environmental determinants, the articulation of form, spatial organization, and aesthetic judgment. Prereq: . Admission into second year of program.

ARCH 272. Architectural Design II. 6 Credits.
Studio course focused on exercises in basic design incorporating abstract two-dimensional design, functional response to environmental determinants, the articulation of form, spatial organization, and aesthetic judgment. Prereq: ARCH 271.

ARCH 291. Seminar. 1-3 Credits.

ARCH 292. Study Abroad. 1-15 Credits.

ARCH 294. Individual Study. 1-5 Credits.

ARCH 296. Field Experience. 1-15 Credits.

ARCH 299. Special Topics. 1-5 Credits.

ARCH 321. History and Theory of Architecture I. 3 Credits.
History and theory of architecture from ancient times through the Renaissance with attention placed on the design connections across cultures and across the globe. Lecture course.

ARCH 322. History of Architecture II. 3 Credits.
History of architecture from the Baroque to the present placing within a global perspective. Lecture course.

ARCH 323. History and Theory of Architecture III. 3 Credits.
History and theory of architecture from the mid-range of modernism to the contemporary, exploring different movements, methods, and ideas, including global and vernacular influences. Prereq: Admission into the second year of the Architecture or Landscape Architecture program.

ARCH 341. Site Design for Architects. 3 Credits.
Intermediate investigations and applied learning activities directed towards understanding building site inventory, analysis, and appropriate design responses. Prereq: ARCH 272.

ARCH 344. Architectural Structures I. 3 Credits.
Overview of the principles of statics and mechanics of materials and structural concepts relative to building members and frames. Prereq: ARCH 271 and admission to the professional program.

ARCH 351. Materials & Construction. 4 Credits.
Study of building materials from source through manufacture, focusing on their contribution to design and the study of the assembly processes of construction. Lecture course. Prereq: ARCH 272.

ARCH 371. Architectural Design III. 6 Credits.
Studio courses providing intermediate level exercises in architectural design; responding to contextual, cultural, environmental, climatic, technological, and aesthetic determinants. Prereq: ARCH 272.

ARCH 372. Architectural Design IV. 6 Credits.
Studio course continuing intermediate level exercises in architectural design: responding to contextual, cultural, environmental, climatic, technological, and aesthetic determinants. Prereq: ARCH 371.

ARCH 379. Study Tour Abroad. 1-6 Credits.

ARCH 391. Seminar. 1-3 Credits.

ARCH 392. Study Abroad. 1-15 Credits.

ARCH 394. Individual Study. 1-5 Credits.

ARCH 397. Fe/Coop Ed/Internship. 1-4 Credits.

ARCH 399. Special Topics. 1-5 Credits.

ARCH 443. Architectural Structures II. 3 Credits.
Overview of the principles of statics and mechanics of materials and structural concepts relative to building members and frames. Prereq: ARCH 344, ARCH 372.

ARCH 450. Architectural Detailing. 3 Credits.
Study of wood, steel, masonry, and concrete construction assemblies through architectural detailing, with an introduction to specifications and construction documents. Prereq: ARCH 371.

ARCH 453. Environmental Control Systems: Passive Principles. 3 Credits.
Study of architectural design related to thermal comfort, climate, passive solar systems, daylighting, acoustics, and other environmental concerns. Prereq: ARCH 272.

ARCH 454. Environmental Control System: Active System. 3 Credits.
Study of the basic fundamentals of illumination and basic power generation, distribution and service; heating, ventilation, and air-conditioning systems; plumbing systems; and acoustics as they relate to building design. Prereq: ARCH 371, 453.

ARCH 461. Urban Design. 3 Credits.
Study of urban form and urban theory, development, and processes in a historic and contemporary context. Prereq: ARCH 371 or LA 371.

ARCH 471. Architectural Design V. 6 Credits.
Studio courses involving the complex organization of architectural spaces and forms in an urban context. Prereq: ARCH 372.

ARCH 472. Architectural Design VI. 6 Credits.
Studio courses involving the complex organization of architectural spaces and forms in an urban context. Prereq: ARCH 471.

ARCH 474. International Design Studio. 6 Credits.
Comprehensive design studio experience in advanced architectural studies to be conducted in culturally diverse, international locations. Prereq: ARCH 471.

ARCH 475. Design Build Studio. 6 Credits.
Studio course resulting in completed small-scale construction project. This course may be repeated for credit. {Also offered for graduate credit - see ARCH 675.}.

ARCH 491. Seminar. 1-5 Credits.

ARCH 492. Study Abroad. 1-15 Credits.

ARCH 494. Individual Study. 1-5 Credits.

ARCH 496. Field Experience. 1-15 Credits.

ARCH 497. FE/Coop Ed/Internship. 1-4 Credits.

ARCH 499. Special Topics. 1-5 Credits.

ARCH 675. Design Build Studio. 6 Credits.
Studio course resulting in completed small-scale construction project. This course may be repeated for credit. {Also offered for undergraduate credit - see ARCH 475.}.

ARCH 721. Non-Western Architectural Traditions. 3 Credits.
Advanced course on the investigation of design methods and building traditions of non-Western cultures and diverse geographic regions. May be repeated.

ARCH 722. Urbanism. 3 Credits.
Advanced course to explore in-depth aspects of urban design. May be repeated.

ARCH 723. Historic Preservation. 3 Credits.
Advanced course to explore the philosophy and techniques of preserving historic buildings. May be repeated.

ARCH 724. Architectural Technology. 3 Credits.
Advanced course to explore the historical and theoretical underpinnings of architectural technology. May be repeated.

ARCH 725. Architecture or the Recent Past. 3 Credits.
Advanced course to explore the major architectural movements and personalities since the mid-20th century. May be repeated.

ARCH 726. Current Architectural Theory. 3 Credits.
Advanced course focused on current issues and the work and design theory of leading architectural practitioners around the world. May be repeated.

ARCH 727. Vernacular Architectural Traditions. 3 Credits.
Advanced course to explore vernacular architectural traditions in North America and elsewhere. May be repeated.

ARCH 728. Sociocultural Issues. 3 Credits.
Advanced course focused on the social issues and movements that have influenced environmental design. May be repeated.

ARCH 763. Programming/Thesis Prep. 3 Credits.
Discussion and application of a comprehensive design process for production of the design thesis. Emphasis on preparing a design program.

ARCH 771. Advanced Architectural Design. 6 Credits.
Advanced studio course addressing complex design problems requiring increased self-direction.

ARCH 772. Design Thesis. 8 Credits.
Advanced studio course devoted to the execution of a comprehensive design thesis project, from schematic design through design development, presentation, and review. Prereq: ARCH 663, ARCH 771.

ARCH 781. Professional Practice. 3 Credits.
Study of contemporary architectural practice covering professional development, firm organization, and project management within the context of the ethical, legal, and regulatory environment. Cross-listed with LA 581.

ARCH 789. Professional Topics in Architecture. 3 Credits.
Various topics related to theorectical or methodological aspects of architecture as a professional discipline. May be repeated.

ARCH 790. Graduate Seminar. 1-3 Credits.

ARCH 793. Individual Study. 1-5 Credits.

ARCH 795. Field Experience. 1-10 Credits.

Art (ART)

ART 110. Introduction to the Visual Arts. 3 Credits.
Study and analysis of artistic methods and meaning in the visual arts; designed for non-majors.

ART 111. Introduction to Art History. 3 Credits.
Survey of world art from prehistoric to modern times designed for non-majors.

ART 120. Painting I. 3 Credits.
Introduction to basic painting through a variety of materials. Includes historical examples, painting the human figure, using acrylics, oils, pastel, and mixed-media.

ART 122. Studio Technology Foundations. 3 Credits.
Studio Technology Foundations is an introductory-level course in the Department of Visual Art. Lectures, demonstrations, and class assignments offer students an introduction to core technologies in the visual arts and equip students with a working knowledge of their respective operations and applications.

ART 124. Foundations of Design. 3 Credits.
Foundations of Design is an introductory course that provides a comprehensive study of design elements and principles for work in two and three-dimensions.

ART 130. Drawing I. 3 Credits.
Study and application of different drawing media, methods, and techniques. Drawing from the human figure required.

ART 131. Foundations Drawing. 3 Credits.
This course emphasizes observational and technical skill development in a variety of media to solve literal and conceptual problems relating to the history of drawing.

ART 150. Ceramics I. 3 Credits.
Introduction to basic ceramic techniques. Includes wheel-throwing and hand-building techniques, surface decoration, glazing, and firing.

ART 153. Design Thinking and Creative Strategy. 3 Credits.
This course offers an introduction to the theory of art and design production, design processes, and critical theory, as it relates to the creation and reception of visual arts. Through a combination of lectures, reading discussions, and in-class activities students will learn strategies to solve problems and effectively move ideas into visual/conceptual statements.

ART 160. Sculpture I. 3 Credits.
Introduction to basic sculpture materials and techniques. Includes exploration of sculptural form in maquettes and large-scale work; additive and subtractive approaches in wood, stone, and mixed media; casting practice in plaster and hydro-stone.

ART 170. Printmaking I. 3 Credits.
Introduction to basic printmaking techniques and materials. Includes mono-print, collagraph, intaglio, relief, and serigraphy in both traditional and nontoxic methods.

ART 180. Photography I. 3 Credits.
Introduction to basic photography. Includes visual issues of black and white and color photography. Experience with black and white processing and printing.

ART 185. Graphic Design I. 3 Credits.
Introduction to the foundations and principles of graphic design and graphic design software.

ART 194. Individual Study. 1-3 Credits.

ART 196. Field Experience. 1-15 Credits.

ART 199. Special Topics. 1-5 Credits.

ART 210. Art History I. 3 Credits.
Intensive survey of art from Paleolithic to the Renaissance.

ART 211. Art History II. 3 Credits.
Intensive survey of art from the Renaissance to the present.

ART 220. Painting II. 3 Credits.
Intermediate study, studio practice, and critique. Use of oils, acrylics, watercolor, and mixed media. Painting the human figure and development of individual concept and content. Prereq: ART 120.

ART 230. Drawing II. 3 Credits.
Advanced study and application of different drawing media, methods, techniques and drawing the human figure. Prereq: ART 130.

ART 250. Ceramics II. 3 Credits.
Intermediate study, studio practice, and critique. Development of individual concept and content. Further exploration of forming skills and surface decoration. Introduction to basic mold techniques, clay and glaze theory, and kiln technology. Prereq: ART 150.

ART 260. Sculpture II. 3 Credits.
Intermediate study, practice, and critique. Further exploration of materials and processes. Development of individual concept and content. Prereq: ART 160.

ART 270. Printmaking II. 3 Credits.
Intermediate study, studio practice, and critique. Extension of process and media. Development of individual concept and content. Prereq: ART 170.

ART 280. Digital Image and Output. 3 Credits.
Introduction to digital photography workflow, digital image editing software, and inkjet printing. Prereq: ART 180.

ART 285. Graphic Design and Digital Media. 3 Credits.
Intermediate-level introduction to concepts and practices related to graphic design, digital technologies and their applications in design and visual arts. Prereq: ART 185.

ART 291. Seminar. 1-3 Credits.

ART 292. Study Abroad. 1-15 Credits.

ART 294. Individual Study. 1-3 Credits.

ART 299. Special Topics. 1-5 Credits.

ART 320. Painting III. 3 Credits.
Advanced study, studio practice, and critique. Exploration of mixed-media. Emphasis on individual concept and content. Prereq: ART 220.

ART 330. Drawing III. 3 Credits.
Advanced study, studio practice, and critique. Use of mixed-media approaches. Emphasis on individual concept and content. Life drawing emphasis. Prereq: ART 230.

ART 335. Figure Drawing. 3 Credits.
Exploration of the human form through drawing representationally, abstractly and expressively using a variety of media. Studying historic and contemporary use of the figure will be significant. Prereq: ART 130.

ART 350. Ceramics III. 3 Credits.
Advanced study and studio practice with individual and group critique. Focus on current issues in ceramics and innovative use of form, process, and materials. Emphasis on individual concept and content. Prereq: ART 250.

ART 360. Sculpture III. 3 Credits.
Advanced study, practice, and critique. Use of mixed-media. Specialization in materials and processes. Emphasis on individual concept and content. Prereq: ART 260.

ART 370. Printmaking III. 3 Credits.
Advanced study, studio practice, the human figure, and critique. Exploration of mixed-media. Emphasis on individual concept and content. Prereq: ART 270.

ART 379. Study Tour Abroad. 1-6 Credits.

ART 380. 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 280.

ART 385. Topics in Graphic Design. 3 Credits.
Development of concepts and practices related to graphic design, digital technologies and their applications in design and visual arts. May be repeated for credit. Prereq: ART 185.

ART 389. Art Theory and Criticism. 3 Credits.
This course covers the development and application of art theory and criticism from the advent of photography to the present. The course presents theory and criticism as fluid methods of understanding art. The course covers standard theories as well as their critical applications. Prereq: ART 210, ART 211.

ART 391. Seminar. 1-3 Credits.

ART 392. Study Abroad. 1-3 Credits.

ART 394. Individual Study. 1-3 Credits.

ART 399. Special Topics. 1-5 Credits.

ART 420. Painting IV. 3 Credits.
Advanced study, studio practice and critique in painting. Exploration and development of an individual concept. May be repeated. Prereq: ART 320.

ART 430. Drawing IV. 3 Credits.
Advanced study, studio practice and critique in drawing. Exploration in individual concept, process and professional preparation. May be repeated. Prereq: ART 330.

ART 435. Advanced Figure Drawing. 3 Credits.
Advanced study, studio practice and critique in figure drawing. Continued exploration of the human form and development of an individual concept. May be repeated. Prereq: ART 335.

ART 450. Ceramics IV. 3 Credits.
Advanced study, studio practice and critique in ceramics. A focus on current issues in ceramics with innovative use of form, process and materials centered in a personal use of content and formal issues. May be repeated. Prereq: ART 350.

ART 451. History of American Art. 3 Credits.
Study of American art from pre-Columbian through contemporary (including Native American), emphasizing its highly individual nature and its effect on world art. Prereq: ART 210, ART 211.

ART 452. Contemporary Art. 3 Credits.
Study of the development of contemporary art examining its cultural and intellectual basis; includes analysis of current art imagery and readings in art theory and criticism.

ART 453. Topics in Art History. 3 Credits.
As an upper-division course in a specialized topic in Art History, the subject matter of the course varies by semester, allowing the curriculum to be more responsive and flexible in the subjects it addresses. May be repeated. Prereq: ART 210 or ART 211.

ART 460. Sculpture IV. 3 Credits.
Advanced study, studio practice and critique in sculpture. A focus on current issues in sculpture with innovative use of form, process and materials centered in a personal use of content and formal issues. May be repeated. Prereq: ART 360.

ART 470. Printmaking IV. 3 Credits.
Advanced study, studio practice and critique in printmaking. Exploration in printmaking of individual concept, process and professional preparation. May be repeated. Prereq: ART 370.

ART 480. Advanced Photography. 3 Credits.
Advanced study, studio practice and critique in photography. Students will expand knowledge of processes while extending their personal exploration. May be repeated. Prereq: ART 380.

ART 485. Advanced Graphic Design. 3 Credits.
Development and application of concepts and practices related to graphic design and visual arts through individual semester projects that may support capstone experience. May be repeated. Prereq: ART 385.

ART 489. Baccalaureate Project. 3-6 Credits.
Capstone research and creative experience within a specific area of interest with emphasis on refinement of aesthetic applications of techniques and media. May be repeated.

ART 491. Seminar. 1-5 Credits.

ART 492. Study Abroad. 1-15 Credits.

ART 494. Individual Study. 1-5 Credits.

ART 496. Field Experience. 1-15 Credits.

ART 499. Special Topics. 1-5 Credits.

ART 690. Graduate Seminar. 1-5 Credits.

ART 793. Individual Study/Tutorial. 1-5 Credits.

Arts Humanities and Social Sciences (AHSS)

Courses

AHSS 188. Cultural Diversity Scholars. 2 Credits.
This course is required for all new first-year students and transfer students receiving the Cultural Diversity Tuition Discount. The course covers topics such as written and oral communication, critical thinking, and orientation to campus resources. Restricted to recipients of the cultural diversity tuition discount.

AHSS 191. Seminar. 1-5 Credits.

AHSS 199. Special Topics. 1-5 Credits.

AHSS 472. Introduction to Publishing. 3 Credits.
This introductory class will familiarize students with the history, business, and practice of small press publishing. Course lectures, readings, and activities focus on various facets of publishing history, production, and marketing processes. The course includes an orientation to North Dakota State University Press - a teaching and academic press located on the NDSU campus - and a hands-on experience in publishing a current chapbook manuscript for the press. The course will address the following areas of small press publishing: history of the small press movement; the history and aesthetics of the book; manuscript acquisitions and editing; the business of publishing; design aspects of publishing; copyright laws and permissions; promotion and marketing; and digital publishing. {Also offered for graduate credit - See AHSS 672.}.

AHSS 476. Practicum in Publishing. 3 Credits.
The Practicum in Publishing implements knowledge and background gained during the Introduction to Publishing course. Students will obtain and apply the skills of a publisher as they undertake editorial, publicity, and marketing activities for the following year's book releases. Students will take on responsibilities of key roles in social media marketing and event development. This practicum offers in-depth, real-life experience with a decades-old publishing house, putting into practice current methods and customs of scholarly and literary publishing, while meeting real-time publishing deadlines and schedules in preparation for national distribution of North Dakota State University Press books. Prereq: AHSS 472. {Also offered for graduate credit - See AHSS 676.}.

AHSS 491. Seminar. 1-5 Credits.

AHSS 493. Undergraduate Research. 1-5 Credits.

AHSS 496. Field Experience. 1-15 Credits.

AHSS 672. Introduction to Publishing. 3 Credits.
This introductory class will familiarize students with the history, business, and practice of small press publishing. Course lectures, readings, and activities focus on various facets of publishing history, production, and marketing processes. The course includes an orientation to North Dakota State University Press - a teaching and academic press located on the NDSU campus - and a hands-on experience in publishing a current chapbook manuscript for the press. The course will address the following areas of small press publishing: history of the small press movement; the history and aesthetics of the book; manuscript acquisitions and editing; the business of publishing; design aspects of publishing; copyright laws and permissions; promotion and marketing; and digital publishing. {Also offered for undergraduate credit - See AHSS 472.}.

AHSS 676. Practicum in Publishing. 3 Credits.
The Practicum in Publishing implements knowledge and background gained during the Introduction to Publishing course. Students will obtain and apply the skills of a publisher as they undertake editorial, publicity, and marketing activities for the following year's book releases. Students will take on responsibilities of key roles in social media marketing and event development. This practicum offers in-depth, real-life experience with a decades-old publishing house, putting into practice current methods and customs of scholarly and literary publishing, while meeting real-time publishing deadlines and schedules in preparation for national distribution of North Dakota State University Press books. Prereq: AHSS 672. {Also offered for undergraduate credit - See AHSS 476.}.

AHSS 690. Seminar. 1-5 Credits.

AHSS 695. Field Experience. 1-15 Credits.

AHSS 796. Special Topics. 1-5 Credits.

Athletics (ATHL)

ATHL 223. Intercollegiate Sports Participation. 1 Credit.
Participation on an intercollegiate sports team. May be repeated.

ATHL 323. Intercollegiate Sports Participation. 1 Credit.
Participation on an intercollegiate sports team. May be repeated.

Biochemistry (BIOC)

BIOC 194. Individual Study. 1-5 Credits.

BIOC 196. Field Experience. 1-15 Credits.

BIOC 199. Special Topics. 1-5 Credits.

BIOC 260. Elements of Biochemistry. 4 Credits.
Protein structure, function conformation, and dynamics; enzymes, DNA-RNA: structure and flow of genetic information; biological membranes; metabolism. 4 lectures. Prereq: CHEM 117 or CHEM 122, CHEM 140 or CHEM 240.

BIOC 291. Seminar. 1-3 Credits.

BIOC 292. Study Abroad. 1-15 Credits.

BIOC 294. Individual Study. 1-5 Credits.

BIOC 299. Special Topics. 1-5 Credits.

BIOC 303. The Science of Learning. 1 Credit.
This course is designed for students serving as Learning Assistants in the College of Science and Mathematics and who are interested in the science behind learning in the STEM disciplines.

BIOC 350. Fundamentals of Forensic DNA Analysis. 2 Credits.
Principles, technologies, and analysis of genetic information (DNA) and its applications to forensic science, in particular, identity profiling.

BIOC 379. Study Tour Abroad. 1-6 Credits.

BIOC 391. Seminar. 1-3 Credits.

BIOC 392. Study Abroad. 1-15 Credits.

BIOC 394. Individual Study. 1-5 Credits.

BIOC 399. Special Topics. 1-5 Credits.

BIOC 460. Foundations of Biochemistry and Molecular Biology I. 3 Credits.
Rigorous treatment of biomolecules, generation and use of metabolic energy, biosynthesis, metabolic regulation; storage, transmission, and expression of genetic information. 3 lectures. Prereq: CHEM 240 or CHEM 342. Recommended Prereq: BIOL 150. {Also offered for graduate credit - see BIOC 660.}.

BIOC 460L. Foundations of Biochemistry I Laboratory. 1 Credit.
Laboratory to accompany BIOC 460. Introduction to techniques and instrumentation in biochemistry. Co-Req: BIOC 460.

BIOC 461. Foundations of Biochemistry and Molecular Biology II. 3 Credits.
Interrelations between metabolic pathways and controls, with emphasis on mammalian systems; biochemistry of specialized tissues, fluids, and hormones, regulation of gene expression in eukaryotes; genetic defects in metabolism. 3 lectures. Recommended prereq: BIOC 460. {Also offered for graduate credit - see BIOC 661.}.

BIOC 473. Methods of Biochemical Research. 3 Credits.
Advanced separation, characterization, and enzymological techniques for research in the biological sciences are emphasized. 1 lecture, 2 three-hour laboratories. Prereq: BIOC 461. {Also offered for graduate credit - see BIOC 673.}.

BIOC 474. Methods of Recombinant DNA Technology. 3 Credits.
Principles and techniques of recombinant DNA construction, gene cloning, and analysis of gene structure. 1 lecture, 2 three-hour laboratories. Prereq: BIOC 460. Co-req: BIOC 461. Recommended: ZOO 315. {Also offered for graduate credit - see BIOC 674.}.

BIOC 475. Computer Applications in Biochemistry and Molecular Biology. 3 Credits.
This course will cover basic and advanced biochemical calculations and the use of computer programs to make these calculations. Programs for the presentation of data and seminars will also be presented. Prereq: BIOC 460. {Also offered for graduate credit - see BIOC 675.}.

BIOC 483. Cellular Signal Transduction Processes and Metabolic Regulations. 3 Credits.
Advanced topics in regulation of metabolic processes including signal transduction, reversible and irreversible covalent modification, hormonal effects, protein turnover, and related phenomena. 2 lectures. {Also offered for graduate credit - see BIOC 683.}.

BIOC 487. Molecular Biology of Gene Expression. 3 Credits.
This is an advanced undergraduate course designed to analyze current information regarding biochemistry and molecular biology of gene expression and regulation in prokaryoates, eukaryoates and archea, with primary emphasis on eukaryotic systems. Prereq: BIOC 460, BIOC 461.

BIOC 491. Seminar. 1-5 Credits.

BIOC 492. Study Abroad. 1-15 Credits.

BIOC 493. Undergraduate Research. 1-5 Credits.

BIOC 494. Individual Study. 1-5 Credits.

BIOC 496. Field Experience. 1-15 Credits.

BIOC 499. Special Topics. 1-5 Credits.

BIOC 660. Foundations of Biochemistry and Molecular Biology I. 3 Credits.
Rigorous treatment of biomolecules, generation and use of metabolic energy, biosynthesis, metabolic regulation; storage, transmission, and expression of genetic information. 3 lectures. {Also offered for undergraduate credit - see BIOC 460.}.

BIOC 661. Foundations of Biochemistry and Molecular Biology II. 3 Credits.
Interrelations between metabolic pathways and controls, with emphasis on mammalian systems; biochemistry of specialized tissues, fluids, and hormones; regulation of gene expression in eukaryotes; genetic defects in metabolism. 3 lectures. {Also offered for undergraduate credit - see BIOC 461.}.

BIOC 673. Methods of Biochemical Research. 3 Credits.
Advanced separation, characterization, and enzymological techniques for research in the biological sciences are emphasized. 1 lecture, 2 three-hour laboratories. Prereq: BIOC 661. Coreq: BIOC 701. {Also offered for undergraduate credit - see BIOC 473.}.

BIOC 674. Methods of Recombinant DNA Technology. 3 Credits.
Principles and techniques of recombinant DNA construction, gene cloning, and analysis of gene structure. 1 lecture, 2 three-hour laboratories. Recommended co-req: BIOC 702. {Also offered for undergraduate credit - see BIOC 474.}.

BIOC 675. Computer Applications in Biochemistry and Molecular Biology. 3 Credits.
This course will cover basic and advanced biochemical calculations and the use of computer programs to make these calculations. Programs for the presentation of data and seminars will also be presented. Prereq: BIOC 660. {Also offered for undergraduate credit - see BIOC 475.}.

BIOC 683. Cellular Signal Transduction Processes and Metabolic Regulation. 3 Credits.
Advanced topics in regulation of metabolic processes including signal transduction, reversible and irreversible covalent modification, hormonal effects, protein turnover, and related phenomena. 2 lectures. Prereq: BIOC 702. F (alernate 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 899. Doctoral Dissertation. 1-15 Credits.

Biological Sciences (BIOL)

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.

BIOL 111. Concepts of Biology. 3 Credits.
Introduction to a wide range of biological topics, from the organism, ecology, and evolution to the cell, molecular biology, and genetics.

BIOL 111L. Concepts of Biology Lab. 1 Credit.
Introduction to a wide range of biological topics, from the organism, ecology, and evolution to the cell, molecular biology, and genetics.

BIOL 124. Environmental Science. 3 Credits.
Ecological principles related to human cultures, resource use, and environmental alterations.

BIOL 124L. Environmental Science Laboratory. 1 Credit.
Ecological principles related to human cultures, resource use, and environmental alterations.

BIOL 126. Human Biology. 3 Credits.
Consideration of selected problems in human biology.

BIOL 126L. Human Biology Laboratory. 1 Credit.
Consideration of selected problems in human biology.

BIOL 150. General Biology I. 3 Credits.
Introduction to cellular and molecular biology, genetics, and evolution.

BIOL 150L. General Biology I Laboratory. 1 Credit.
Introduction to cellular and molecular biology, genetics, and evolution.

BIOL 151. General Biology II. 3 Credits.
An introduction to the biology of living organisms and their interactions with each other and their environments. Examples primarily involve plants and animals, but include other groups of organisms as well. Prereq: BIOL 150.

BIOL 151L. General Biology II Laboratory. 1 Credit.
An introduction to the biology of living organisms and their interactions with each other and their environments. Examples primarily involve plants and animals, but include other groups of organisms as well. Prereq: BIOL 150L.

BIOL 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.

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 252. Plant and Animal Diversity. 3 Credits.
An introduction to the anatomy and physiology of higher plants and animals. An integrative and comparative look at the organization and function of plants and animals. Prereq: BIOL 150 and BIOL 151.

BIOL 270. Antibiotic Drug Discovery. 3 Credits.
This course is an authentic research experience for undergraduates. Students in the course will participate in a larger national research initiative aimed at discovering new antibiotics produced by soil bacteria. Prereq: BIOL 150 and BIOL 151.

BIOL 271. Wildlife Ecology and Conservation: An Undergraduate Research Course. 3 Credits.
This course is an authentic research experience for undergraduates. Students in the course will participate in collaborative research projects with their teams, each team will design its own unique project focused on the wildlife population of interest. Prereq: BIOL 150, BIOL 150L, BIOL 151, BIOL 151L.

BIOL 272. Research Experience: Learning in Biology. 3 Credits.
This course is an authentic research experience for undergraduates. Students in the course will explore the processes of learning and instruction in undergraduate biology through critical reading of literature, experimental design, data analysis, and communication of research findings. Prereq: BIOL 150, BIOL 150L, BIOL 151, BIOL 151L.

BIOL 291. Seminar. 1-3 Credits.

BIOL 292. Study Abroad. 1-15 Credits.

BIOL 293. Undergraduate Research. 1-5 Credits.

BIOL 294. Individual Study. 1-5 Credits.

BIOL 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.
Discussion of the mechanisms of evolution, including population genetics, selection, speciation, adaptation, and molecular evolution. Capstone course for Botany and Biological Sciences majors. Prereq: BIOL 150, BIOL 151 and BIOL 315.

BIOL 364. General Ecology. 3 Credits.
Ecological principles associated with organism environment interactions, populations, communities, and ecosystems. Quantitative approach with examples (animal, plant, microbial) included. Prereq: BIOL 150 or BIOL 151.

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 150L.

BIOL 379. Study Tour Abroad. 1-6 Credits.

BIOL 391. Seminar. 1-3 Credits.

BIOL 392. Study Abroad. 1-15 Credits.

BIOL 393. Undergraduate Research. 1-5 Credits.

BIOL 394. Individual Study. 1-5 Credits.

BIOL 396. Field Experience. 1-15 Credits.

BIOL 399. Special Topics. 1-5 Credits.

BIOL 410. Comparative Chordate Morphology. 3 Credits.
This is a combination lecture/lab course designed to introduce you to the systematics, history, and structure of the chordates, particularly the craniates. Structural and functional similarities and differences among organs and organ systems of representative organisms as well as the use of comparative morphology as a tool to better understand the process of chordate evolution will be emphasized. Prereq: BIOL 150, BIOL 151, BIOL 252.

BIOL 414. Plant Systematics. 3 Credits.
Plant identification, nomenclature and classification are aspects of plant systematics. Modern plant systematics uses molecular approaches in addition to visual traits such as morphology to order plants in accordance with our current understanding of evolution and the 'Tree of Life'. The course includes outdoor activities to learn plant identification as long as the weather permits. Prereq: BIOL 150 and BIOL 151.

BIOL 444. Vertebrate Histology. 3 Credits.
Study of the microscopic anatomy of vertebrate tissues and organs, especially mammals. Classification and identification of epithelium, connective, muscle, and nervous tissue types. Study of these 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 150, BIOL 151. {Also offered for graduate credit - see BIOL 652.}.

BIOL 454. Herpetology. 3 Credits.
Primarily a field and laboratory course focusing on amphibians and reptiles. Students must make a commitment to participate in at least one of two 4-day field trips plus an independent review project. Prereq: BIOL 150, BIOL 151. F/2 (odd years) {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 660.}.

BIOL 462. Physiological Ecology. 3 Credits.
Study of the physiological mechanisms underlying life-history trade-offs and constraints in an ecological and evolutionary context. Prereq: BIOL 150, BIOL 151. {Also offered for graduate credit - see BIOL 662.}.

BIOL 463. Animal Behavior. 3 Credits.
Description of the principal behavior patterns of animals with consideration of ecological, evolutionary, and internal mechanisms. Prereq: BIOL 151, BIOL 151L.

BIOL 464. Endocrinology. 3 Credits.
Physiology and anatomy of endocrine glands; chemistry and interrelations of their secretions. Prereq: BIOL 150, BIOL 151. {Also offered for graduate credit - see BIOL 664.}.

BIOL 465. Hormones and Behavior. 3 Credits.
Study of the organizational and activational role endocrine systems play in regulating animal behaviors. These studies will be explored within an ecological and evolutionary framework. Prereq: BIOL 150 and BIOL 151. {Also offered for graduate credit - see BIOL 665.}.

BIOL 472. Structure and Diversity of Plants and Fungi. 3 Credits.
We will focus on structure and morphology of plants and fungi, as well as explore the diversity or adaptations plants and fungi have acquired to overcome a variety of environmental and habitat challenges. Prereq: BIOL 150, BIOL 151.

BIOL 475. Conservation Biology. 3 Credits.
Integrative approach to the study and conservation of biodiversity. Application of principles from various sub-disciplines of the biological and social sciences to current conservation problems. Prereq: BIOL 150, BIOL 151. {Also offered for graduate credit - see BIOL 675.}.

BIOL 476. Wildlife Ecology and Management. 3 Credits.
Application of ecological principles to management of game and non-game wildlife populations. Prereq: BIOL 150 and BIOL 151. {Also offered for graduate credit - see BIOL 676.}.

BIOL 477. Wildlife and Fisheries Management Techniques. 3 Credits.
Students will learn techniques used in the study and management of fish and wildlife populations. Students will design an independent field research project to be executed during a field trip (typically 2-4 days in length). Prereq: BIOL 150 and BIOL 151. {Also offered for graduate credit - see BIOL 677.}.

BIOL 479. Biomedical Genetics and Genomics. 3 Credits.
This course will cover the diagnoses, clinical presentations, prevention and treatments of hereditary diseases (Mendelian and complex); the ever-increasing roles that genetics and genomics have in advancing medicine (including personalized medicine). Prereq: BIOL 150, BIOL 151 and BIOL 315 or BOT 315 or PLSC 315 or ZOO 315. {Also available for graduate credit - see BIOL 679.}.

BIOL 480. Ecotoxicology. 3 Credits.
Ecotoxicology, the behavior of pollutants in and effects on ecosystems; top-down and bottom-up approaches for assessment/prediction of effects on populations, communities and ecosystems; ecotoxicological testing at single/multi-species levels; biomarkers; passive/active biomonitoring. Prereq: BIOL 151 and BIOL 151L. {Also offered for graduate credit - see BIOL 680.}.

BIOL 481. Wetland Science. 3 Credits.
Definition of wetlands, biogeochemistry, ecophysiology and adaptations to wetland conditions in plants and animals, biodiversity and productivity, wetland ecology, applications of wetlands for treatment of wastewater and other forms of bioremediation. Prereq: BIOL 151, BIOL 151L. {Also offered for graduate credit - see BIOL 681.}.

BIOL 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/BOT/PLSC/ZOO 315, ZOO 370. {Also offered for graduate credit - See BIOL 683.}.

BIOL 491. Seminar. 1-5 Credits.

BIOL 492. Study Abroad. 1-15 Credits.

BIOL 493. Undergraduate Research. 1-5 Credits.

BIOL 494. Individual Study. 1-5 Credits.

BIOL 496. Field Experience. 1-15 Credits.

BIOL 499. Special Topics. 1-5 Credits.

BIOL 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 must make a commitment to participate in at least one of two 4-day field trips plus an independent review project. {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. Study Abroad. 1-15 Credits.

BIOL 695. Field Experience. 1-15 Credits.

BIOL 696. Special Topics. 1-5 Credits.

BIOL 766. Advanced Animal Behavior. 3 Credits.
This course investigates current concepts and research areas in animal behavior, with a focus on topics that lie at the interface between animal behavior, ecology and evolution.

BIOL 790. Graduate Seminar. 1-3 Credits.

BIOL 791. Temporary/Trial Topics. 1-5 Credits.

BIOL 793. Individual Study/Tutorial. 1-5 Credits.

BIOL 794. Practicum/Internship. 1-10 Credits.

BIOL 795. Field Experience. 1-15 Credits.

BIOL 796. Special Topics. 1-5 Credits.

BIOL 797. Master's Paper. 1-3 Credits.
Literature review, research, and preparation for paper required for the comprehensive study option. Graded S or U.

BIOL 798. Master's Thesis. 1-10 Credits.

BIOL 820. Advanced Cell Biology. 3 Credits.
In-depth survey of cell biology, including studies of membranes, secretion cytoskeleton, cellular movement organelles, and gene regulation.

BIOL 825. Biology of Aging. 3 Credits.
This course will take an integrative approach to understanding the biology of aging. We will examine both the evolutionary causes and underlying mechanisms of aging in diverse organisms including humans.

BIOL 842. Quantitative Biology. 3 Credits.
Philosophy and techniques for collecting, handling, and interpreting research data in the biological sciences. S.

BIOL 850. Advanced Ecology. 3 Credits.
This course covers classical ecological literature and current literature focusing on ecological research philosophy and techniques. An overview/introduction of a variety of statistical methods for analyzing ecological data is covered.

BIOL 851. Advanced Conservation Biology. 3 Credits.
This class will cover recent developments in the field of conservation biology, with a specific focus on recent literature. Areas of focus will include Evolutionary Conservation and Conservation Genetics.

BIOL 859. Evolution. 3 Credits.
Evolution is the process by which species change over time through descent with modification. This course will focus on understanding the different applications of evolutionary theory to current issues in the biological sciences.

BIOL 860. Evolutionary Ecology. 3 Credits.
Lecture-discussion course on recent developments in evolutionary theory and their implications in the study of animal adaptation, ecology, and behavior.

BIOL 862. Environment and Adaptation. 3 Credits.
Environmental factors and responses evidenced with life-history patterns, genetic variation, population dynamics, species-interactions, and physiological processes.

BIOL 865. Biological Rhythms. 3 Credits.
This course will provide a greater understanding of the nature of endogenous time keeping ("clocks") and will investigate A) the biological mechanisms by which these 'clocks' interface with the environment, both biotic (e.g. social behavioral) and abiotic, to B) enable adaptive responses. This class will focus almost exclusively on vertebrates, but may include classic examples and insights gained from plants and invertebrates.

BIOL 876. Population Dynamics. 4 Credits.
Principles and mechanics of animal population dynamics. Prereq: an interest in working with numbers. S (odd years).

BIOL 877. Analysis of Population and Demographic Data. 3 Credits.
Contemporary maximum likelihood approaches to estimating abundance, survival, reproduction, and dispersal in free-living populations. Goodness-of-fit and information theory applied to population model selection. Examples from a variety of real populations. Prereq: BIOL 876, STAT 660 or STAT 661, ENT 842.

BIOL 884. Biological Research Principles. 3 Credits.
Discussion, analysis of published research papers, lectures on selected topics, and student research proposal. Prereq: STAT 725.

BIOL 892. Graduate Teaching Experience. 1-6 Credits.

BIOL 893. Individual Study/Tutorial. 1-5 Credits.

BIOL 895. Field Experience. 1-15 Credits.

Botany (BOT)

BOT 194. Individual Study. 1-3 Credits.

BOT 196. Field Experience. 1-15 Credits.

BOT 199. Special Topics. 1-5 Credits.

BOT 291. Seminar. 1-3 Credits.

BOT 292. Study Abroad. 1-15 Credits.

BOT 294. Individual Study. 1-5 Credits.

BOT 299. Special Topics. 1-5 Credits.

BOT 379. Study Tour Abroad. 1-6 Credits.

BOT 391. Seminar. 1-3 Credits.

BOT 392. Study Abroad. 1-15 Credits.

BOT 393. Undergraduate Research. 1-5 Credits.

BOT 394. Individual Study. 1-5 Credits.

BOT 399. Special Topics. 1-5 Credits.

BOT 450. Range Plants. 3 Credits.
Identification, distribution, and forage value of important U.S. range plants. 1 lecture, 2 two-hour laboratories. Prereq: BOT 314. 450. F {Also offered for graduate credit - see BOT 650.}.

BOT 491. Seminar. 1-5 Credits.

BOT 492. Study Abroad. 1-15 Credits.

BOT 493. Undergraduate Research. 1-5 Credits.

BOT 494. Individual Study. 1-5 Credits.

BOT 496. Field Experience. 1-15 Credits.

BOT 499. Special Topics. 1-5 Credits.

BOT 650. Range Plants. 3 Credits.
Identification, distribution, and forage value of important U.S. range plants. 1 lecture, 2 two-hour laboratories. Cross-listed with PLSC 650. F {Also offered for undergraduate credit - see BOT 450.}.

BOT 690. Graduate Seminar. 1-3 Credits.

BOT 695. Field Experience. 1-15 Credits.

BOT 696. Special Topics. 1-5 Credits.

BOT 790. Graduate Seminar. 1-3 Credits.

BOT 791. Temporary/Trial Topics. 1-5 Credits.

BOT 793. Individual Study/Tutorial. 1-5 Credits.

BOT 795. Field Experience. 1-15 Credits.

BOT 796. Special Topics. 1-5 Credits.

BOT 797. Master's Paper. 1-3 Credits.

BOT 798. Master's Thesis. 1-10 Credits.

BOT 899. Doctoral Dissertation. 1-15 Credits.

Business Administration (BUSN)

BUSN 189. Skills for Academic Success. 1 Credit.
Development of skills and techniques for academic success. Includes study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation. Introduction to campus resources and governance. Cross-listed with ABEN 189, AGRI 189, HD&E 189, ME 189, and UNIV 189.

BUSN 191. Seminar. 1-5 Credits.

BUSN 194. Individual Study. 1-3 Credits.

BUSN 196. Field Experience. 1-15 Credits.

BUSN 199. Special Topics. 1-5 Credits.

BUSN 291. Seminar. 1-3 Credits.

BUSN 292. Study Abroad. 1-15 Credits.

BUSN 294. Individual Study. 1-3 Credits.

BUSN 296. Field Experience. 1-15 Credits.

BUSN 299. Special Topics. 1-5 Credits.

BUSN 301. Organizational Citizen. 0 Credits.
Demonstrate ability to become an effective organizational citizen. Pass/Fail grading.

BUSN 318. Taxation in Management Decisions. 3 Credits.
Study of the fundamental concepts of tax implications that result from common business transactions. Prereq: ACCT 102 or ACCT 201. Cross-listed with ACCT 318. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 340. International Business. 3 Credits.
Study of international business: ways in which it differs from domestic operations; benefits of operating globally; and political, cultural, and economic problems faced by managers of firms engaged in international activities. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 341. Global Business Environment. 3 Credits.
Introduction to the policies, procedures, and institutions impacting the global business environment, including visits to relevant businesses, institutions, and historical sites. This course is taught exclusively as part of an NDSU study abroad experience. Prereq: acceptance into the NDSU College of Business program in Europe. May be repeated for credit.

BUSN 347. Principles of Real Estate. 3 Credits.
Principles and techniques of real estate appraisals, practical application of appraisal principles, and techniques to real property evaluation. Prereq: Students must be College of Business professional major or minor, Junior or Senior classification, and a 2.50 minimum NDSU grade point average. Cross-listed with AGEC 347.

BUSN 379. Study Tour Abroad. 1-6 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 383. Organizational Communication I. 3 Credits.
Exploration of the theory of management communication practices in organizations. Emphasis on the formal structure and interpersonal aspects of supervisor-subordinate relations. Prereq: Students must be College of Business professional major or minor, Junior or Senior classification, and a 2.50 minimum NDSU grade point average. Cross-listed with COMM 383.

BUSN 391. Seminar. 1-3 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 392. Study Abroad. 1-15 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 394. Individual Study. 1-5 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 397. Fe/Coop Ed/Internship. 1-4 Credits.

BUSN 399. Special Topics. 1-5 Credits.

BUSN 413. Business Internship. 3 Credits.
Supervised professional experience with an appropriate public or private business. Students must meet standards established by the employer and the College of Business. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 430. Legal and Social Environment of Business. 3 Credits.
Study of legal and regulatory environment in which business firms operate, as well as the social environment. Includes business ethics and social responsibility issues. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see BUSN 630.}.

BUSN 431. Business Law I-Contracts, Property and Torts. 3 Credits.
A study of the foundations of business law and commercial transactions: the law of contracts, personal property, real estate, insurance, wills and estates, and torts. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 440. International Business Law. 3 Credits.
Study of public and private international law as it relates to international business: international contracts and sales; international business organizations; and international trade, tariffs, and agreements. Prereq: BUSN 430. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see BUSN 640.}.

BUSN 474. Cooperatives. 3 Credits.
Theory, practice, and evaluation of cooperatives including principles, management, marketing, finance, taxes, legal issues, and adjusting to change. Prereq: ECON 201. Cross-listed with AGEC 474. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. F, S, Su .{Also offered for graduate credit - see BUSN 674.}.

BUSN 487. Managerial Economics. 4 Credits.
Use of decision science techniques such as statistical and numerical analysis and optimization to study profit, demand and supply, cost and production, market structure, pricing practices, and the impact of government regulations on management decisions. Prereq: MGMT 320, ECON 201, ECON 202, MATH 144 or MATH 146. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 489. Strategic Management. 4 Credits.
Integration and application of management, marketing, and finance principles in written and oral case analysis of organizations. Consideration of global, ethical, and current social issues. Capstone for Accounting, Business Administration, and Management Information Systems majors. Prereq: FIN 320, MGMT 320, MRKT 320, Senior standing. Co-Req: BUSN 430.

BUSN 491. Seminar. 1-5 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 492. Study Abroad. 1-15 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 494. Individual Study. 1-5 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 496. Field Experience. 1-15 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 499. Special Topics. 1-5 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 640. International Business Law. 3 Credits.
Study of public and private international law as it relates to international business: international contracts and sales; international business organizations; and international trade, tariffs, and agreements. {Also offered for undergraduate credit - see BUSN 440.}.

BUSN 674. Cooperatives. 3 Credits.
Theory, practice, and evaluation of cooperatives including principles, management, marketing, finance, taxes, legal issues, and adjusting to change. Cross-listed with AGEC 674. F, S, Su. {Also offered for undergraduate credit - see BUSN 474.}.

BUSN 690. Graduate Seminar. 1-3 Credits.

BUSN 692. Study Abroad. 1-15 Credits.

BUSN 696. Special Topics. 1-5 Credits.

BUSN 780. Economics for Managers in the Global Economy. 3 Credits.
This course will provide students with an understanding of the microeconomic tools for managerial decision making as well as an understanding of the macroeconomic environment in which firms operate. The course will include an emphasis on international issues and their impacts on the firm, such as international trade, international investment, and foreign exchange risk.

BUSN 789. Advanced Strategic Management. 3 Credits.
Value-centered enterprise leadership, integrating functional business expertise into strategy formulation and implementation. Prereq: FIN 740, MGMT 750, MGMT 751, MRKT 760.

BUSN 790. Graduate Seminar. 1-3 Credits.

BUSN 791. Temporary/Trial Topics. 1-5 Credits.

BUSN 793. Individual Study/Tutorial. 1-5 Credits.

BUSN 794. Practicum/Internship. 1-8 Credits.

BUSN 795. Field Experience. 1-15 Credits.

BUSN 796. Special Topics. 1-5 Credits.

BUSN 797. Master's Paper. 1-3 Credits.

BUSN 798. Master's Thesis. 1-10 Credits.

Cereal & Food Sciences (CFS)

CFS 194. Individual Study. 1-3 Credits.

CFS 196. Field Experience. 1-15 Credits.

CFS 199. Special Topics. 1-5 Credits.

CFS 200. Introduction to Food Systems. 3 Credits.
The fundamentals of food science and food safety will be introduced with emphasis on how food components and processing affect quality and safety of foods.

CFS 210. Introduction to Food Science and Technology. 2 Credits.
Overview of food components, food quality, nutrition, processing, packaging, safety, sanitation laws, sensory evaluation, distribution, and utilization.

CFS 291. Seminar. 1-3 Credits.

CFS 292. Study Abroad. 1-15 Credits.

CFS 294. Individual Study. 1-5 Credits.

CFS 299. Special Topics. 1-5 Credits.

CFS 370. Food Processing I. 3 Credits.
This course is designed to provide students with an introduction to food processing methods. The course will provide hands-on experience with a focus on basic food processing methods. Recommended Prereq: CFS 210.

CFS 379. Study Tour Abroad. 1-6 Credits.

CFS 391. Seminar. 1-3 Credits.

CFS 392. Study Abroad. 1-15 Credits.

CFS 394. Individual Study. 1-5 Credits.

CFS 397. Fe/Coop Ed/Internship. 1-4 Credits.

CFS 399. Special Topics. 1-5 Credits.

CFS 430. Food Unit Operations. 2 Credits.
Thermodynamics, materials and energy balance, fluid flow, heat transfer, heat exchange, all related to food processing. Prereq: MATH 147, PHYS 211, PHYS 211L. {Also offered for graduate credit - see CFS 630.}.

CFS 450. Cereal Technology. 3 Credits.
Discussion of cereal grains, their properties, evaluation, and utilization. {Also offered for graduate credit - see CFS 650.}.

CFS 452. Food Laws and Regulations. 3 Credits.
Regulations, laws, and dynamics governing development of food policy. Prereq: SAFE 470. Cross-listed with SAFE 452 and AGEC 452. {Also offered for graduate credit - see CFS 652.}.

CFS 460. Food Chemistry. 3 Credits.
Study of food components including water, carbohydrates, lipids, proteins, vitamins, minerals, and enzymes. Recommended Prereq: CFS 210, CHEM 341, CHEM 341L. {Also offered for undergraduate credit - see CFS 660.}.

CFS 461. Food Chemistry Laboratory. 1 Credit.
Laboratory isolation, observation of characteristics, and quantitation of food components. Recommended Coreq: CFS 460. {Also offered for graduate credit - see CFS 661.}.

CFS 462. Food Ingredient Technology. 3 Credits.
The course will present principles and discuss utilization of food ingredients. It provides chemical and physical nature of food ingredients; functions and effects on chemical, rheological, microbiological, and nutritional properties of foods. Distribution and legislation of food ingredients, sources, properties and their applications will be discussed. This course also will shed light on the molecules that constitute our macro and micro nutrients and will attempt to clarify a number of the food issues using the best evidence available. Prereq or Co-req: CFS 460. {Also offered for graduate credit - See CFS 662.}.

CFS 464. Food Analysis. 3 Credits.
Principles, applications, and practice of methods for quantitative determination of food components. 2 lectures, 1 three-hour laboratory. Prereq: CFS 210. {Also offered for graduate credit - see CFS 664.}.

CFS 470. Food Processing II. 3 Credits.
This course is designed to provide students with an in-depth academic and practical exposure to food processing methods and the food industry. Concepts in quality control systems and sanitation will be discussed. Recommended Prereq: CFS 370. {Also offered for graduate credit - see CFS 670.}.

CFS 471. Food Processing Laboratory. 1 Credit.
Field trips, experiments on freezing, freeze-drying, spray drying, canning, beverage production, water activity measurements, shelf life, and quality control. Recommended Coreq: CFS 470. {Also offered for graduate credit - see CFS 671.}.

CFS 472. Cereal and Food Fermentation. 3 Credits.
This is an advanced course with a focus on topics in food fermentation. This course will integrate principles of food microbiology, biochemistry, and discussion of food fermentation processing. Areas covered include microorganisms involved in fermentation; dairy, meat, vegetable, cereal grain, fruit and unique fermented foods and their processing, and food safety aspects of fermented foods. Prereq: CFS 370 or MICR 350 or MICR 453. {Also available for graduate credit - See CFS 672.}.

CFS 474. Sensory Science of Foods. 3 Credits.
The science used in the evaluation of flavor, color, and texture of foods. Experiential approaches will be used to evaluate sensory characteristics of foods. Recommended Prereq: STAT 330. {Also offered for graduate credit - see CFS 674.}.

CFS 480. Food Product Development. 3 Credits.
This course is designed to provide students the opportunity to incorporate the basic principles of food science in the theoretical development of food products. (Food Science Capstone) Prereq: CFS 453, CFS 460, CFS 464, CFS 470. {Also offered for graduate credit - see CFS 680.}.

CFS 491. Seminar. 1-5 Credits.

CFS 492. Study Abroad. 1-15 Credits.

CFS 494. Individual Study. 1-5 Credits.

CFS 496. Field Experience. 1-15 Credits.

CFS 499. Special Topics. 1-5 Credits.

CFS 630. Food Unit Operations. 2 Credits.
Thermodynamics, materials and energy balance, fluid flow, heat transfer, heat exchange, all related to food processing. {Also offered for undergraduate credit - see CFS 430.}.

CFS 650. Cereal Technology. 3 Credits.
Discussion of cereal grains, their properties, evaluation, and utilization. {Also offered for undergraduate credit - see CFS 450.}.

CFS 652. Food Laws and Regulations. 3 Credits.
Regulations, laws, and dynamics governing development of food policy. Cross-listed with SAFE 652 and AGEC 652. {Also offered for undergraduate credit - see CFS 452.}.

CFS 660. Food Chemistry. 3 Credits.
Study of food components including water, carbohydrates, lipids, proteins, vitamins, minerals, and enzymes. {Also offered for undergraduate credit - see CFS 440.}.

CFS 661. Food Chemistry Laboratory. 1 Credit.
Laboratory isolation, observation of characteristics, and quantitation of food components. Coreq: CFS 660. {Also offered for undergraduate credit - see CFS 461.}.

CFS 662. Food Ingredient Technology. 3 Credits.
The course will present principles and discuss utilization of food ingredients. It provides chemical and physical nature of food ingredients; functions and effects on chemical, rheological, microbiological, and nutritional properties of foods. Distribution and legislation of food ingredients, sources, properties and their applications will be discussed. This course also will shed light on the molecules that constitute our macro and micro nutrients and will attempt to clarify a number of the food issues using the best evidence available. Prereq: CFS 660. {Also available for undergraduate credit - See CFS 462.}.

CFS 664. Food Analysis. 3 Credits.
Principles, applications, and practice of methods for quantitative determination of food components. 2 lectures, 1 three-hour laboratory. Prereq: CFS 660.{Also offered for undergraduate credit - see CFS 464.}.

CFS 670. Food Processing II. 3 Credits.
This course is designed to provide students with an in-depth academic and practical exposure to food processing methods and the food industry. Concepts in quality control systems and sanitation will be discussed. {Also offered for undergraduate credit - see CFS 470.}.

CFS 671. Food Processing Laboratory. 1 Credit.
Field trips, experiments on freezing, freeze-drying, spray drying, canning, beverage production, water activity measurements, shelf life, and quality control. Coreq: CFS 670. {Also offered for undergraduate credit - see CFS 471.}.

CFS 672. Cereal and Food Fermentation. 3 Credits.
This is an advanced course with a focus on topics in food fermentation. This course will integrate principles of food microbiology, biochemistry, and discussion of food fermentation processing. Areas covered include microorganisms involved in fermentation; dairy, meat, vegetable, cereal grain, fruit and unique fermented foods and their processing, and food safety aspects of fermented foods. {Also available for undergraduate credit - See CFS 472.}.

CFS 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. Study Abroad. 1-15 Credits.
Pre-arranged study at accredited foreign institutions or in approved study abroad programs.

CFS 695. Field Experience. 1-15 Credits.

CFS 696. Special Topics. 1-5 Credits.

CFS 725. Food Policy. 3 Credits.
Provides quantitative tools and models used to analyze general food safety policies. Three lectures. Prereq: SAFE 670. Cross-listed with AGEC 725 and SAFE 725.

CFS 758. Fundamentals of Flour Testing and Bakng. 3 Credits.
Flour testing, industrial, and experimental bread baking. Production methods, ingredients, and baking reactions. Lectures and laboratories. Prereq: CFS 650.

CFS 759. Milling. 3 Credits.
Experimental and industrial feed and flour milling. Production, equipment, and factors involved in the milling process. Lectures and laboratories. Prereq: CFS 650.

CFS 760. Pasta Processing. 3 Credits.
Durum wheat quality, pasta production, and pasta quality evaluation. Lectures and laboratories. Prereq: CFS 650.

CFS 761. Malting and Brewing. 3 Credits.
Barley and malt quality; malting and brewing. Lectures and laboratories. Prereq: CFS 650.

CFS 764. Carbohydrate Chemistry. 2 Credits.
This course focuses on developing i) knowledge on structural features of carbohydrates and ii) skills for structural characterization of carbohydrates in plants and microorganisms using analytical methods. Recommended prereq: Introductory Chemistry/Biochemistry class.

CFS 765. Advanced Cereal and Food Chemistry I. 4 Credits.
Physiochemical, structural, functional, and analysis of cereal and food carbohydrates and enzymes. Biochemical aspects of these components will also be presented.

CFS 766. Advanced Cereal and Food Chemistry II. 4 Credits.
Physiochemical, structural, and functional properties of cereal and food proteins and lipids in food systems.

CFS 790. Graduate Seminar. 1-3 Credits.

CFS 791. Temporary/Trial Topics. 1-5 Credits.

CFS 792. Graduate Teaching Experience. 1-6 Credits.

CFS 793. Individual Study. 1-5 Credits.

CFS 794. Practicum/Internship. 1-8 Credits.

CFS 795. Field Experience. 1-15 Credits.

CFS 796. Special Topics. 1-5 Credits.

CFS 797. Master's Paper. 1-3 Credits.

CFS 798. Master's Thesis. 1-10 Credits.

CFS 892. Graduate Teaching Experience. 1-6 Credits.

CFS 899. Doctoral Dissertation. 1-15 Credits.

Chemistry (CHEM)

CHEM 117. Chemical Concepts and Applications. 3 Credits.
Introduction to general and organic chemistry, with applications drawn from the health, environmental, and materials sciences. Prereq or Coreq: MATH 103, MATH 104 or MATH 107 or Math placement.

CHEM 117L. Chem Concepts and Applications Lab. 1 Credit.
Introduction to general and organic chemistry, with applications drawn from the health, environmental, and materials sciences. Prereq or Coreq: MATH 103 or MATH 107 or Math placement. (ND:LABSC) CCN.

CHEM 121L. General Chemistry I Laboratory. 1 Credit.
Matter, measurement, atoms, ions, molecules, reactions, chemical calculations, thermochemistry, bonding, molecular geometry, periodicity, and gases. Prereq or Coreq: MATH 103 or MATH 107 or Math placement.

CHEM 121. General Chemistry I. 3 Credits.
Matter, measurement, atoms, ions, molecules, reactions, chemical calculations, thermochemistry, bonding, molecular geometry, periodicity, and gases. Prereq or Coreq: MATH 103 or MATH 107 or Math placement.

CHEM 122. General Chemistry II. 3 Credits.
Intermolecular forces, liquids, solids, kinetics, equilibria, acids and bases, solution chemistry, precipitation, thermodynamics, and electrochemistry. Prereq: CHEM 121.

CHEM 122L. General Chemistry II Laboratory. 1 Credit.
Intermolecular forces, liquids, solids, kinetics, equilibria, acids and bases, solution chemistry, precipitation, thermodynamics, and electrochemistry. Prereq: CHEM 121L.

CHEM 140. Organic Chemical Concepts and Applications. 1 Credit.
Introduction to organic chemistry for pre-nursing and other students who need to meet the prerequisite for CHEM 260.

CHEM 150. Principles of Chemistry I. 3 Credits.
Chemistry for students with good high school preparation in mathematics and science. Electronic structure, stoichiometry, molecular geometry, ionic and covalent bonding, energetics of chemical reactions, gases, transition metal chemistry. Prereq: MATH 103 or MATH 107 or Math placement.

CHEM 151. Principles of Chemistry II. 3 Credits.
Liquids and solids, equilibrium, kinetics, thermodynamics, acids and bases, oxidation-reduction chemistry, electrochemistry. Coreq: CHEM 150.

CHEM 160. Principles of Chemistry Laboratory I. 1 Credit.
Chemistry for students with good high school preparation in mathematics and science. Electronic structure, stoichiometry, molecular geometry, ionic and covalent bonding, energetics of chemical reactions, gases, transition metal chemistry.

CHEM 161. Principles of Chemistry Laboratory II. 1 Credit.
Liquids and solids, equilibrium, kinetics, thermodynamics, acids and bases, oxidation-reduction chemistry, electrochemistry. Prereq: CHEM 160.

CHEM 194. Individual Study. 1-3 Credits.

CHEM 196. Field Experience. 1-15 Credits.

CHEM 199. Special Topics. 1-5 Credits.

CHEM 240. Survey of Organic Chemistry. 3 Credits.
Structure and bonding, nomenclature; hydrocarbons: alkanes, alkenes, alkynes, aromatics; substituted hydrocarbons: alkyl halides, stereochemistry, alcohols, phenols, ethers, amines; carbonyls: aldehydes, ketones; carboxylic acids, esters, amides. Prereq: CHEM 121.

CHEM 291. Seminar. 1-3 Credits.

CHEM 292. Study Abroad. 1-15 Credits.

CHEM 294. Individual Study. 1-5 Credits.

CHEM 299. Special Topics. 1-5 Credits.

CHEM 341L. Organic Chemistry I Laboratory. 1 Credit.
First semester of a two-semester course in organic chemistry for students in sciences and pre-professional curricula. Prereq: CHEM 122L or CHEM 161.

CHEM 341. Organic Chemistry I. 3 Credits.
First semester of a two-semester course in organic chemistry for students in sciences and pre-professional curricula. Prereq: CHEM 122 or CHEM 151.

CHEM 342L. Organic Chemistry II Laboratory. 1 Credit.
Structure and reactivity, named reactions, carbon-carbon bond forming reactions, aromatic and heterocyclic chemistry, biomolecules and polymers, and multi-step synthesis. Prereq: CHEM 341L.

CHEM 342. Organic Chemistry II. 3 Credits.
Structure and reactivity, named reactions, carbon-carbon bond forming reactions, aromatic and heterocyclic chemistry, biomolecules and polymers, and multi-step synthesis. Prereq: CHEM 240 or CHEM 341.

CHEM 353. Majors Organic Chemistry Laboratory I. 1 Credit.
Organic functional group synthesis. Modern analytical tools for functional group analysis and structure determination. Coreq: CHEM 341.

CHEM 354. Majors Organic Chemistry Laboratory II. 2 Credits.
More advanced aspects of organic laboratory operations, synthesis, analysis, and structure determination using spectroscopic techniques. Coreq: CHEM 342.

CHEM 364. Physical Chemistry I. 3 Credits.
Mathematical and physical basis of chemical phenomena. Emphasis on quantum chemistry and spectroscopy. Prereq: CHEM 122 or CHEM 151, MATH 259 or MATH 265, PHYS 252.

CHEM 365. Physical Chemistry II. 3 Credits.
Mathematical and physical basis of chemical phenomena. Emphasis on chemical thermodynamics. Prereq: CHEM 122 or CHEM 151, MATH 259 or MATH 265 and PHYS 252.

CHEM 379. Study Tour Abroad. 1-6 Credits.

CHEM 380. Chemistry Junior Seminar. 1 Credit.
Includes discussion of chemistry topics, technical writing instruction and assignments; participation in senior seminar discussions.

CHEM 391. Seminar. 1-3 Credits.

CHEM 392. Study Abroad. 1-15 Credits.

CHEM 394. Individual Study. 1-5 Credits.

CHEM 397. Fe/Coop Ed/Internship. 1-4 Credits.

CHEM 399. Special Topics. 1-5 Credits.

CHEM 425. Inorganic Chemistry I. 3 Credits.
Electronic structure, ionic and covalent structure and bonding, point groups and symmetry, coordination chemistry, acid-base and redox chemistry. Prereq: CHEM 364. {Also offered for graduate credit - see CHEM 625.}.

CHEM 426. Crystallography/Crystal Chemistry. 2 Credits.
Geometric and space group crystallography. Structure and bonding in common minerals and industrially important solids. Structure-property relationships. Half semester. {Also offered for graduate credit - see CHEM 626.}.

CHEM 427. X-Ray Diffraction. 2 Credits.
Analytical X-ray powder diffraction for qualitative and quantitative analysis of crystalline solids. Crystal structure analysis using powder methods. Introduction to X-ray fluorescence spectrometry. Half semester. {Also offered for graduate credit - see CHEM 627.}.

CHEM 428. Geochemistry. 3 Credits.
Introduction to geochemistry: chemistry of the Earth, groundwater, isotopes, global geochemical cycles, geochemical modeling, and environmental geochemistry. Recommended: CHEM 121 or CHEM 150. Cross-listed with GEOL 428. (alternate years) {Also offered for undergraduate credit - see CHEM 628.}.

CHEM 429. Inorganic Chemistry Laboratory. 2 Credits.
Methods of synthesis and characterization of inorganic and organometallic compounds. Prereq: CHEM 354, CHEM 431L. Coreq: CHEM 425.

CHEM 431L. Analytical Chemistry I Laboratory. 2 Credits.
Chemical equilibrium and its analytical applications; introduction to chromatography and potentiometry. Prereq: CHEM 122L or CHEM 161.

CHEM 431. Analytical Chemistry I. 3 Credits.
Chemical equilibrium and its analytical applications; introduction to chromatography and potentiometry. Prereq: CHEM 122 or CHEM 151, CHEM 122L or CHEM 161 and CHEM 342.

CHEM 432. Analytical Chemistry II. 3 Credits.
Theory and application of modern instrumental techniques, including spectroscopy and electrochemistry. Prereq: CHEM 431. {Also offered for graduate credit - see CHEM 632.}.

CHEM 432L. Analytical Chemistry II Laboratory. 1 Credit.
Theory and application of modern instrumental techniques, including spectroscopy and electrochemistry. Prereq: CHEM 431L. {Also offered for graduate credit - see CHEM 632L.}.

CHEM 435. Chemical History. 2 Credits.
Survey of the history of the chemical sciences from the stone-age through the early 1900s. Prereq: CHEM 341. {Also offered for graduate credit - see CHEM 635.}.

CHEM 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 and ME. {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. Study Abroad. 1-15 Credits.

CHEM 493. Undergraduate Research. 1-5 Credits.

CHEM 494. Individual Study. 1-5 Credits.

CHEM 496. Field Experience. 1-15 Credits.

CHEM 499. Special Topics. 1-5 Credits.

CHEM 625. Inorganic Chemistry I. 3 Credits.
Electronic structure, ionic and covalent structure and bonding, point groups and symmetry, coordination chemistry, acid-base and redox chemistry. {Also offered for undergraduate credit - see Chem 425.}.

CHEM 626. Crystallography/Crystal Chemistry. 2 Credits.
Geometric and space group crystallography. Structure and bonding in common minerals and industrially important solids. Structure-property relationships. Half semester. {Also offered for undergraduate credit - see CHEM 426.}.

CHEM 627. X-Ray Diffraction. 2 Credits.
Analytical X-ray powder diffraction for qualitative and quantitative analysis of crystalline solids. Crystal structure analysis using powder methods. Introduction to X-ray fluorescence spectrometry. Half semester. {Also offered for undergraduate credit - see CHEM 427.}.

CHEM 628. Geochemistry. 3 Credits.
Introduction to geochemistry: chemistry of the Earth, groundwater, isotopes, global geochemical cycles, geochemical modeling, and environmental geochemistry. Cross-listed with GEOL 628. (alternate years) {Also offered for undergraduate credit - see CHEM 428.}.

CHEM 632. Analytical Chemistry II. 3 Credits.
Theory and application of modern instrumental techniques, including spectroscopy and electrochemistry. {Also offered for undergraduate credit - see CHEM 432.}.

CHEM 632L. Analytical Chemistry II Laboratory. 1 Credit.
Theory and application of modern instrumental techniques, including spectroscopy and electrochemistry. {Also offered for undergraduate credit - see CHEM 432L.}.

CHEM 635. Chemical History. 2 Credits.
Survey of the history of the chemical sciences from the stone-age through the early 1900's. {Also offered for undergraduate credit - see CHEM 435.}.

CHEM 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 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). Cross-listed with CPM and ME. {Also offered for undergraduate credit - See CHEM 436.}.

CHEM 665. Survey of Physical Chemistry. 4 Credits.
Conceptual approach to physical chemistry including thermodynamics, kinetics, and quantum mechanics. Application of fundamental concepts to the life sciences. 4 lectures. {Also offered for undergraduate credit - see CHEM 465.}.

CHEM 672. Surface Chemistry. 2 Credits.
The object of the course is to enhance the knowledge of experimental and computational techniques in a sub area of physical chemistry. {Also offered for undergraduate credit - see CHEM 472.}.

CHEM 676. Introduction to Computational Quantum Chemistry. 3 Credits.
This is a mathematically non-rigorous introduction to procedures and capabilities of basic computational quantum chemistry with practical aspects on using common computational chemistry software. {Also offered for undergraduate credit - see CHEM 476.}.

CHEM 690. Graduate Seminar. 1-3 Credits.

CHEM 696. Special Topics. 1-5 Credits.

CHEM 720. Introduction to Chemical Research. 2 Credits.
This course will serve as an introduction to research in the molecular sciences, with the goal to prepare graduate students for a successful graduate research experience and for a future research career in the molecular sciences.

CHEM 724. Chemical Applications of Group Theory. 1 Credit.
Symmetry, point groups, basic theory of mathematical groups, application of group theory to chemical bonding and spectroscopy.

CHEM 725. Advanced Survey of Inorganic Chemistry. 4 Credits.
This course is an advanced survey course in Inorganic Chemistry. It emphasizes structure, electronic and magnetic properties, bonding, and symmetry of inorganic compounds, including organometallic and coordination complexes, and their reactivities. Topics also include main-group chemistry, solid-state materials, Lewis acid-base chemistry, oxidation-reduction reactions, and an introduction to physical methods used to probe the properties and track reactions of inorganic compounds.

CHEM 726. Photochemistry and Photophysics. 4 Credits.
Fundamental principles in photochemistry and photophysics, rules for electronic transitions, energy transfer, electron transfer, photochemical reactions of organic chromophores (carbonyls, alkenes, enones, aromatics), singlet oxygen, photochemistry in organized and constrained media, organic solid state photochemistry, instrumental methods in photophysics, application of photochemistry. Prereq: CHEM 625, CHEM 724.

CHEM 727. Organometallic Chemistry. 3 Credits.
Synthesis, reactivity, and bonding in organometallic compounds. Prereq: CHEM 425 or CHEM 625.

CHEM 728. Physical Methods for Chemical and Biomolecular Research. 2 Credits.
Fundamentals and applications of physical methodologies, with emphasis on spectroscopic methods, used to probe molecular structure and the structural basis of reactivity. Covers optical, chirooptical, vibrational, paramagnetic resonance, and nuclear spectroscopic methods along with their applications to the study of molecular and biomolecular systems. Prereq: CHEM 625 or BIOC 665.

CHEM 729. X-Ray Structure Determination. 2 Credits.
Use of single crystal X-ray diffraction data to determine molecular and crystal structures. Half semester.

CHEM 730. Separations. 2 Credits.
Theory of equilibrium chemistry in aqueous and nonaqueous systems; principles of chromatographic and other separation techniques. Prereq: CHEM 632.

CHEM 732. Advanced 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. Intermediate Physical Chemistry. 4 Credits.
Fundamental principles of physical chemistry including quantum chemistry, spectroscopy, molecular thermodynamics, and kinetics.

CHEM 760. Statistical Thermodynamics. 4 Credits.
Macroscopic and microscopic models for the study of equilibrium properties of pure phases and solutions.

CHEM 761. Optical Spectroscopy. 2 Credits.
Theory and practice of modern spectroscopic methods. Emphasis on visible and ultraviolet wavelength ranges. Half semester. Prereq: CHEM 632.

CHEM 763. Kinetics. 2 Credits.
Experimental methods to determine reaction rates, empirical rate laws, transition state theory. Half semester.

CHEM 764. Dynamics. 2 Credits.
Chemical physics of energy transfer and reactive collisions. Half semester. Prereq: CHEM 763.

CHEM 766. Quantum Chemistry I. 4 Credits.
Wave functions and their properties, quantum mechanical behavior of atoms and molecules.

CHEM 767. Quantum Chemistry II. 2 Credits.
Ab initio and semi-empirical methods for the calculation of energetic and structural properties of molecules; computational methods. Half semester. Prereq: CHEM 766.

CHEM 790. Graduate Seminar. 1-3 Credits.

CHEM 791. Temporary/Trial Topics. 1-5 Credits.

CHEM 793. Individual Study/Tutorial. 1-5 Credits.

CHEM 794. Practicum. 1-10 Credits.

CHEM 795. Field Experience. 1-15 Credits.

CHEM 796. Special Topics. 1-5 Credits.

CHEM 797. Master's Paper. 1-3 Credits.

CHEM 798. Master's Thesis. 1-10 Credits.

CHEM 892. Graduate Teaching Experience. 1-6 Credits.

CHEM 899. Doctoral Dissertation. 1-15 Credits.

Civil Engineering (CE)

CE 111. Introduction to Civil Engineering. 2 Credits.
Introduction to duty and role of the professional engineer, phases of engineering design activities, computer applications with word processing and spreadsheets. 2 one-hour lectures. S.

CE 194. Individual Study. 1-3 Credits.

CE 196. Field Experience. 1-15 Credits.

CE 199. Special Topics. 1-5 Credits.

CE 204. Surveying. 4 Credits.
Measurements and errors; topographical and construction surveys; vertical and horizontal control methods; field exercises and computation techniques for surveying data; computation of earthwork volumes. 2 one-hour lectures, 2 three-hour laboratories. Prereq: MATH 105. F, S.

CE 212. Civil Engineering Graphic Communications. 3 Credits.
Integrating manual drafting and computer-aided drafting/design in one course with emphases on civil engineering practices. This required course will be taught at sophomore level to get students properly prepared for CE courses. Prereq: Sophomore standing in CE program.

CE 291. Seminar. 1-3 Credits.

CE 292. Study Abroad. 1-15 Credits.

CE 294. Individual Study. 1-5 Credits.

CE 299. Special Topics. 1-5 Credits.

CE 303. Civil Engineering Materials. 2 Credits.
Physical, mechanical and chemical properties of different types of bituminous materials and Portland cement concrete; industry standards for evaluating raw materials and mix designs. 2 one-hour lectures. Prereq: ME 223. F, S.

CE 303L. Civil Engineering Materials Laboratory. 1 Credit.
Tests for evaluating raw materials and mix designs of different types of bituminous materials and Portland cement concrete. 1 three-hour laboratory. Prereq: ME 223. Co-req: CE 303, F S.

CE 309. Fluid Mechanics. 3 Credits.
Statics, kinematics, and dynamics of fluid flow; momentum and energy concepts; flow through pipes; uniform flow in open channels; pumps and measurement of flow. 3 one-hour lectures. Prereq: ME 222. F, S.

CE 310. Fluid Mechanics Laboratory. 1 Credit.
Visualization and verification of the concepts of fluid flow, pumps, turbines, and flow meters. 1 two-hour laboratory. Prereq: CE 309. F, S.

CE 316. Soil Mechanics. 3 Credits.
Principles of soil mechanics including three-phase composition, classification, effective stress, consolidation, shear strength, compaction, and site investigation. 2 lectures, 1 two-hour laboratory. Prereq: ME 222, ME 223. Co-req or Prereq: MATH 266.

CE 343. Structural Engineering and Analysis. 4 Credits.
Structural loading and analysis of statically determinate and indeterminate structures. Covers the elastic analysis and deformations of trusses, beams, and frames using force methods, displacement methods, matrix methods, and moment distribution. Prereq: ME 223.

CE 370. Introduction to Environmental Engineering. 3 Credits.
Introduction to various municipal and industrial pollutants being introduced into water, air, and land systems and their effects on the environment. Application of chemical, physical, and biological principles to the management of these pollutants. 3 one-hour lectures. Prereq: CE 309, CHEM 122.

CE 371. Environmental Engineering Laboratory. 1 Credit.
Water, wastewater, and solid waste analyses regarding their theory, objectives, and practices. Exposure to practical applications of the scientific and design theories presented in CE 370. 1 three-hour laboratory. Co-req: CE 370.

CE 379. Study Tour Abroad. 1-6 Credits.

CE 391. Seminar. 1-3 Credits.

CE 392. Study Abroad. 1-15 Credits.

CE 394. Individual Study. 1-5 Credits.

CE 397. Fe/Coop Ed/Internship. 1-4 Credits.

CE 399. Special Topics. 1-5 Credits.

CE 403. Civil Engineering Materials II: Steel, Wood and Polymers. 2 Credits.
Composition, properties, structure, and behavior of steel, wood, and polymeric materials; elastic, plastic, and viscous behavior under various environmental and loading conditions. Prereq: CE 303. {Also offered for graduate credit - see CE 603.}.

CE 404. Reinforced Concrete. 3 Credits.
Principles of design and analysis of reinforced concrete members, flexural and shear design of rectangular and tee beams, serviceability criteria, short and slender columns. 2 one-hour lectures, 1 two-hour session. Prereq: CE 343. F, S.

CE 405. Advanced Reinforced Concrete. 2 Credits.
Development and anchorage of reinforcement, details of reinforcement in flexural members, continuous beams and one-way slabs, slender columns, two-way slabs. 1 one-hour lecture, 1 two-hour session. Prereq: CE 404. F, S {Also offered for graduate credit - see CE 605.}.

CE 408. Water Resources and Supply. 3 Credits.
Hydrologic concepts, development of water supply sources, principles involved in the collection and transportation of water/wastewater/storm runoff, and distribution of water for municipal use. Prereq: CE 309. F, S.

CE 410. Water and Wastewater Engineering. 3 Credits.
Principles involved in treatment, disposal, reuse, and recycling of municipal water supplies and wastewaters. Laboratory introduces tests to evaluate treatment requirements and effectiveness. 3 one-hour lectures, 1 three-hour laboratory. Prereq: CE 370. {Also offered for graduate credit - see CE 610.}.

CE 411. Design of Pre-stressed Concrete. 2 Credits.
Theory and design of pre-stressed concrete structures, pre- and post-tensioning, loss of pre-stress, proportioning of flexural members, deflections. 2 one-hour lectures. Prereq: CE 404. S {Also offered for graduate credit - see CE 611.}.

CE 417. Slope Stability and Retaining Walls. 3 Credits.
Performance and design of retaining walls, sheet pile walls, braced walls, and reinforced earth. Also evaluation and mitigation of unstable earth slopes. Prereq: CE 316. S {Also offered for graduate credit - see CE 617.}.

CE 418. Transportation Engineering. 4 Credits.
Location, analysis, modeling, and design of multi-modal facilities including highways, railways, airports, terminals, harbors, ports, canals, waterways, pipelines, and conveyor systems. 3 one-hour lectures, 1 two-hour session. Prereq: CE 204, ME 221, MATH 259.

CE 419. Pavement Design. 3 Credits.
Design of flexible and rigid pavements including sub-grade, base courses, surface courses; evaluation criteria including soil, climate, traffic, material, drainage; initial and maintenance cost considerations; construction practices. 3 one-hour lectures. Co-req: CE 303. {Also offered for graduate credit - see CE 619.}.

CE 421. Open Channel Flow. 3 Credits.
Geometric and hydraulic properties of open channels, continuity, momentum and energy principles, design of channels, gradually varied flow, critical flow and culvert design. 3 one-hour lectures. Prereq: CE 309. S {Also offered for graduate credit - see CE 621.}.

CE 425. Bridge Evaluation and Rehabilitation. 3 Credits.
Topics include bridge evaluation methodologies, review of bridge codes, behavior of constructed bridges, sources of bridge deterioration, rehabilitation design with advanced composite materials, structural health monitoring. Prereq: CE 343 and CE 404. {Also offered for graduate credit - see CE 625.}.

CE 430. Timber and Form Design. 3 Credits.
Analysis and design of wood structures and concrete formwork. 2 one-hour lectures, 1 three-hour session. Prereq: ME 223. S.

CE 441. Finite Element Analysis. 3 Credits.
Weak and strong solutions to governing differential equations in bars, boundary conditions, Galerkin approximation, nodal basis functions, shape functions. Beam and two-dimensional problems with triangular and quadrilateral elements. Prereq: CE 343. {Also offered for graduate credit - see CE 641.}.

CE 442. Matrix Analysis of Structures. 2 Credits.
Review of matrix algebra, flexibility and stiffness methods, direct stiffness method, introduction to finite element analysis. 2 lectures. Prereq: CE 343. F, S {Also offered for graduate credit - see CE 642.}.

CE 444. Structural Steel Design. 3 Credits.
Design of metal structures including mechanical behavior of metals; behavior and proportioning of tension and compression members; beams, beam columns, and connections; selection of metal structural systems. 2 one-hour lectures, 1 two-hour session. Prereq: CE 343. F.

CE 445. Advanced Steel Design. 2 Credits.
Analysis and design of metal structures including connections, selection of structural systems. 1 one-hour lecture, 1 two-hour session. Prereq: CE 444. S {Also offered for graduate credit - see CE 645.}.

CE 446. Basic Dynamics of Structures. 3 Credits.
Analysis of single degree of freedom structural systems to harmonic and general dynamic loading, free vibration of multiple degree of freedom systems, modal superposition, earthquake engineering. 3 one-hour lectures. Prereq: CE 343. F {Also offered for graduate credit - see CE 646.}.

CE 447. Stability of Structures. 3 Credits.
Concepts of stability of equilibrium; stability criteria, work, energy and variational methods; elastic buckling of columns, beams, frames, and plates; FE implementations of stability; design of locally unstable sections. Prereq: CE 343. {Also offered for graduate credit - see CE 647.}.

CE 452. Fundamentals of Oil & Gas Pipeline: Design, Operation, Inspection & Maintenance. 3 Credits.
This course introduces the fundamentals to design, operate, inspect, and maintain oil & gas pipelines, including basics for pipeline materials, design, network, construction, measuring and detection technology, maintenance, and repair. Prereq: CE 418. {Also offered for graduate credit - see CE 652.}.

CE 454. Geometric Highway Design. 3 Credits.
Location and design of highways and streets; design controls, elements of design; cross-section design; design of intersections, interchanges, safety appurtenances, and 3R projects. 2 one-hour lectures, 1 two-hour session. Prereq: CE 418. F {Also offered for graduate credit - see CE 654.}.

CE 455. Airport Planning and Design. 2 Credits.
System planning and demand forecasting; siting and configuration of airports; aircraft characteristics; air traffic controls; standards for geometric design, pavement design, drainage and safety. 2 one-hour lectures. Prereq: CE 418. F {Also offered for graduate credit - see CE 655.}.

CE 456. Railroad Planning and Design. 3 Credits.
Rail planning and location analysis, track/rail structure, track layout and control system, locomotives and train resistance, track safety standards and geometrics, terminal design. 3 one-hour lectures. Prereq: CE 418. F {Also offered for graduate credit - see CE 656.}.

CE 457. Pavement Management Systems. 2 Credits.
Pavement design, maintenance, and rehabilitation strategies; planning, budgeting, and programming for pavement management at network and project levels; development, design, and maintenance of pavement management systems. 2 one-hour lectures. Prereq: CE 303.

CE 458. Bituminous Materials and Mix. 3 Credits.
This course presents fundamental knowledge of asphalt material properties, performance requirements, specifications and related test characteristics. Prereq: CE 303 {Also offered for graduate credit - see CE 658.}.

CE 461. Foundation Engineering. 3 Credits.
Performance and selection of the following foundations: shallow, mat, combined pile, and drilled piers. 3 one-hour lectures. Prereq: CE 316. F {Also offered for graduate credit - see CE 661.}.

CE 462. Designing with Geosynthetics. 2 Credits.
Theories, principles, and engineering design using geosynthetic materials for a variety of civil engineering applications. Applications to geotechnical, environmental, transportation, and water resources fields are emphasized. Includes construction issues. Prereq: CE 316. S {Also offered for graduate credit - see CE 662.}.

CE 464. Advanced Soil Mechanics. 2 Credits.
This course introduces the students to advanced topics in soil mechanics, 1) unsaturated soil mechanics and 2) molecular modeling of clay-fluid interactions, for the design of foundations, retaining walls and slopes for realistic soil moisture conditions. Prereq: CE 316. {Also offered for graduate credit - see CE 664.}.

CE 471. Environmental Nanotechnology. 3 Credits.
This course introduces nanotechnology with special emphasis on environmental science and engineering. Applications and environmental implications of nanotechnology will be discussed from a national and global perspective. Prereq: CE 370 and junior or senior standing. {Also offered for graduate credit - see CE 671.}.

CE 473. Air Pollution. 3 Credits.
Fundamentals of air pollution and its control technology. Types and sources of air pollutants, meteorology, effects on plants, animals, people, and property. Design of control equipment. 3 one-hour lectures, 1 three-hour laboratory. Prereq: CE 370. S {Also offered for graduate credit - see CE 673.}.

CE 476. Watershed Modeling. 3 Credits.
Concepts of watershed, watershed hydrology, application of GIS tools, DEM-based watershed delineation, watershed hydrologic modeling, state-of-the-art watershed modeling software, and hands-on applications. Prereq: CE 408. {Also offered for graduate credit - see CE 676.}.

CE 477. Applied Hydrology. 3 Credits.
Scope of hydrology, hydrologic cycle and components, runoff volume and peak flow estimation, hydrograph analysis, probabilistic concepts in water resources, flood- frequency analysis, application of risk concepts to hydrological design, flow estimation for ungaged watersheds. Two 75-minute lectures. Prereq: CE 408. F {Also offered for graduate credit - see CE 677.}.

CE 478. Water Quality Management. 3 Credits.
Physical, chemical, biological, hydrological characteristics, and hydrodynamic elements of receiving waters. Characterizations, measurement, and modeling methods of river/streams, lakes/reservoirs, and groundwater systems. 2 one-hour lectures. Prereq: CE 370. {Also offered for graduate credit - see CE 678.}.

CE 479. Advanced Water and Wastewater Treatment. 3 Credits.
Selected problems in the investigation and design of sewerage systems, water distribution systems, wastewater treatment plants, and water purification plants. 2 one-hour lectures. Prereq: CE 370 and CE 410. {Also offered for graduate credit - see CE 679.}.

CE 483. Contracts and Specifications. 3 Credits.
Formation, interpretation, and termination of engineering contracts. Engineering specifications and drawings. Other legal matters of concern to engineers. 2 one-hour lectures. Prereq: Senior standing. F, S.

CE 486. Nanotechnology and Nanomaterials. 3 Credits.
This course covers principles of nanotechnology, nanomaterials and develops a framework for their understanding. The basic tools of nanotechnology: nanoscale characterization, physics and materials design will be discussed in the context of current technological advances. Prereq: Senior standing in Engineering or Sciences. Cross-listed with ME 486. {Also offered for graduate credit - see CE 686.}.

CE 489. Senior Design. 3 Credits.
An open-ended capstone design project encompassing a number of civil engineering disciplines. Management, business, public policy, and leadership concepts. Importance of professional licensure. 3 one-hour lectures. Prereq: Senior standing. F, S.

CE 491. Seminar. 1-5 Credits.

CE 492. Study Abroad. 1-15 Credits.

CE 494. Individual Study. 1-5 Credits.

CE 496. Field Experience. 1-15 Credits.

CE 499. Special Topics. 1-5 Credits.

CE 603. Civil Engineering Materials II: Steel, Wood and Polymers. 2 Credits.
Composition, properties, structure, and behavior of steel, wood, and polymeric materials; elastic, plastic, and viscous behavior under various environmental and loading conditions. {Also offered for undergraduate credit - see CE 403.}.

CE 605. Advanced Reinforced Concrete. 2 Credits.
Development and anchorage of reinforcement, details of reinforcement in flexural members, continuous beams and one-way slabs, slender columns, two-way slabs. 1 one-hour lecture, 1 two-hour session. F, S {Also offered for undergraduate credit - see CE 405.}.

CE 610. Water & Wastewater Engineering. 3 Credits.
Principles involved in treatment, disposal, reuse, and recycling of municipal water supplies and wastewaters. Laboratory introduces tests to evaluate treatment requirements and effectiveness. 3 one-hour lectures, 1 three-hour laboratory. F {Also offered for undergraduate credit - see CE 410.}.

CE 611. Design of Pre-stressed Concrete. 2 Credits.
Theory and design of pre-stressed concrete structures, pre- and post-tensioning, loss of pre-stress, proportioning of flexural members, deflections. 2 one-hour lectures. S {Also offered for undergraduate credit - see CE 411.}.

CE 617. Slope Stability and Retaining Walls. 3 Credits.
Performance and design of retaining walls, sheet pile walls, braced walls, and reinforced earth. Also evaluation and mitigation of unstable earth slopes.S {Also offered for undergraduate credit - see CE 417.}.

CE 619. Pavement Design. 3 Credits.
Design of flexible and rigid pavements including sub-grade, base courses, surface courses; evaluation criteria including soil, climate, traffic, material, drainage; initial and maintenance cost considerations; construction practices. 3 one-hour lectures. {Also offered for undergraduate credit - see CE 419.}.

CE 621. Open Channel Flow. 3 Credits.
Geometric and hydraulic properties of open channels, continuity, momentum and energy principles, design of channels, gradually varied flow, critical flow and culvert design. 3 one-hour lectures. S {Also offered for undergraduate credit - see CE 421.}.

CE 625. Bridge Evaluation and Rehabilitation. 3 Credits.
Topics include bridge evaluation methodologies, review of bridge codes, behavior of constructed bridges, sources of bridge deterioration, rehabilitation design with advanced composite materials, structural health monitoring. {Also offered for undergraduate credit - see CE 425.}.

CE 641. Finite Element Analysis. 3 Credits.
Weak and strong solutions to governing differential equations in bars, boundary conditions, Galerkin approximation, nodal basis functions, shape functions. Beam and two-dimensional problems with triangular and quadrilateral elements. F, S {Also offered for undergraduate credit - see CE 441.}.

CE 642. Matrix Analysis of Structures. 2 Credits.
Review of matrix algebra, flexibility and stiffness methods, direct stiffness method, introduction to finite element analysis. 2 lectures. F, S {Also offered for undergraduate credit - see CE 442.}.

CE 645. Advanced Steel Design. 2 Credits.
Analysis and design of metal structures including connections, selection of structural systems. 1 one-hour lecture, 1 two-hour session. S {Also offered for undergraduate credit - see CE 445.}.

CE 646. Basic Dynamics of Structures. 3 Credits.
Analysis of single degree of freedom structural systems to harmonic and general dynamic loading, free vibration of multiple degree of freedom systems, modal superposition, earthquake engineering. 3 one-hour lectures. F {Also offered for undergraduate credit - see CE 446.}.

CE 647. Stability of Structures. 3 Credits.
Concepts of stability of equilibrium; stability criteria, work, energy and variational methods; elastic buckling of columns, beams, frames, and plates; FE implementations of stability; design of locally unstable sections. {Also offered for undergraduate credit - see CE 447.}.

CE 652. Fundamentals of Oil & Gas Pipeline: Design, Operation, Inspection & Maintenance. 3 Credits.
This course introduces the fundamentals to design, operate, inspect, and maintain oil & gas pipelines, including basics for pipeline materials, design, network, construction, measuring and detection technology, maintenance, and repair. {Also offered for undergraduate credit - see CE 452.}.

CE 654. Geometric Highway Design. 3 Credits.
Location and design of highways and streets; design controls, elements of design; cross-section design; design of intersections, interchanges, safety appurtenances, and 3R projects. 2 one-hour lectures, 1 two-hour session. F {Also offered for undergraduate credit - see CE 454.}.

CE 655. Airport Planning and Design. 2 Credits.
System planning and demand forecasting; siting and configuration of airports; aircraft characteristics; air traffic controls; standards for geometric design, pavement design, drainage and safety. 2 one-hour lectures. F{Also offered for undergraduate credit - see CE 455.}.

CE 656. Railroad Planning and Design. 3 Credits.
Rail planning and location analysis, track/rail structure, track layout and control system, locomotives and train resistance, track safety standards and geometrics, terminal design. 3 one-hour lectures. F {Also offered for undergraduate credit - see CE 456.}.

CE 658. Bituminous Materials and Mix. 3 Credits.
This course presents fundamental knowledge of asphalt material properties, performance requirements, specifications and related test characteristics. {Also offered for undergraduate credit - see CE 458.}.

CE 661. Foundation Engineering. 3 Credits.
Performance and selection of the following foundations: shallow, mat, combined pile, and drilled piers. 3 one-hour lectures. F {Also offered for undergraduate credit - see CE 461.}.

CE 662. Designing with Geosynthetics. 2 Credits.
Theories, principles, and engineering design using geosynthetic materials for a variety of civil engineering applications. Applications to geotechnical, environmental, transportation, and water resources fields are emphasized. Includes construction issues. S {Also offered for undergraduate credit - see CE 462.}.

CE 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 673. Air Pollution. 3 Credits.
Fundamentals of air pollution and its control technology. Types and sources of air pollutants, meteorology, effects on plants, animals, people, and property. Design of control equipment. 3 one-hour lectures, 1 three-hour laboratory. S {Also offered for undergraduate credit - see CE 473.}.

CE 676. Watershed Modeling. 3 Credits.
Concepts of watershed, watershed hydrology, application of GIS tools, DEM-based watershed delineation, watershed hydrologic modeling, state-of-the-art watershed modeling software, and hands-on applications. {Also offered for undergraduate credit - see CE 476.}.

CE 677. Applied Hydrology. 3 Credits.
Scope of hydrology, hydrologic cycle and components, runoff volume and peak flow estimation, hydrograph analysis, probabilistic concepts in water resources, flood- frequency analysis, application of risk concepts to hydrological design, flow estimation for ungaged watersheds. Two 75-minute lectures. F {Also offered for undergraduate credit - see CE 477.}.

CE 678. Water Quality Management. 3 Credits.
Physical, chemical, biological, hydrological characteristics, and hydrodynamic elements of receiving waters. Characterizations, measurement, and modeling methods of river/streams, lakes/reservoirs, and groundwater systems. 2 one-hour lectures. {Also offered for undergraduate credit - see CE 478 .}.

CE 679. Advanced Water and Wastewater Treatment. 3 Credits.
Selected problems in the investigation and design of sewerage systems, water distribution systems, wastewater treatment plants, and water purification plants. 2 one-hour lectures. {Also offered for undergraduate credit - see CE 479.}.

CE 686. Nanotechnology and Nanomaterials. 3 Credits.
This course covers principles of nanotechnology, nanomaterials and develops a framework for their understanding. The basic tools of nanotechnology: nanoscale characterization, physics and materials design will be discussed in the context of current technological advances. Cross-listed with ME 686. {Also offered for undergraduate credit - see CE 486.}.

CE 690. Graduate Seminar. 1-3 Credits.

CE 695. Field Experience. 1-15 Credits.

CE 696. Special Topics. 1-5 Credits.

CE 701. Theory of Elasticity. 2 Credits.
Theoretical and applied study of the classical theories of plates and shells as they pertain to engineering problems including small displacement of rectangular and circular plates and thin shells. 2 one-hour lectures.

CE 702. Plates and Shells. 2 Credits.
A theoretical study of linear elasticity, Saint Venant's problems, plain stress, plain strain, strain energy, and torsion. 2 one-hour lectures.

CE 706. Plastic Design in Structural Steel. 2 Credits.
Inelastic bending of beams and frames, application of upper and lower bound theorems, calculation of deflection, effect of axial and shearing forces on flexural strength, connections, structural safety, and rules of plastic design. 2 one-hour lectures.

CE 709. Dynamics of Structures and Foundations. 2 Credits.
Advanced topics in structural dynamics, frequency domain response, generalized coordinates, nonlinear structural response, dynamic analysis of framed structures, structures with distributed properties, seismic design considerations. 2 one-hour lectures.

CE 714. Theory of Elastic Stability. 2 Credits.
Bending of beams under simultaneous action of axial and lateral loads, buckling of compressed bars in both the elastic and plastic ranges, design formulas, lateral buckling of beams. 2 one-hour lectures.

CE 720. Continuum Mechanics. 3 Credits.
Tensor analysis in affined and metric spaces, kinematics of motion, general principles of continuum mechanics, thermodynamics of deformation, and postulates on constitutive laws. 3 one-hour lectures. Cross-listed with ME 720. F.

CE 725. Biomaterials-Materials in Biomedical Engineering. 3 Credits.
This course covers the fundamentals of synthesis, properties, and biocompatibility of metallic, ceramic, polymeric and composite materials that are designed for replacement of biological materials such as hard and soft tissues.

CE 757. Pavement Evaluation and Rehabilitation. 3 Credits.
Advanced knowledge of pavement performance; pavement evaluation; implementation of pavement management at network and project level; maintenance and rehabilitation strategies; life-cycle-cost analysis.

CE 762. Advanced Foundation Engineering. 2 Credits.
Advanced topics in performance and design of foundations. Current topics include a two-dimensional finite element analysis of the foundation and its supporting soil. 2 one-hour lectures. Prereq: CE 661.

CE 770. Hazardous Waste Site Remediation. 3 Credits.
Overview of hazardous waste issues, classification, legislation, process fundamentals, fate and transport of contaminants, management, and treatment/remediation methods. 3 one-hour lectures. S.

CE 771. Economics of Transportation Systems. 3 Credits.
The course will provide an understanding of transportation economics and policy issues facing society. Topics include transportation demand, model costs, transportation competition and market power, transportation regulation, transportation investment, and the economics of transportation safety. Cross-listed with AGEC 771.

CE 772. Rural Logistics and Distribution Management. 3 Credits.
Logistical systems and concepts, distribution management, management of railroads and motor carriers, and location of facilities. Includes agribusiness and natural resource case studies. Cross-listed with AGEC 772.

CE 776. Ground Water and Seepage. 3 Credits.
Groundwater as a resource, relation to hydrologic cycle, well hydraulics, seepage, ground water quality and contamination, ground water flow models. 3 one-hour lectures. S.

CE 778. Transportation Administration. 3 Credits.
Public organization behavior and administration, fund accounting, public budgeting, financial management, and strategic management of transportation agencies. Includes transportation case studies.

CE 779. Watershed Water Quality Modeling. 3 Credits.
Watershed characteristics, non-point source pollution and modeling, latest watershed-scale water quality modeling tools and software, hands-on applications.

CE 780. Transportation Planning. 3 Credits.
Types of transportation planning; history of urban and statewide transportation planning; development and trends in travel demand forecasting; trip generation, trip distribution, mode choice, traffic assignment; transportation plans for modal, and multi-modal alternatives; policy formulation and analysis. 1 three-hour lecture. S.

CE 781. Traffic Engineering. 3 Credits.
Traffic characteristics, studies, and control devices; operations analysis and design; aspects of signing, signalization, markings, and lighting; accident analysis; traffic laws and ordinances; work zone safety practices; arterial and freeway management. 1 three-hour lecture plus two-hour laboratory work. S.

CE 782. Introduction to Intelligent Infrastructure. 3 Credits.
Intelligent infrastructure and associated technologies for sensing, detection, and measurements used in civil infrastructure applications (can be applied to structure, transportation, and geotechnical engineering field).

CE 790. Graduate Seminar. 1-3 Credits.

CE 791. Temporary/Trial Topics. 1-5 Credits.

CE 793. Individual Study/Tutorial. 1-5 Credits.

CE 795. Field Experience. 1-15 Credits.

CE 796. Special Topics. 1-5 Credits.

CE 797. Master's Paper. 1-3 Credits.

CE 798. Master's Thesis. 1-10 Credits.

CE 892. Graduate Teaching Experience. 1-6 Credits.

CE 899. Doctoral Dissertation. 1-15 Credits.

Classical Languages (CLAS)

CLAS 101. First-Year Latin I. 4 Credits.
Introduction to forms, syntax, and vocabulary of classical Latin.

CLAS 102. First-Year Latin II. 4 Credits.
Introduction to forms, syntax, and vocabulary of classical Latin.

CLAS 194. Individual Study. 1-5 Credits.

CLAS 196. Field Experience. 1-15 Credits.

CLAS 199. Special Topics. 1-5 Credits.

CLAS 289. Biblical Hebrew I. 3 Credits.
Fundamentals of Hebrew script, grammar, and syntax. Includes selected readings from Biblical prose.

CLAS 290. Biblical Hebrew II. 3 Credits.
Fundamentals of Hebrew script, grammar, and syntax. Includes selected readings from Biblical prose.

CLAS 291. Seminar. 1-3 Credits.

CLAS 294. Individual Study. 1-5 Credits.

CLAS 299. Special Topics. 1-5 Credits.

CLAS 379. Study Tour Abroad. 1-6 Credits.

CLAS 391. Seminar. 1-3 Credits.

CLAS 392. Study Abroad. 1-15 Credits.

CLAS 394. Individual Study. 1-5 Credits.

CLAS 399. Special Topics. 1-5 Credits.

CLAS 491. Seminar. 1-5 Credits.

CLAS 494. Individual Study. 1-5 Credits.

CLAS 496. Field Experience. 1-15 Credits.

CLAS 499. Special Topics. 1-5 Credits.

Coatings and Polymeric Materials (CPM)

CPM 194. Individual Study. 1-5 Credits.

CPM 196. Field Experience. 1-15 Credits.

CPM 199. Special Topics. 1-5 Credits.

CPM 291. Seminar. 1-5 Credits.

CPM 292. Study Abroad. 1-15 Credits.

CPM 294. Individual Study. 1-5 Credits.

CPM 299. Special Topics. 1-5 Credits.

CPM 379. Study Tour Abroad. 1-6 Credits.

CPM 391. Seminar. 1-3 Credits.

CPM 392. Study Abroad. 1-15 Credits.

CPM 394. Individual Study. 1-5 Credits.

CPM 399. Special Topics. 1-5 Credits.

CPM 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 and ME. {Also offered for graduate credit - See CPM 636.}.

CPM 451. Laboratory, Chemical, Radiation, and Biological Safety. 1 Credit.
Hazards and safe practices in chemical, radiation and biological laboratories, applicable to all studies at NDSU. Recognized by the University as completion (for credit) of safety training to work in a research laboratory. {Also offered for graduate credit - see CPM 651.}.

CPM 472. Environment and Chemical Industries. 2 Credits.
Environmental issues as they pertain to the chemical industry. Topics to include environmental regulations, the issues with disposal and waste, and designing environmentally compliant processes. Recommended Prereq: CHEM 121. {Also offered for graduate credit - see CPM 672.}.

CPM 473. Polymer Synthesis. 3 Credits.
Chemical synthesis of all types of polymers, including the understanding and tailoring of materials formed by these very high molecular weight molecules. Polymers have unique properties due to their conformation and high molecular mass, and are used in a wide variety of applications from paints to structural, engineering materials. Prereq: CHEM 240 or CHEM 342. {Also offered for graduate credit - see CPM 673.}.

CPM 474. Applied Polymer Science. 3 Credits.
Polymers are used in many important applications such as coatings, adhesives, and composites among others. Beginning with a survey of the main methods of polymer and resin synthesis, the course will emphasize the use of polymers in coatings and other applications including polymer structure - property relationships, formulation concepts, methods of evaluation, and use of solvents. Prereq: CHEM 240 or CHEM 342. {Also offered for graduate credit - see CPM 674.}.

CPM 475. Coatings' Materials Science. 3 Credits.
Materials science of composite materials with a focus on polymeric coatings. Includes properties of component materials, design, testing and application. Specialized topics include corrosion, rheology, appearance science and adhesion. Prereq: CPM 474. {Also offered for graduate credit - see CPM 675.}.

CPM 483. Polymer Practicum. 2 Credits.
Focus on key synthetic methods for polymer synthesis, reaction kinetics, and the characterization methods. Students will be introduced to basic lab skills and the analytical tools used to synthesize and characterize macromolecules. Prereq: CPM 473.) {Also offered for graduate credit - see CPM 683.}.

CPM 484. Coatings I Laboratory. 2 Credits.
Preparation and testing of coatings, synthesis and characterization of resins, characterization of coatings. Laboratory counterpart to CPM 474. Recommended Coreq: CPM 474. {Also offered for graduate credit - see CPM 684.}.

CPM 485. Coatings II Laboratory. 2 Credits.
Formulation and application testing of coatings versus property requirements; color measurement and matching. Laboratory counterpart to CPM 475. 1 six-hour laboratory. Hours flexible. Recommended Prereq: CPM 484. Recommended Coreq: CPM 475. {Also offered for graduate credit - see CPM 685.}.

CPM 486. Corrosion and Materials. 3 Credits.
Corrosion science and engineering: basic electrochemistry of corrosion, measurement of corrosion, choice of materials in engineering design to mitigate corrosion, corrosion control by coatings, evaluation of corrosion protection, and areas of special corrosion problems. Recommended Prereq: CHEM 121 or CHEM 150. Cross-listed with CHEM 486. {Also offered for graduate credit - see CPM 686.}.

CPM 487. Corrosion and Materials Laboratory. 1 Credit.
The laboratory will allow the students to become acquainted with experimental techniques for the study of corrosion processes and the failure of materials. Additionally, the methods for protection of materials will be practiced. Recommended Co-req: CPM 486. {Also offered for graduate credit - see CPM 687.}.

CPM 491. Seminar. 1-5 Credits.

CPM 492. Study Abroad. 1-15 Credits.

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 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). Cross-listed with CHEM and ME. {Also offered for undergraduate credit - See CPM 436.}.

CPM 651. Laboratory, Chemical, Radiation, and Biological Safety. 1 Credit.
Hazards and safe practices in chemical, radiation and biological laboratories, applicable to all studies at NDSU. Recognized by the University as completion (for credit) of safety training to work in a research laboratory. {Also offered for undergraduate credit - see CPM 451.}.

CPM 672. Environment and Chemical Industries. 2 Credits.
Environmental issues as they pertain to the chemical industry. Topics to include environmental regulations, the issues with disposal and waste, and designing environmentally compliant processes. {Also offered for undergraduate credit - see CPM 472.}.

CPM 673. Polymer Synthesis. 3 Credits.
Chemical synthesis of all types of polymers, including the understanding and tailoring of materials formed by these very high molecular weight molecules. Polymers have unique properties due to their conformation and high molecular mass, and are used in a wide variety of applications from paints to structural, engineering materials. {Also offered for undergraduate credit - see CPM 473.}.

CPM 674. Applied Polymer Science. 3 Credits.
Polymers are used in many important applications such as coatings, adhesives, and composites among others. Beginning with a survey of the main methods of polymer and resin synthesis, the course will emphasize the use of polymers in coatings and other applications including polymer structure - property relationships, formulation concepts, methods of evaluation, and use of solvents. {Also offered for undergraduate credit - see CPM 474.}.

CPM 675. Coatings' Materials Science. 3 Credits.
Materials science of composite materials with a focus on polymeric coatings. Includes properties of component materials, design, testing and application. Specialized topics include corrosion, rheology, appearance science and adhesion. Prereq: CPM 674. {Also offered for undergraduate credit - see CPM 475.}.

CPM 683. Polymer Practicum. 2 Credits.
Focus on key synthetic methods for polymer synthesis, reaction kinetics, and the characterization methods. Students will be introduced to basic lab skills and the analytical tools used to synthesize and characterize macromolecules. Prereq: CPM 673. {Also offered for undergraduate credit - see CPM 483.}.

CPM 684. Coatings I Laboratory. 2 Credits.
Preparation and testing of coatings, synthesis and characterization of resins, characterization of coatings. Laboratory counterpart to CPM 674. Recommended Coreq: CPM 674. {Also offered for undergraduate credit - see CPM 484.}.

CPM 685. Coatings II Laboratory. 2 Credits.
Formulation and application testing of coatings versus property requirements; color measurement and matching. Laboratory counterpart to CPM 675. 1 six-hour laboratory. Hours flexible. Recommended Prereq: CPM 684. Recommended Coreq: CPM 675.{Also offered for undergraduate credit - see CPM 485.}.

CPM 686. Corrosion and Materials. 3 Credits.
Corrosion science and engineering: basic electrochemistry of corrosion, measurement of corrosion, choice of materials in engineering design to mitigate corrosion, corrosion control by coatings, evaluation of corrosion protection, and areas of special corrosion problems. Cross-listed with CHEM 686. {Also offered for undergraduate credit - see CPM 486.}.

CPM 687. Corrosion and Materials Laboratory. 1 Credit.
The laboratory will allow the students to become acquainted with experimental techniques for the study of corrosion processes and the failure of materials. Additionally, the methods for protection of materials will be practiced. Recommended Co-req: CPM 686. {Also offered for undergraduate credit - see CPM 487.}.

CPM 690. Graduate Seminar. 1 Credit.

CPM 695. Field Experience. 1-15 Credits.

CPM 696. Special Topics. 1-5 Credits.

CPM 771. Modern Methods of Polymer Characterization. 3 Credits.
Understanding the physical properties of polymers and methods for their characterization. Focusing on the significance and interplay of physical parameters and the underlying physics of the characterization methods.

CPM 773. Organic Chemistry Of Coatings. 3 Credits.
Synthesis of polymers used in coating systems, polymers having tailored and defined architectures; crosslinking reactions used in coatings. Recommended Prereq: CHEM 741.

CPM 775. Color And Appearance. 3 Credits.
Topics in color and appearance in coatings, Colorimetry, Color and Gloss Measurement, Optical Properties of Pigments, Opacity, CIE and LAB Color Spaces, Color Matching. Recommended Prereq: CPM 675.

CPM 778. Physical Chemistry of Polymers. 3 Credits.
Examines the interrelationships among polymer structure, morphology, physical state and properties. Key aspects include molecular weight, and its distribution, and the organization of the atoms along the polymer chain. Recommended Prereq: CPM 673.

CPM 782. Physical Chemistry Of Coatings. 3 Credits.
Thermodynamics of interfaces, transport in coatings, colloid stability, advanced CPVC concepts, film formation, particle size effects, and theories of coating application methods. Recommended Coreq: CPM 674.

CPM 790. Graduate Seminar. 1 Credit.

CPM 791. Temporary/Trial Topics. 1-5 Credits.

CPM 793. Individual Study/Tutorial. 1-5 Credits.

CPM 795. Field Experience. 1-15 Credits.

CPM 796. Special Topics. 1-5 Credits.

CPM 798. Master's Thesis. 1-10 Credits.

CPM 899. Doctoral Dissertation. 1-15 Credits.

College of Health Professions (CHP)

Courses

CHP 125. Medical Terminology for Health Professionals. 1 Credit.
A systematic study of building medical terms and understanding their relationship to human anatomy and physiology, pathology and medical treatment. Pre-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.

CHP 184. Understanding and Developing Compassion in Patient Care. 1 Credit.
Examination of multiple perspectives on compassion, and reflection on the role of compassion and empathy broadly and in relation to healthcare. Opportunity to apply these concepts through volunteer service in a patient care setting. Restricted to Pre-Radiologic Sciences, Pre-Respiratory Care or Pre-Medical Laboratory Science majors only.

CHP 190. Critical Thinking and Academic Success. 2 Credits.
This course provides students with opportunities to develop proficient critical thinking skills as they are used in the health professions. This course will also immerse students in reasoning-related activities that facilitate academic success, teamwork, and a demonstrated commitment to the roles and responsibilities required of all health care providers. Prereq: Students must declare a pre-professional major in the College of Health Professions (CHP).

CHP 379. Study Tour Abroad. 1-6 Credits.

CHP 400. Interprofessional Health Care Practice. 3 Credits.
This course is designed for pharmacy, nursing, allied sciences, and other allied health students focusing on the necessary knowledge, skills, and attitudes to function as an effective member of the health care team. Prereq: PHRM 355 for Pharmacy students and NURS 340 and NURS 341 for Nursing students. Cross-listed with HNES.

CHP 450. Complementary and Alternative Therapies: An Evidence-Based Approach. 2 Credits.
This course is designed to provide health professions students with an overview of all forms of complementary and alternative medicine (CAM) commonly practiced in the United States. Students will develop knowledge, skills, and practical tools necessary to understand and evaluate CAM, and provide recommendations for appropriate use to patients or other health care professionals. Prereq: NURS 210 with a grade of C or better or PHRM 480 with a grade of C or better.

CHP 479. Study Tour Abroad. 1-6 Credits.

Communication (COMM)

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 112. Understanding Media and Social Change. 3 Credits.
Exploration of the purpose, function, and impact of media on society. Mass communication majors must earn a grade of B or better.

COMM 114. Human Communication. 3 Credits.
Overview of communication theory with emphasis on information transmission and social influence functions of communication behavior in personal and mediated contexts. Grade of B or better is required for Pre-Communication majors. Repeatable only once.

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 public relations. Journalism majors must earn a grade of B or better. Prereq: COMM 112, ENGL 120.

COMM 212. Interpersonal Communication. 3 Credits.
Theory and practice of communication in interpersonal relationships. Includes aspects of self-expression and relationship communication. Speech communication majors must earn a grade of B or better.

COMM 214. Persuasive Speaking. 3 Credits.
Elements of persuasive speaking with focus on evaluating information directed at the consumer. Includes strategies of altering attitudes, beliefs, values, and behavior. Prereq: COMM 110.

COMM 216. Intercultural Communication. 3 Credits.
Exploration of the definition, models, and verbal processes of communication between different cultural groups.

COMM 220. Persuasion. 3 Credits.
Exploration of the role and function of persuasion in personal, professional, and civic life. Provides an overview of critical, rhetorical, and social scientific theories of persuasion.

COMM 245. Principles of Broadcast Production. 3 Credits.
Creation, critique, and analysis of audio production and single camera video productions with special emphasis on radio and television news. Restricted to Communication professional majors and minors.

COMM 260. Introduction to Web Design. 3 Credits.
This course aims to orient students to Web concepts, design, presentation, and evaluation. Prereq: CSCI 114, CSCI 116, MIS 116 or CSCI 160.

COMM 261. Introduction to Web Development. 3 Credits.
Introduces the tools used by Web Development professionals, including HTML, Web editors, imaging software, Javascript, and Acrobat pdf format. Prereq: COMM 260.

COMM 291. Seminar. 1-3 Credits.

COMM 292. Study Abroad. 1-15 Credits.

COMM 294. Individual Study. 1-5 Credits.

COMM 296. Field Experience. 1-15 Credits.

COMM 299. Special Topics. 1-5 Credits.

COMM 301. Rhetorical Traditions. 3 Credits.
Historical/descriptive examination of rhetorical theory from the classical through modern periods. Restricted to Communication professional majors and minors.

COMM 308. Business and Professional Speaking. 3 Credits.
Oral and written communication skills for professional and business settings. Includes resume, cover letter and memo writing; interpersonal and group applications; and interviewing and professional presentations emphasis. Prereq: COMM 110. Restricted to Communication professional majors and minors.

COMM 310. Advanced Media Writing. 3 Credits.
Construction of professional quality messages for the modern media landscape. Prereq: B or better in COMM 200. Restricted to Communication professional majors and minors.

COMM 312. Oral Performance Studies. 3 Credits.
Study and practice of the principles involved in oral performance. Includes the development of vocal qualities and articulation, as well as the analysis of literary texts representing a variety of genres and formats of interpretation. Prereq: COMM 110. Restricted to Communication professional majors and minors.

COMM 313. Editorial Processes. 3 Credits.
Principles of print media copy-editing, headline composition, publication design, photo editing, and computer editing. Prereq: COMM 200. Restricted to Communication professional majors and minors.

COMM 315. Small Group Communication. 3 Credits.
Focus on group processes, methods of problem solving, parliamentary procedures, and relational components of group interaction. Restricted to Communication professional majors and minors.

COMM 316. Conflict Communication. 3 Credits.
Exploration of conflict interaction in business and public sectors; application of negotiation strategies, decision-making, problem-solving, and bargaining. Prereq: completion of pre-communication degree requirements.

COMM 318. Argumentation and Advocacy. 3 Credits.
Theory and process of argumentation with practical experience in preparation and delivery of formal and informal arguments. Prereq: COMM 110. Restricted to Communication professional majors and minors.

COMM 320. Communication Analysis. 3 Credits.
Overview and application of basic methods used in communication analysis. Mass Communication and Speech Communication majors must earn a grade of B or better. Restricted to Communication professional majors and minors.

COMM 321. Introduction to Communication Theory. 3 Credits.
Major theoretical approaches to the study of communication from social scientific and humanistic traditions. Restricted to Communication professional majors and minors.

COMM 325. Applied Research Methods. 4 Credits.
This course provides an overview of the scientific model, the philosophy and goals of science, and a detailed study of qualitative and quantitative methodologies. Lecture, laboratory. Co-req or Prereq: STAT 330. Cross-listed with POLS 325 and CJ 325.

COMM 330. Photography for the Media. 3 Credits.
An introduction to digital photography techniques for students who plan to specialize in preparing visual images for print and online media. Prereq: students must be Communication majors or minors in the professional program.

COMM 340. Social Research Methods. 3 Credits.
Overview of the scientific method, the philosophy of science, and the goals of science. Detailed study of qualitative and quantitative methodologies. Cross-listed with SOC 340.

COMM 341. Social Research Methods Laboratory. 1 Credit.
Laboratory to accompany COMM 340. Provides application of conceptualization, operationalization, sampling methods, qualitative and quantitative research methods, and computer statistical analysis. Cross-listed with SOC 341.

COMM 346. Sports Broadcasting. 3 Credits.
Overview of television sports broadcasting skills with an emphasis on reporting, shooting highlights, anchoring, editing and play-by-play announcing. Prereq: COMM 345.

COMM 347. Television On-Air Performance. 3 Credits.
Introduction to basic skills required of an on-air television personality, including news and sports anchors, talk show hosts, and on-site production hosts. Prereq: COMM 345.

COMM 362. Principles of Design For Print. 3 Credits.
Applications of various design principles and pagination techniques to cognitive problem solving involved in developing material for publication. Restricted to Communication professional majors and minors.

COMM 363. Advanced Web Design. 3 Credits.
Students build advanced competence in developing and maintaining websites using advanced web design programming. Prereq: COMM 260, COMM 261.

COMM 375. Principles of Strategic Communication. 3 Credits.
Advertising and public relations are studied theoretically and as professional fields; theory, principles, and practices are used in creating strategic communication campaigns. Prereq: COMM 200 and completion of pre-Communication degree requirements.

COMM 376. Advertising Creative Strategies. 3 Credits.
Introduces students to creative ideas in advertising and their translation into words and images. Emphasis is on strategic approaches to creative decision-making across all media. Prereq: COMM 375 Restricted to Communication professional majors and minors.

COMM 377. Advertising Media Planning. 3 Credits.
This course introduces students to the basic concepts of media planning and buying in advertising. Emphasis is placed on strategic approaches to the media placement process across all forms of media. Prereq: COMM 375. Restricted to Communication professional majors and minors.

COMM 379. Study Tour Abroad. 1-6 Credits.

COMM 380. Health Communication I. 3 Credits.
This course is designed to introduce students to the field of health communication. Students will learn about models of health communication, doctor-patient communication, designing and implementing health campaigns, and organizational communication in health organizations.

COMM 381. Patient-Provider Communication. 3 Credits.
This course is designed to provide verbal and nonverbal strategies to improve patient-provider interaction during the medical visit and subsequent sessions involving the diagnosis and treatment of health-related conditions. Restricted to Communication professional majors and minors, Allied Sciences, Health, Nutrition, and Exercise Science, Nursing, Pharmaceutical Sciences, Pharmacy Practice, and Psychology majors only.

COMM 383. Organizational Communication I. 3 Credits.
Exploration of the theory of management communication practices in organizations. Emphasis on the formal structure and interpersonal aspects of supervisor-subordinate relations. Prereq: Junior standing. Cross-listed with BUSN 383. Restricted to Communication professional majors and minors.

COMM 391. Seminar. 1-5 Credits.

COMM 392. Study Abroad. 1-15 Credits.

COMM 394. Individual Study. 1-5 Credits.

COMM 396. Field Experience. 1-15 Credits.

COMM 397. Fe/Coop Ed/Internship. 1-4 Credits.

COMM 399. Special Topics. 1-5 Credits.
Restricted to Communication professional majors and minors.

COMM 412. Gender and Communication. 3 Credits.
Exploration of philosophical and theoretical issues surrounding gender construction, communication, and culture. Focus on ways in which communication in families, schools, media, and other institutions create and sustain gender roles. Restricted to Communication professional majors and minors.

COMM 421. History of Journalism. 3 Credits.
The history and development of journalism as shaped by the political and social environment. Prereq: COMM 310. Restricted to Communication professional majors and minors.

COMM 425. Specialty Writing. 3 Credits.
Methods and practice of writing features and opinion for print publications. Prereq: COMM 310. Restricted to Communication professional majors and minors.

COMM 431. Communication Ethics and Law. 3 Credits.
Analysis of ethical and legal issues affecting communications and communication industries. Restricted to Communication professional majors and minors.

COMM 434. Communication Law. 3 Credits.
Exploration of speech and press protections of the First Amendment; includes libel, privacy, electronic media regulation, and speech regulation. Restricted to Communication professional majors and minors.

COMM 435. Critical Approaches to Popular Culture. 3 Credits.
Analysis of popular cultures as a reflection and influencer of social values. Explores how media representation, industry, economics, globalization, and the overlap between politics and entertainment affect American popular culture. Restricted to Communication professional majors and minors.

COMM 442. Digital Media and Society. 3 Credits.
Explores the impact of technological developments on media and mediated culture.

COMM 445. Advanced Broadcast Production. 3 Credits.
Development of skills in the creation, critique, and analysis of television productions in the studio and in the field. Prereq: COMM 345. Restricted to Communication professional majors and minors.

COMM 446. Television Studio Production. 3 Credits.
This course introduces students to studio and control practices as well as producing and anchoring newscasts and talk shows. Students will learn basic production skills including all areas of studio production by working in Bison Information Network's TV studio. Prereq: COMM 345.

COMM 450. Issues in Communication. 3 Credits.
Studies of key issues in the field of communication. May be repeated. Restricted to Communication professional majors and minors.

COMM 451. Directing Forensics. 2 Credits.
Theory and practical strategies for coaching individual speaking events and debate at the high school or collegiate levels. Prereq: Junior standing. Restricted to Communication professional majors and minors.

COMM 462. Web Database Programming. 3 Credits.
Introduces students to Web database concepts, design, normalization processes, and implementation. Prereq: COMM 260, 261. Restricted to Communication professional majors and minors.

COMM 465. Convergence Media. 3 Credits.
Techniques for digital storytelling, multimedia content creation, and cross-platform production. Prereq: restricted to Communication professional majors or minors only.

COMM 470. Research for Strategic Communication. 3 Credits.
Students in advertising and public relations must respond to changing contexts as they design and conduct campaigns. This course provides tailored strategies needed by our students as they move into the professional advertising and public relations environments. Prereq: COMM 375.

COMM 472. Public Relations Campaigns. 3 Credits.
Social science research as applied to public relations, case study analysis, construction, and implementation of public relations campaigns. Prereq: COMM 370 or COMM 375. Restricted to Communication professional majors and minors.{Also offered for graduate credit - see Comm 672.}.

COMM 473. Case Study in Public Relations. 3 Credits.
Advanced study of applied public relations theory through intense case study analysis and research focused on organizations. Case studies from the Public Relations Society of America are used. Prereq: COMM 472. Restricted to Communication professional majors and minors.

COMM 476. Advertising Campaign Practicum. 3 Credits.
This course challenges students to apply the knowledge they have gained in previous advertising classes. Specifically, students will design an advertising campaign including market research, creative execution, media planning, and account management. Prereq: COMM 376 or COMM 377. Restricted to Communication professional majors and minors.

COMM 480. Health Communication II. 3 Credits.
Designed to introduce students to advanced theory and research in health communication. Course topics include interpersonal health communication, intervention design, and global perspectives on health communication. Prereq: COMM 380. Restricted to Communication professional majors and minors.

COMM 483. Organizational Communication II. 3 Credits.
Examination of the structure and function of interpersonal communication networks in formal organizations, methods of network analysis. Prereq: COMM 383. Restricted to Communication professional majors and minors.

COMM 484. Organizational Advocacy and Issue Management. 3 Credits.
Exploration of communication theories and campaigns to assess the impact of historical and contemporary advocacy in both for-profit and non-profit sectors. Prereq: COMM 383.

COMM 485. Risk and Crisis Communication. 3 Credits.
Crisis communication practices in organizations of all types with emphasis on planning, emergency communication, image restoration, and organizational learning. Prereq: COMM 110. Cross-listed with SAFE 485. Restricted to Communication professional majors and minors.

COMM 487. Organizational Power and Leadership. 3 Credits.
This course emphasizes communicative dimensions of organizational leadership. Theory will be discussed as a foundation for leadership practices. Prereq: COMM 383. Restricted to Communication professional majors and minors.

COMM 488. Social Influence and Organizational Change. 3 Credits.
Exploration of research and theory of social influence and change in organizations. Focus on interpersonal, group, and organizational influence processes and systems view of organizational change efforts. Prereq: COMM 383.

COMM 491. Seminar. 1-5 Credits.
Restricted to Communication professional majors and minors.

COMM 492. Study Abroad. 1-15 Credits.
Restricted to Communication professional majors and minors.

COMM 493. Undergraduate Research. 1-5 Credits.

COMM 494. Individual Study. 1-5 Credits.
Restricted to Communication professional majors and minors.

COMM 496. Field Experience. 1-15 Credits.
Restricted to Communication professional majors and minors.

COMM 499. Special Topics. 1-5 Credits.
Restricted to Communication professional majors and minors.

COMM 672. Public Relations Campaigns. 3 Credits.
Social science research as applied to public relations, case study analysis, construction, and implementation of public relations campaigns. {Also offered for undergraduate credit - see Comm 472.}.

COMM 690. Graduate Seminar. 1-3 Credits.

COMM 695. Field Experience. 1-15 Credits.

COMM 696. Special Topics. 1-5 Credits.

COMM 700. Research Methods in Communication. 3 Credits.
Introduction to research planning and design, methods of research, and presentation of research results.

COMM 701. Advanced Research Methods in Communication I. 3 Credits.
Advanced research methods in communication; research planning, design, and presentation. Prereq: COMM PhD students only.

COMM 702. Introduction to College Teaching in the Humanities and Social Sciences. 3 Credits.
Techniques for effective teaching and assessing learning at the college level. Includes special issues and responsibilities related to college-level teaching.

COMM 704. Qualitative Research Methods in Communication. 3 Credits.
Introduction to theory and practice of qualitative research in communication. Prereq: COMM 700.

COMM 707. Quantitative Research Methods in Communication. 3 Credits.
Introduction to quantitative research planning and design, methods of research, and presentation of research results. Prereq: COMM 700.

COMM 711. Communication Theory. 3 Credits.
Major theoretical approaches to the study of communication from social scientific and humanistic traditions.

COMM 715. Theories of Small Group Communication. 3 Credits.
Survey of theoretical constructs of communication in the small group setting. Examination of current methods of research.

COMM 731. Communication Ethics Seminar. 3 Credits.
Study of ethical theories and their relationship to the mass media.

COMM 735. Theories of Media, Technology, and Society. 3 Credits.
This course examines social scientific and critical theories of media, communication technology, and social change.

COMM 750. Advanced Issues in Communication. 3 Credits.
Advanced theory and philosophy of research issues in the field of communication. May be repeated.

COMM 767. Rhetorical Criticism. 3 Credits.
Survey of critical methods of inquiry that may be applied to oral discourse and frameworks for critically evaluating communication processes and products.

COMM 783. Advanced Organizational Communication I. 3 Credits.
Exploration of the theory of management communication practices in organizations. Emphasis on the formal structure of and interpersonal aspects of supervisor-subordinate relations. Prereq: Graduate standing.

COMM 786. Risk Communication. 3 Credits.
Explores the relationship between communication strategies and risk perception, assessment, and management. Cross-listed with SAFE 786.

COMM 790. Graduate Seminar. 1-3 Credits.

COMM 791. Temporary/Trial Topics. 1-5 Credits.

COMM 792. Graduate Teaching Experience. 1-6 Credits.

COMM 793. Individual Study/Tutorial. 1-5 Credits.

COMM 794. Practicum. 1-15 Credits.

COMM 795. Field Experience. 1-15 Credits.

COMM 796. Special Topics. 1-5 Credits.

COMM 797. Master's Paper. 1-3 Credits.

COMM 798. Master's Thesis. 1-10 Credits.

COMM 799. Master's Examination. 1-6 Credits.
Literature review, research and preparation for the master's examination option.

COMM 892. Graduate Teaching Experience. 1-6 Credits.

COMM 893. Individual Study/Tutorial. 1-5 Credits.

COMM 899. Doctoral Dissertation. 1-15 Credits.

Community Development (CED)

CED 709. Community Development Orientation. 2 Credits.
Introduces students in the on-line Master's degree program in community development to the on-line classroom environment, and to the science, practice, and profession of community development.

CED 711. Principles and Strategies of Community Change. 3 Credits.
Analyze theories, principles, strategies and practices of community change and development from a multidisciplinary perspective in order to construct a personal framework for the practice of community economic development. Prereq: CED 709.

CED 713. Community Development II: Organizing for Community Change. 3 Credits.
An examination of the role of civil society in community planning efforts, the connection between social relationships and economic activity, the structure and implications of power, conflict management, inclusiveness, and equitable change. Prereq: CED 709.

CED 715. Community Analysis: Introduction to Methods. 3 Credits.
An introduction to the research methods relevant to community development, strategies for reporting and applying findings in community action, and issues of research ethics and inclusiveness. Prereq: CED 709.

CED 717. Community and Regional Economic Policy and Analysis. 3 Credits.
Explores theories of economic growth, community economic and industrial base, sources of economic growth or decline, and strategies for local and regional economic development. Prereq: CED 709.

CED 719. Community Natural Resource Management. 3 Credits.
Theoretical frameworks, methodological investigation, and applied practices of natural resource development as a component of community economic development. Prereq: CED 709.

CED 721. Introduction to Native Community Development. 3 Credits.
Examines community development in the context of diverse tribal structures and cultures, and provides a holistic analysis of the unique histories and jurisdictional considerations of Native communities. Prereq: CED 709.

CED 723. Building Native Community/Economic Capacity. 3 Credits.
Non-Western approaches to helping Native communities build their economic capacity through participatory, culture-centered, and strength-based approaches to development. Prereq: CED 709.

CED 725. Wellness in Native Communities. 1 Credit.
Highlights health care issues challenging Native communities and identifies strategies and practices to address those challenges. Prereq: CED 709.

CED 726. Youth Development in Native Communities. 1 Credit.
Contemporary issues facing Native youth, including demographics, early parenting, juvenile justice, education, health, employment, and youth-elder connections. Prereq: CED 709.

CED 727. Indian Country Agriculture and Natural Resources. 1 Credit.
Explores the impact of structural inequality, globalization, and sovereignty on planning, sustainability, and development of agriculture and natural resources on Native American reservations. Prereq: CE 709.

CED 728. Role of Tribal Colleges in Economic Development. 1 Credit.
Examines the tribal college model of economic development using a social capital analytical framework. Prereq: CED 709.

CED 731. Ecological Economics. 3 Credits.
Examines the synthesis of ecology and economic utility through the inherent interdependence, jointness, and potential complementarity between the ecology and economy of a place. Prereq: CED 709.

CED 733. Sustainable Communities. 3 Credits.
Links the management of natural capital in communities and society to their implications for community sustainability in terms of economic vitality, social well-being, and ecosystem health. Prereq: CED 709.

CED 735. Policy and Politics of Coastal Areas. 3 Credits.
This course explores public policy and programs pertaining to America's coastlines as it pertains to community economic development. Prereq: CED 709.

CED 741. Economic Development Strategies and Programs. 3 Credits.
This course covers the most widely used strategies and programs for economic development within an action planning process, including retention and expansion of business and industry, retail development, downtown revitalization, incubating new firm creation, industrial attraction, and tourism development. Prereq: CED 709.

CED 742. Economic and Fiscal Impact Analysis. 1 Credit.
Examines the underlying concepts of and the tools for conducting community economic and fiscal impact analysis. Prereq: CED 709.

CED 743. Cost-Benefit Analysis. 1 Credit.
This course examines cost-benefit analysis, cost effectiveness, and cost-utility analysis in the context of community economic development. Prereq: CED 709.

CED 744. Local Economic Analysis. 1 Credit.
This course offers descriptive tools of community economic analysis to assess the current or past state of a community's economy, to predict the future of that economy, and to help leaders make effective economic decisions. Prereq: CED 709.

CED 745. Land Management Planning. 3 Credits.
Examines the principles and practices of real estate, including legal, economic, and social implications from the viewpoint of real estate practicioners, investors, and society. The course covers land use programs and methods of zoning. Prereq: CED 709.

CED 752. Basic Grant Development and Management. 3 Credits.
Introduces the grant development and management process, explores steps in the search for funding sources, examines program budgets and justifications, and lists plans for program sustainability. Prereq: CED 709.

CED 753. Not-for-profit Management. 3 Credits.
This course examines the unique management issues faced by not-for-profit community economic development organizations in terms of policy setting, participation, administration, and accountability. Prereq: CED 709.

CED 755. Community Leadership and Capacity Building. 3 Credits.
This course defines and applies leadership strategies to the community economic development context. The course examines the link between leadership and community capacity. Prereq: CED 709.

CED 790. Graduate Seminar. 1-5 Credits.

CED 793. Individual Study/Tutorial. 1-5 Credits.

CED 798. Master's Thesis. 1-10 Credits.

Computer Science (CSCI)

CSCI 114. Microcomputer Packages. 3 Credits.
General introduction to computer concepts, operating systems, the internet, word processing, spreadsheets, database management and presentation software. Credit awarded only for CSCI 114 or CSCI 116, not both.

CSCI 122. Visual BASIC. 3 Credits.
Introduction to programming in the BASIC/Visual BASIC language.

CSCI 159. Computer Science Problem Solving. 3 Credits.
Computer-based problem solving techniques are introduced in the context of the Internet, including web-site development. Programming concepts, data structures and algorithms, as well as modeling techniques are discussed.

CSCI 160. Computer Science I. 4 Credits.
Introduction to computer science including problem solving, algorithm development, and structured programming in a high-level language. Emphasis on design, coding, testing, and documentation of programs using accepted standards of style. Prereq: MATH 103.

CSCI 161. Computer Science II. 4 Credits.
Continuation of CSCI 160 that emphasizes more advanced programming language features and basic data structures. Students will learn to incorporate advanced programming features such as Interfaces and Generics into the programs they develop. Prereq: CSCI 160.

CSCI 172. Intermediate Visual BASIC. 3 Credits.
Elements of Visual Basic for those with previous programming background. Topics include fundamental constructs, Active X controls, file processing, database management, and SQL. Prereq: one semester/experience in any programming language.

CSCI 189. Skills for Academic Success. 1 Credit.
This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

CSCI 194. Individual Study. 1-3 Credits.

CSCI 196. Field Experience. 1-15 Credits.

CSCI 199. Special Topics. 1-5 Credits.

CSCI 212. Self-Paced C++. 1 Credit.
Introduction to the C++ programming language. Students complete exercises and programming assignments at their own pace. Prereq: Programming skill in another language.

CSCI 213. Modern Software Development. 3 Credits.
This course provides students with exposure to, and practice with a modern software development environment. Students do individual projects covering all the major phases of prescriptive software development including: requirements engineering, design, construction, testing and debugging. Prereq: CSCI 161.

CSCI 214. Self-Paced C. 1 Credit.
Introduction to the C programming language. Students complete exercises and programming assignments at their own pace. Prereq: CSCI 160.

CSCI 222. Discrete Mathematics. 3 Credits.
Sets, functions, relations, logic, methods of proof, mathematical induction, combinatorics, recurrence relations, generating functions. Prereq: CSCI 160.

CSCI 227. Computing Fundamentals I. 3 Credits.
Two-semester sequence focused on problem solving and writing computer programs in a modern high-level programming language in a state-of-the-art programming environment. Second semester includes an introduction to the object-oriented programming paradigm. Prereq: MATH 103 or MATH 107.

CSCI 228. Computing Fundamentals II. 3 Credits.
Two-semester sequence focused on problem solving and writing computer programs in a modern high-level programming language in a state-of-the-art programming environment. Second semester includes an introduction to the object-oriented programming paradigm. Prereq: CSCI 227.

CSCI 277. Introduction to UNIX. 3 Credits.
This course introduces students to the UNIX operating system environment. Topics include basic UNIX commands, operating system installation and administration, application installation, use of alternative shells, web servers, and system security. Cross-listed with MIS 277.

CSCI 291. Seminar. 1-3 Credits.

CSCI 292. Study Abroad. 1-15 Credits.

CSCI 294. Individual Study. 1-5 Credits.

CSCI 299. Special Topics. 1-5 Credits.

CSCI 312. Survey of Programming Languages. 3 Credits.
This course provides an introduction to major types of programming languages including block-structured, object-oriented, dynamic, declarative and functional languages. For each of the languages, an example language other than the main teaching language will be selected. Prereq: CSCI 228.

CSCI 313. Software Development for Games. 3 Credits.
This course provides students with an understanding of agile software development. Students work in small teams to use an agile methodology to develop a computer game. Prereq: CSCI 213.

CSCI 336. Theoretical Computer Science. 3 Credits.
Parsing techniques, context-free languages, Turing machines, recursive and recursively enumerable languages, unrestricted grammars, unsolvable decision problems, computability, introduction to computational complexity. Prereq: CSCI 222.

CSCI 345. Topics on Personal Computers. 3 Credits.
Exploration of some aspects of personal computers not covered in other courses, varies each time it is offered. May be repeated. Prereq: CSCI 161.

CSCI 366. Database Systems. 3 Credits.
Introduction to database systems, including database design, data modeling, storage structures, database theory, and the building of database applications. Prereq: CSCI 213.

CSCI 371. Web Scripting Languages. 3 Credits.
This course examines Scripting Languages and their applications. Emphasis will be placed on web scripting. A representative set of scripting languages will be covered. Prereq: CSCI 122 or CSCI 160 or CSCI 227 or ECE 173. Cross-listed with MIS 371.

CSCI 372. Comparative Programming Languages. 3 Credits.
Fundamental concepts of programming languages and inherent design choices are analyzed. The course focuses mainly on concepts of block-structured and object-oriented languages, but other languages, such as declarative and functional languages, also are discussed. Prereq: CSCI 213.

CSCI 374. Computer Organization and Architecture. 3 Credits.
Organization and structure of the major sections of a computer: CPU, memory, and I/O system organization and implementation issues. Prereq: CSCI 213. Cross-listed with ECE 374.

CSCI 379. Study Tour Abroad. 1-6 Credits.

CSCI 391. Seminar. 1-3 Credits.

CSCI 392. Study Abroad. 1-15 Credits.

CSCI 394. Individual Study. 1-5 Credits.

CSCI 397. Fe/Coop Ed/Internship. 1-4 Credits.

CSCI 399. Special Topics. 1-5 Credits.

CSCI 403. Defensive Network Security. 3 Credits.
This course will cover the design, development and testing of network and software systems for defending computer systems and networks. Key areas of focus will be the development of secure software, software and software system decision making to ensure security and the use of software systems to protect and detect intrusions into computer networks. Prereq: CSCI 213 or ECE 275 or ME 213. {Also offered for graduate credit - See CSCI 603}.

CSCI 404. Ethical Hacking. 3 Credits.
This course teaches students how to test systems by viewing systems security from the bad actors' perspective in conducting system testing. The course prepares students to take the EC Council Certified Ethical Hacker examination. {Also offered for graduate credit - See CSCI 604.}.

CSCI 409. Cybersecurity Law and Policy. 3 Credits.
This course will cover the laws and policy related to cybersecurity. This will include law and policy at the international, national and state levels. The impact of national and state law on corporate and institutional policies will be discussed and institutional policy development and implementation will be reviewed. Prereq: CSCI 213 or ECE 275 or ME 213. {Also offered for graduate credit - See CSCI 609}.

CSCI 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 or ECE 275. {Also offered for graduate credit - see CSCI 613.}.

CSCI 415. Networking and Parallel Computation. 3 Credits.
This course provides students with an understanding of networking and multi-programming. Students will write some multi-programs. Prereq: CSCI 313, CSCI 366. {Also offered for graduate credit - See CSCI 615.}.

CSCI 418. Simulation Models. 3 Credits.
Fundamental techniques involved in using a computer to simulate business, social, and industrial systems. Includes principles of random variate generation, statistical sampling, and design of experiments. Prereq: STAT 367. {Also offered for graduate credit - see CSCI 618.}.

CSCI 426. Introduction to Artificial Intelligence. 3 Credits.
Introduction to artificial intelligence for undergraduates. Includes basic AI concepts and techniques. Prereq: CSCI 222 and CSCI 372.

CSCI 428. Computational Techniques for Environmental Sustainability. 3 Credits.
This course covers computational technology that is relevant for work in sustainability. Geo-spatial data management, statistical concepts for data mining, and computational modeling techniques, are discussed in the context of environmental sustainability. Prereq: CSCI 161. {Also offered for graduate credit - see CSCI 628.}.

CSCI 429. Network Applications and Environments. 3 Credits.
This course is devoted to the study of network services and the development of internet resources. Prereq: CSCI 161 or CSCI 228.

CSCI 436. Intelligent Agents. 3 Credits.
Fundamentals of Intelligent Agents technology, agent communication languages, applications, and intelligent agents development. Prereq: CSCI 372. {Also offered for graduate credit - see CSCI 636.}.

CSCI 445. Software Projects Capstone. 3 Credits.
Presentations on the mechanics of working cooperatively as a team doing commercial software development. Students work in teams to deliver realistic work products to local businesses. Course presentations cover teamwork, software development pragmatics, and software documentation. Prereq: CSCI 313 and CSCI 366.

CSCI 450. Cloud Computing. 3 Credits.
The course discusses various topics and technologies related to Cloud Computing. Topics include distributed system models and enabling technologies, computer cluster, virtual machines, design of cloud computing platforms, cloud programming and software environments. Prereq: CSCI 372. {Also offered for graduate credit - see CSCI 650.}.

CSCI 453. Linear Programming and Network Flows. 3 Credits.
Linear programming models and applications, primal and dual formulations, computational procedures; introduction to networks, maximum flow, and shortest path problems. Prereq: MATH 265. {Also offered for graduate credit - see CSCI 653.}.

CSCI 454. Operations Research. 3 Credits.
Deterministic and probabilistic models of operations research: networks and project management, dynamic programming, non-linear programming, inventory, queuing, reliability, stochastic processes, and simulation. Prereq: CSCI 453, STAT 367. {Also offered for graduate credit - see CSCI 654.}.

CSCI 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.
Fundamental concepts and technologies of mobile and wireless networks. Topics include wireless transmission characteristics, mobility management, wireless local area networks, ad hoc and sensor networks, and cellular networks. Prereq: CSCI 366 and CSCI 372. {Also offered for graduate credit - see CSCI 662.}.

CSCI 467. Algorithm Analysis. 3 Credits.
Design, correctness, and analysis of algorithms and data structures. Prereq: MATH 166, CSCI 161 and CSCI 222 or MATH 270. {Also offered for graduate credit - see CSCI 667.}.

CSCI 469. Network Security. 3 Credits.
Cryptography and its application to network and operating system security; authentication; email, web, IP, and wireless security; firewalls and intrusion detection techniques; security threats and countermeasures; legal and ethical issues. Prereq: CSCI 222, CSCI 459, C/C++ or JAVA. {Also offered for graduate credit - see CSCI 669.}.

CSCI 473. Foundations of the Digital Enterprise. 3 Credits.
This course is designed to familiarize individuals with current and emerging electronic commerce technologies using the Internet. Prereq: CSCI 372.

CSCI 474. Operating Systems Concepts. 3 Credits.
How operating systems manage the resources of a computer. Topics include processes, concurrency, scheduling, deadlocks, memory allocation, virtual and secondary storage. Prereq: CSCI 374.

CSCI 476. Computer Forensics. 3 Credits.
This course introduces principles, techniques, tools, and practical skills necessary to perform rudimentary investigations of incidents in which computers play a significant or interesting role. Prereq: CSCI 474 or instructor approval. {Also offered for graduate credit - see CSCI 676.}.

CSCI 477. Object-Oriented Systems. 3 Credits.
Introduction to the concepts and advantages of object-oriented computer systems. Introduces exercises with at least one such language. Prereq: CSCI 372. {Also offered for graduate credit - see CSCI 677.}.

CSCI 479. Introduction to Data Mining. 3 Credits.
Introduction to data mining includes basic data mining techniques, querying, spreadsheet data mining, data warehouses, evaluation techniques, knowledge discovery in databases, examples and a survey of advanced techniques. Prereq: Basic database course (e.g. CSCI 366 or CSCI 468). {Also offered for graduate credit - see CSCI 679.}.

CSCI 485. Autonomous Command and Artificial Intelligence for Robots and Other Cyber-Physical Systems. 3 Credits.
This course will cover the command and control of multi-robot systems. This will include the process of onboard decision making, considering both planning-based and real time decisions. Artificial intelligence techniques for robotic systems will be covered as will the application of similar techniques to non-robot cyber-physical systems. Prereq: CSCI 213 or ECE 275 or ME 213. {Also offered for graduate credit - See CSCI 685.}.

CSCI 488. Human-Computer Interaction. 3 Credits.
Survey of the methodologies and alternatives used in developing and evaluating human-computer interfaces. Prereq: CSCI 313. {Also offered for graduate credit - see CSCI 688.}.

CSCI 489. Social Implications of Computers. 3 Credits.
Capstone course for Computer Science. Presentation and discussion of several ethical and social issues that have arisen from the introduction of the computer including copy-protected software and liability for computer software errors. Prereq: CSCI 372. {Also offered for graduate credit - see CSCI 689.}.

CSCI 491. Seminar. 1-5 Credits.

CSCI 492. Study Abroad. 1-15 Credits.

CSCI 493. Undergraduate Research. 1-6 Credits.

CSCI 494. Individual Study. 1-5 Credits.

CSCI 496. Field Experience. 1-15 Credits.

CSCI 499. Special Topics. 1-5 Credits.

CSCI 603. Defensive Network Security. 3 Credits.
This course will cover the design, development and testing of network and software systems for defending computer systems and networks. Key areas of focus will be the development of secure software, software and software system decision making to ensure security and the use of software systems to protect and detect intrusions into computer networks. {Also offered for undergraduate credit - See CSCI 403}.

CSCI 604. Ethical Hacking. 3 Credits.
This course teaches students how to test systems by viewing systems security from the bad actors' perspective in conducting system testing. The course prepares students to take the EC Council Certified Ethical Hacker examination. {Also offered for undergraduate credit - See CSCI 404.}.

CSCI 609. Cybersecurity Law and Policy. 3 Credits.
This course will cover the laws and policy related to cybersecurity. This will include law and policy at the international, national and state levels. The impact of national and state law on corporate and institutional policies will be discussed and institutional policy development and implementation will be reviewed. {Also offered for undergraduate credit - See CSCI 409}.

CSCI 613. Principles of Software Engineering. 3 Credits.
An introduction to concepts of software engineering. Software development activities through a project. Lifecycle models, requirements, specification, design, implementation, and testing. Software quality, tools, and techniques. A term paper for graduate students. {Also offered for undergraduate credit - see CSCI 413.}.

CSCI 615. Networking and Parallel Computation. 3 Credits.
This course provides students with an understanding of networking and multi-programming. Students will write some multi-programs. {Also offered for undergraduate credit - See CSCI 415.}.

CSCI 618. Simulation Models. 3 Credits.
Fundamental techniques involved in using a computer to simulate business, social, and industrial systems. Includes principles of random variate generation, statistical sampling, and design of experiments. {Also offered for undergraduate credit - see CSCI 418.}.

CSCI 628. Computational Techniques for Environmental Sustainability. 3 Credits.
This course covers computational technology that is relevant for work in sustainability. Geo-spatial data management, statistical concepts for data mining, and computational modeling techniques, are discussed in the context of environmental sustainability. {Also offered for undergraduate credit - see CSCI 428.}.

CSCI 636. Intelligent Agents. 3 Credits.
Fundamentals of Intelligent Agents technology, agent communication languages, applications, and intelligent agents development. {Also offered for undergraduate credit - see CSCI 436.}.

CSCI 650. Cloud Computing. 3 Credits.
The course discusses various topics and technologies related to Cloud Computing. Topics include distributed system models and enabling technologies, computer cluster, virtual machines, design of cloud computing platforms, cloud programming and software environments. {Also offered for undergraduate credit - see CSCI 450.}.

CSCI 653. Linear Programming and Network Flows. 3 Credits.
Linear programming models and applications, primal and dual formulations, computational procedures; introduction to networks, maximum flow, and shortest path problems. {Also offered for undergraduate credit - see CSCI 453.}.

CSCI 654. Operations Research. 3 Credits.
Deterministic and probabilistic models of operations research: networks and project management, dynamic programming, non-linear programming, inventory, queuing, reliability, stochastic processes, and simulation. Prereq: CSCI 653. {Also offered for undergraduate credit - see CSCI 454.}.

CSCI 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.
Fundamental concepts and technologies of mobile and wireless networks. Topics include wireless transmission characteristics, mobility management, wireless local area networks, ad hoc and sensor networks, and cellular networks. {Also offered for undergraduate credit - see CSCI 462.}.

CSCI 667. Algorithm Analysis. 3 Credits.
Design, correctness, and analysis of algorithms and data structures. {Also offered for undergraduate credit - see CSCI 467.}.

CSCI 669. Network Security. 3 Credits.
Cryptography and its application to network and operating system security; authentication; email, web, IP, and wireless security; firewalls and intrusion detection techniques; security threats and countermeasures; legal and ethical issues. Prereq: CSCI 659, C/C++ or JAVA. {Also offered for undergraduate credit - see CSCI 469.}.

CSCI 675. Operating Systems Design. 3 Credits.
Advanced operating systems topics such as protection, errors, and distributed systems. Case studies of representative operating systems. Students work in small teams to implement their own basic operating systems. {Also offered for undergraduate credit - see CSCI 475.}.

CSCI 676. Computer Forensics. 3 Credits.
This course introduces principles, techniques, tools, and practical skills necessary to perform rudimentary investigations of incidents in which computers play a significant or interesting role. {Also offered for undergraduate credit - see CSCI 476.}.

CSCI 677. Object-Oriented Systems. 3 Credits.
Introduction to the concepts and advantages of object-oriented computer systems. Introduces exercises with at least one such language. {Also offered for undergraduate credit - see CSCI 477.}.

CSCI 679. Introduction to Data Mining. 3 Credits.
Introduction to data mining includes basic data mining techniques, querying, spreadsheet data mining, data warehouses, evaluation techniques, knowledge discovery in databases, examples and a survey of advanced techniques. Prereq: Basic database course (e.g. CSCI 668 or CSCI 765). {Also offered for undergraduate credit - see CSCI 479.}.

CSCI 685. Autonomous Command and Artificial Intelligence for Robots and Other Cyber-Physical Systems. 3 Credits.
This course will cover the command and control of multi-robot systems. This will include the process of onboard decision making, considering both planning-based and real time decisions. Artificial intelligence techniques for robotic systems will be covered as will the application of similar techniques to non-robot cyber-physical systems. {Also available for undergraduate credit - See CSCI 485.}.

CSCI 688. Human-Computer Interaction. 3 Credits.
Survey of the methodologies and alternatives used in developing and evaluating human-computer interfaces. {Also offered for undergraduate credit - see CSCI 488.}.

CSCI 689. Social Implications of Computers. 3 Credits.
Capstone course for Computer Science. Presentation and discussion of several ethical and social issues that have arisen from the introduction of the computer including copy-protected software and liability for computer software errors. {Also offered for undergraduate credit - see CSCI 489.}.

CSCI 690. Graduate Seminar. 1-3 Credits.

CSCI 695. Field Experience. 1-15 Credits.

CSCI 696. Special Topics. 1-5 Credits.

CSCI 713. Software Development Processes. 3 Credits.
This course is designed as a breadth course on the software engineering process. Basic concepts are reviewed and reassured to create a basis for higher concepts and techniques.

CSCI 714. Software Project Planning and Estimation. 3 Credits.
This course is designed to introduce the student to concepts and techniques of how to plan for a software project. This includes time and effort estimation, planning and teaming the project, and managing the development activities. Prereq: CSCI 713.

CSCI 715. Software Requirements Definition and Analysis. 3 Credits.
This course is designed to make the student able to identify and capture requirements for a software system and be able to document and assess the requirements. Prereq: CSCI 713.

CSCI 716. Software Design. 3 Credits.
This course covers both architectural design and module design. Students receive practice using a set of patterns to produce software designs with several different types of architecture. Substantial presentation and practice with the UML modeling language is provided. Prereq: CSCI 713.

CSCI 717. Software Construction. 3 Credits.
This course covers the fundamentals of software construction including programming and evaluation of the source code. Students receive a good grounding in and extensive practice with the comprehensive libraries associated with a modern programming language. Prereq: CSCI 713.

CSCI 718. Software Testing and Debugging. 3 Credits.
This course covers the goals, practices, evaluation and limitations of software testing and software debugging. Students receive practice in developing and using test plans and various testing and debugging techniques. Prereq: CSCI 713.

CSCI 724. Survey of Artificial Intelligence. 3 Credits.
Survey of major areas of AI including theorem proving, heuristic search, problem solving, computer analysis of scenes, robotics, natural language understanding, and knowledge-based systems.

CSCI 728. Computer Graphics. 3 Credits.
Principles and algorithms used in computer graphics packages. Emphasis on raster graphics, clipping, hidden-surface elimination, ray-tracing, radiosity.

CSCI 732. Introduction To Bioinformatics. 3 Credits.
An introduction to the principles of bioinformatics including information relating to the determination of DNA sequencing. Prereq: STAT 661. Cross-listed with MATH 732 and STAT 732.

CSCI 736. Advanced Intelligent Systems. 3 Credits.
This course acquaints students with intelligent systems to provide them with working knowledge for building these systems. The course describes expert systems, fuzzy logic, neural networks, evolutionary computation, swarm intelligence, and multi-agent systems.

CSCI 741. Algorithm Analysis. 3 Credits.
Algorithm design and analysis, asymptotic analysis, worst and average case, recurrences, generating functions, divide-and-conquer, the greedy method, search and traversal, backtracking, branch-and-bound.

CSCI 760. Dynamic Programming. 3 Credits.
Dynamic programming as an algorithm design method, formulating and solving problems using dynamic programming, deterministic and stochastic problems in OR and CS.

CSCI 765. Introduction To Database Systems. 3 Credits.
Basic database concepts, models, management facilities, data structures, storage structures, data definition languages, data manipulation languages, normalization, operator implementation algorithms, transactions, correctness, reliability, distribution, performance analysis.

CSCI 771. Software Development Project I. 3 Credits.
The first half of a two semester software development project done as the capstone activity of the Master of Software Engineering program. Student does a one page project proposal, a requirements specification document, and a design specification document. Prereq: CSCI 713, CSCI 715, CSCI 716, and CSCI 718.

CSCI 772. Software Development Project II. 3 Credits.
The second half of a two semester software development project required as the capstone activity of the Master of Software Engineering program. Student submits a test plan, complete testing results, the project source code, and a user manual. Prereq: CSCI 771.

CSCI 773. Foundations of the Digital Enterprise. 3 Credits.
This course covers current and emerging digital technologies, including web development, security, server management, and privacy.

CSCI 774. Topics of theDigital Enterprise. 3 Credits.
Topics in database, networks, cryptology, security, and software engineering as they apply to the digital enterprise. Recommended: CSCI 783.

CSCI 778. Computer Networks. 3 Credits.
Examination of computer networks using the ISO-OSI model as a framework. Practical and theoretical issues are explored in modems, codes, error, impairments, modulation, protocols, and interfaces.

CSCI 783. Topics In Software Systems. 3 Credits.
Includes an area of computer science not otherwise treated in computer science courses. Varies each time offered. May be repeated.

CSCI 787. Topics in Operations Research. 3 Credits.
Includes an area of operational research not considered in other courses. Varies each time offered. May be repeated.

CSCI 790. Graduate Seminar. 1-3 Credits.

CSCI 791. Temporary/Trial Topics. 1-5 Credits.

CSCI 793. Individual Study/Tutorial. 1-5 Credits.

CSCI 795. Field Experience. 1-15 Credits.

CSCI 796. Special Topics. 1-5 Credits.

CSCI 797. Master's Paper. 1-3 Credits.

CSCI 798. Master's Thesis. 1-10 Credits.

CSCI 834. Knowledge Based Systems. 3 Credits.
Examination of types of knowledge-based systems, their powers and limitations. Students create their own knowledge-based system. Prereq: CSCI 724.

CSCI 835. Neural Networks. 3 Credits.
Introduction to the parallel processing paradigms that have been developed recently including neuronetworks and genetic algorithms. Students will work on projects using these tools. Prereq: CSCI 724. Cross-listed with PSYC 774 and IME 774.

CSCI 842. Algorithms and Complexity. 3 Credits.
Linear and nonlinear recurrences, algebraic problems, fast Fourier transforms, lower bound theory, computational geometry, the classes P and NP-completeness, Cook's theorem, NP-hard problems. Prereq: CSCI 741.

CSCI 845. Formal Methods for Software Development. 3 Credits.
The course is a high level course with the aim of formal representation to be able to formally assess characteristics of software. The formal representations are based on the theoretical foundations of computer sciences such as set theory, logic or graph theory. Prereq: CSCI 713.

CSCI 846. Development of Distributed Systems. 3 Credits.
This course is an advanced course in software engineering aiming at strategies and solutions of distributed systems. It assumes the knowledge of software engineering and particularly design and implementation of software systems, then builds on these concepts to how distributed systems are designed and implemented. Prereq: CSCI 713.

CSCI 847. Software Complexity Metrics. 3 Credits.
This course covers complexity metrics for the entire software lifecycle. Students gain experience in using requirements metrics, design metrics, program metrics, test metrics, and planning metrics. The effectiveness and limitations of metrics in all these areas are emphasized. Prereq: CSCI 718.

CSCI 848. Empirical Methods in Software Engineering. 3 Credits.
This course will cover the basics of Empirical Software Engineering. It will focus on the need for collecting metrics and building models as well as the concepts involved in design experiments. Prereq: CSCI 713.

CSCI 858. Bioinformatics Data Mining. 3 Credits.
Techniques and objectives of data mining for biological data with focus on diverse data sources including graphs, sequences and text. Preparation for research in bioinformatics with focus on functional genomics problems. Prereq: CSCI 732.

CSCI 859. Computational Methods in Bioinformatics. 3 Credits.
An introduction to computer science and operations research methods and algorithms that are used for analysis and solution of optimization and other models in bioinformatics.

CSCI 862. Network Flows. 3 Credits.
Theory and algorithms for network flow optimization including network representation data structures, basic change methods, maximum flow, shortest path, minimum cost problems, and generalized networks. Prereq: CSCI 653.

CSCI 866. Database System Internals. 3 Credits.
Transaction management, processing; correctness; recoverability; serializability (conflict and view); concurrency control (2PL, BTO, SGT, multiversion); recovery; distributed systems (correctness, recovery, replication); query processing and optimization. Prereq: CSCI 765.

CSCI 879. Advanced Data Mining. 3 Credits.
Advanced data mining includes in-depth coverage of Association Rule Mining (ARM), Classification and Clustering. The course is designed for those interested in doing research in data mining. Prereq: CSCI 679.

CSCI 880. Methods of Optimization. 3 Credits.
Elements of convex analysis, constrained and unconstrained multi-dimensional linear and nonlinear optimization theory and algorithms, convergence properties and computational complexity. Prereq: CSCI 653. Cross-listed with MATH 880.

CSCI 885. Topics in Computer Architecture. 3 Credits.
Includes an area of computer architecture not considered in other courses. Varies each time offered. May be repeated.

CSCI 889. Topics in Theoretical Computer Science. 3 Credits.
Includes an area of theoretical computer science not considered in other courses. Varies each time offered. May be repeated.

CSCI 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, Construction Management or Construction Engineering major with at least sophomore standing.

CM&E 250. Construction Statics and Mechanics. 3 Credits.
This course provides an introduction to the principles of statics and strength of materials with a focus on the behavior of structural components and systems in the construction industry. Prereq: MATH 146 or higher, Construction Management major and at least sophomore standing.

CM&E 260. Soils and Foundations. 3 Credits.
This course provides a discussion of the aspects of engineering & physical properties of soils; stress; settlement; consolidation; slope stability; earth pressure; bearing capacity; drainage; pore pressure; and foundations. 2 lectures, 1 three-hour laboratory. Prereq: Construction Management majors only.

CM&E 291. Seminar. 1-3 Credits.

CM&E 292. Study Abroad. 1-15 Credits.

CM&E 294. Individual Study. 1-3 Credits.

CM&E 299. Special Topics. 1-5 Credits.

CM&E 301. Construction Technology and Equipment. 3 Credits.
This course provides a discussion of construction techniques; analysis of equipment costs; production; methods of equipment selection; earthwork; dewatering systems; and aggregate production. Prereq: CM&E 240, admission to the Construction Management or Construction Engineering program and junior or senior standing. S.

CM&E 305. Pre-Construction Management. 3 Credits.
Looks into the construction management process, giving insight to how the construction professional interacts with other industry professionals. Overview of estimating, scheduling, and administrative functions of a project and the collaborative efforts required. Prereq: Admission to the Construction Management or Construction Engineering program and at least junior standing.

CM&E 315. Specifications and Contracts. 3 Credits.
This course provides a discussion of various types of construction contracts; contract administration; specifications using CSI and AIA documents. 3 lectures. Prereq: Admission to Construction Management or Construction Engineering program and Junior standing. F.

CM&E 379. Study Tour Abroad. 1-6 Credits.

CM&E 380. Construction Estimating: Quantities and Costs. 3 Credits.
This course provides an introduction to the methods and techniques of conceptual and detailed construction estimating, including: quantity takeoffs; costs related to labor, materials, equipment, overhead and profit; and bidding strategies. Prereq: CM&E 200 and admission to the Construction Management or Construction Engineering program and at least junior standing.

CM&E 391. Seminar. 1-3 Credits.

CM&E 394. Individual Study. 1-3 Credits.

CM&E 397. Fe/Coop Ed/Internship. 1-4 Credits.

CM&E 399. Special Topics. 1-5 Credits.

CM&E 403. Scheduling and Project Control. 3 Credits.
This course provides a discussion on the theories, principles, and techniques of construction planning and scheduling with an emphasis on time management, costs, and resources through the preparation and analysis of network schedules. Co-req or Prereq: CM&E 380. Prereq: Admission to the Construction Management or Construction Engineering program and at least junior standing. {Also offered for graduate credit - see CM&E 603}.

CM&E 405. Construction Support Operations. 3 Credits.
This course provides an introduction to construction safety, construction quality control management, and labor productivity. Prereq: STAT 330. {Also offered for graduate credit - see CM&E 605.}.

CM&E 421. Electrical and Mechanical Construction. 3 Credits.
This course provides an introduction to electrical and mechanical systems, the design and construction procedures used, code-based requirements, interaction with general construction and structural components, and spatial requirements. Prereq: PHYS 211 or PHYS 251 or PHYS 252 and admission to the Construction Management program and at least senior standing. S.

CM&E 430. Land Development. 3 Credits.
This course provides an introduction to the practical applications of the planning, design, and construction phases of the land development process. Prereq: CM&E 204, CM&E 212 and admission to the Construction Management program and at least senior standing. F {Also offered for graduate credit - see CM&E 630.}.

CM&E 450. Steel Design and Construction. 3 Credits.
This course provides a discussion of the selection and design of structural steel systems and methods of construction assembly. 3 lectures. Prereq: CM&E 250 and admission to the Construction Management program and senior standing. F.

CM&E 453. Concrete Design and Construction. 3 Credits.
This course provides an introduction to the fundamental concepts of concrete construction from both design and construction perspectives. 2 one-hour lectures, 1 three-hour laboratory. Prereq: CM&E 250 and CM&E 260 and admission to the Construction Management program and senior standing. S.

CM&E 460. Infrastructure Management. 3 Credits.
This course provides an introduction to the methodologies, tools, and techniques of infrastructure management. Course topics focus on performance measures; deterioration modeling; life-cycle costs; optimization; budgeting; financial management; and policy analysis. Prereq: Junior standing. {Also offered for graduate credit - see CM&E 660.}.

CM&E 465. Bridge Engineering and Management. 3 Credits.
This course provides an introduction to the planning, design, construction, and management concepts of structural steel and reinforced concrete bridges, Including: application of AASHTO LRFD specifications and latest developments in bridge management systems. Prereq: Admission to the Construction Management or Construction Engineering program and senior standing. {Also offered for graduate credit - see CM&E 665.}.

CM&E 475. Design of Site Erosion Control. 3 Credits.
This course provides an introduction to construction site erosion mechanisms; site hydrology and sediment transport; the selection, design, and maintenance of erosion control devices; and erosion control standards and regulations. Prereq: CE 309.

CM&E 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.

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. Students are required to take the Associate Constructor (AC) Exam to demonstrate their knowledge in construction management area.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. Students are required to take the Fundamentals of Engineering (FE) Exam to demonstrate their knowledge in the construction engineering area. Prereq: CM&E 380, CM&E 403 and senior standing in Construction Engineering.

CM&E 491. Seminar. 1-5 Credits.

CM&E 492. Study Abroad. 1-15 Credits.

CM&E 494. Individual Study. 1-5 Credits.

CM&E 496. Field Experience. 1-15 Credits.

CM&E 499. Special Topics. 1-5 Credits.

CM&E 603. Scheduling and Project Control. 3 Credits.
This course provides a discussion on the theories, principles, and techniques of construction planning and scheduling with an emphasis on time management, costs, and resources through the preparation and analysis of network schedules. F {Also offered for undergraduate credit - see CM&E 403.}.

CM&E 605. Construction Support Operations. 3 Credits.
This course provides an introduction to construction safety, construction quality control management, and labor productivity. {Also offered for undergraduate credit - see CM&E 405.}.

CM&E 630. Land Development. 3 Credits.
This course provides an introduction to the practical applications of the planning, design, and construction phases of the land development process. F {Also offered for undergraduate credit - see CM&E 430.}.

CM&E 660. Infrastructure Management. 3 Credits.
This course provides an introduction to the methodologies, tools, and techniques of infrastructure management. Course topics focus on performance measures; deterioration modeling; life-cycle costs; optimization; budgeting; financial management; and policy analysis. Prereq: Junior standing.{Also offered for undergraduate credit - see CM&E 460.}.

CM&E 665. Bridge Engineering and Management. 3 Credits.
This course provides an introduction to the planning, design, construction, and management concepts of structural steel and reinforced concrete bridges, Including: application of AASHTO LRFD specifications and latest developments in bridge management systems. Prereq: Senior standing. {Also offered for undergraduate credit - see CM&E 465.}.

CM&E 687. Building Automation and Control Systems. 3 Credits.
This course is about automation and direct digital control for programmable control of commercial building HVAC systems, including control technology; measuring technology; actuators; control valves and dampers; control of HVAC plants; data communication. {Also offered for undergraduate credit - see CM&E 487.}.

CM&E 696. Special Topics. 1-5 Credits.

CM&E 701. Construction Technology and Equipment. 3 Credits.
This course provides an overview of advanced construction technology and equipment. It covers site improvement, industrial plants, pavements, tunnels, buildings, construction innovation, sustainability, equipment selection and optimization, replacement analysis, and mathematical modeling in construction.

CM&E 703. Advanced Project Planning and Control. 3 Credits.
This course provides a discussion on advanced and emerging theories, principles, tools and techniques of planning, monitoring, and control problems and uncertainties arising in construction projects. Prereq: CM&E 603 or equivalent.

CM&E 711. Construction Cost Estimating. 3 Credits.
This course provides an advanced discussion of quantity takeoffs; labor, materials, equipment, and overhead costs; profit; and bidding strategies for construction projects. F.

CM&E 712. Construction Management. 3 Credits.
This course provides advanced topics on responsibilities and issues that construction professionals typically encounter as they administer a construction project. F.

CM&E 715. Construction Specifications and Contracts. 3 Credits.
This course provides a discussion of the procedures used to prepare and administer construction specifications and contracts, including: Construction Specification Institute format, AIA Documents, General Conditions, and liabilities and incentives for various construction contracts.

CM&E 725. Decision Making and Risk Analysis. 3 Credits.
Decision-making and decision theory. Decision support systems, applied risk identification, and analysis in construction activities. Computer applications. Prereq: CM&E 403. 3 lectures. S.

CM&E 740. Financial and Economic Concepts for Construction Managers. 3 Credits.
This course provides an advanced discussion of financial management and the economic appraisal of construction projects, including: accounting systems, financial documents, managing costs and cash flow, setting profit margins for bidding, time value of money, and economic evaluation of projects.

CM&E 770. Construction Organization Processes. 3 Credits.
The course provides an overview of cirtical management skills and the analysis of organizational management systems. Theories of motivation, planning, leadership, organizational interactions, etc. as they relate to construction operations.

CM&E 785. Advanced Project Engineering and Management. 3 Credits.
This course provides a discussion of advanced topics in construction project engineering and management. Topics include: Geographic Information Systems (GIS) applications in construction, front end planning, and forensic engineering.

CM&E 790. Graduate Seminar. 1-5 Credits.

CM&E 793. Individual Study/Tutorial. 1-5 Credits.

CM&E 795. Field Experience. 1-15 Credits.

CM&E 797. Master's Paper. 1-3 Credits.

CM&E 798. Master's Thesis. 1-10 Credits.

Counselor Education (CNED)

CNED 710. Counseling Techniques. 3 Credits.
Basic principles and techniques in the counseling process. Emphasis given to counseling techniques from several counseling orientations.

CNED 711. Counseling Theory. 3 Credits.
Study of various theories and philosophies of counseling and therapy.

CNED 712. Dynamics Of Self. 3 Credits.
Application of personality theory and the life stages to human behavior and the counseling process.

CNED 713. Assessment Techniques. 3 Credits.
Techniques and procedures of studying the individual and diagnostic process in identifying client issues. Prereq: CNED 710 and CNED 711 or instructor approval.

CNED 714. Career Counseling and Testing. 3 Credits.
Study of theories of career development and the use of career information and testing in career counseling. Prereq: Admission to program or instructor approval.

CNED 715. Professional Orientation and Ethics. 3 Credits.
Introduction to dealing with professional and ethical responsibilities and multicultural issues in the counseling field. Prereq: Admission to CNED program.

CNED 716. Social and Cultural Foundtions of Counseling. 3 Credits.
Issues and trends in counseling with multicultural and diverse populations within our society. Prereq: CNED 710, CNED 711.

CNED 720. Group Counseling. 3 Credits.
Study of group counseling principles appropriate to various counseling settings including schools, treatment centers, and agencies. Includes a group experience. Prereq: Admission to Counselor Education program.

CNED 723. Psychopathology and Diagnosis for Counselors. 3 Credits.
Psychopathology, abnormal psychology and the diagnosis of mental and emotional disorders will be studied. The diagnostic process and nomenclature, treatment, referral and prevention of mental and emotional disorders across the lifespan will be examined. Prereq: Admission to program or instructor approval.

CNED 728. Guidance Administration and Consulting. 3 Credits.
Role of administrators, counseling personnel, and teachers in the management of and consulting in K-12 counseling programs. Prereq: Admission to program or instructor approval.

CNED 729. Professional K-12 School Counseling. 3 Credits.
Overview of principles and functions of a K-12 school counseling program, and examination of K-12 school counseling issues and resources. Prereq: CNED 728.

CNED 730. Crisis and Trauma in Counseling Practice. 3 Credits.
Students study various forms of trauma, personal violence, crisis, and disasters Appropriate counseling strategies and interventions are emphasized. Prereq: CNED 710, CNED 711.

CNED 731. Counseling Children and Adolescents. 3 Credits.
Counseling with children and adolescents including specific counseling strategies; mental, physical, and emotional development issues related to counseling. Prereq: CNED 710, CNED 711.

CNED 732. Family Counseling. 3 Credits.
Principles and techniques of family counseling, study of family dynamics, family systems, and theories of family counseling. Prereq: CNED 710, CNED 711.

CNED 734. Dynamics of Addiction. 3 Credits.
Study of the theories and scope of addiction from both the personal and social viewpoints with consideration given to the impact on the family. Prereq: CNED 710, CNED 711.

CNED 735. Clinical Mental Health Counseling. 3 Credits.
Professional knowledge, skills, and practices necessary to address a wide variety of circumstances within the clinical mental health counseling context including prevention and basic intervention skills and professional advocacy.

CNED 790. Graduate Seminar. 1-3 Credits.

CNED 791. Temporary/Trial Topics. 1-5 Credits.

CNED 793. Individual Study/Tutorial. 1-5 Credits.

CNED 794. Practicum/Internship. 1-8 Credits.

CNED 795. Field Experience. 1-15 Credits.

CNED 796. Special Topics. 1-5 Credits.

CNED 797. Master's Paper. 1-3 Credits.

CNED 798. Master's Thesis. 1-10 Credits.

CNED 863. Advanced Clinical Assessment, Report Writing, & Treatment Planning. 3 Credits.
Advanced assessment procedures and abnormal psychology in clinical mental health settings are examined. Emphasis is on administering and interpreting assessments and integrating results into individualized reports including diagnoses, interventions, and treatment with measurable counseling outcomes. Prereq: CNED 713 and admission to the CNED doctoral or master's program.

CNED 867. Advanced Group Counseling. 3 Credits.
Theory and practice of group facilitation will be covered, building on the student's current expertise. Supervised practice in group work is included. Prereq: Admission to doctoral program or permission from instructor.

CNED 869. Instructional Theory and Practice in Counselor Education and Supervision. 3 Credits.
This course addresses theories pertaining to the practices of teaching and learning within the context of professional counseling. Students explore instructional models, educational techniques, and facilitate supervised learning experiences for master's level classes. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 870. Counselor Supervision. 3 Credits.
Theory and practice of counselor supervision. Major schools of thought in counselor supervision will be examined, as well as the process of supervision and relationship between supervisor and supervisee. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 871. Advanced Multicultural Practice in Counselor Education and Supervision. 3 Credits.
This course is designed for students to engage in the advanced study and practice of counseling with diverse populations A major focus is advocacy for minority, non-dominant and oppressed populations. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 872. Advanced Counseling Theories. 3 Credits.
This course is designed for students to engage in the advanced study and practice of theory. Application of theory and models for case conceptualization and treatment of crisis and trauma are emphasized. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 876. Qualitative Research and Program Evaluation. 3 Credits.
Major approaches for qualitative research in counselor education are examined. Theory and practice issues are included, as well as processes for data analysis. Models and methods of program evaluation are included. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 879. Quantitative and Survey Research. 3 Credits.
In-depth analysis of theory, method and technique for conceptualizing and conducting quantitative research in counseling and counselor education will be examined. Survey design and methodology will be included. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 880. Ethical and Legal Issues in Counselor Education and Supervision. 3 Credits.
This course is designed for students to engage in the advanced study of ethical and legal issues in counseling and in the practice of counselor education and supervision. Equivalent to EDUC 757. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 887. Professional Issues: Professional Development, Consultation and Publishing. 3 Credits.
A seminar that addresses the following: needs of practitioners for professional development, both as consumers and providers; theory and practice of consultation; and, the process of developing, writing and submitting manuscripts for publication. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 890. Graduate Seminar. 1-5 Credits.

CNED 893. Individual Study/Tutorial. 1-5 Credits.

CNED 894. Practicum/Internship. 1-8 Credits.

CNED 899. Doctoral Dissertation. 1-15 Credits.

Criminal Justice (CJ)

CJ 201. Introduction to Criminal Justice. 3 Credits.
Examination of the criminal justice system and process. Includes crime, lawmaking, criminality, prosecution, police, courts, and corrections.

CJ 210. Introduction to Policing. 3 Credits.
This course provides an overview of the purpose and function of the police in the United States.

CJ 230. Criminology. 3 Credits.
Study of criminal behavior and the measurement of crime and victimization. Major theories of crime causation and specific types of crime will be examined.

CJ 270. Introduction to Corrections. 3 Credits.
This course provides an overview of the correctional system, including prisons and community sanctions, in the United States.

CJ 291. Seminar. 1-5 Credits.

CJ 299. Special Topics. 1-5 Credits.

CJ 310. Women and Policing. 3 Credits.
This course provides an overview of women working as police officers in the United States. The course will provide the history, changing role, integration, and future of female police officers into this male dominated profession.

CJ 315. Federal Law Enforcement and Crime Policy. 3 Credits.
Examination of the history, development, current make-up, and jurisdiction of federal law enforcement in the United States, as well as the role of the federal government in setting national crime policy and the strategies employed.

CJ 325. Applied Research Methods. 4 Credits.
This course provides an overview of the scientific model, the philosophy and goals of science, and a detailed study of qualitative and quantitative methodologies. Lecture, laboratory. Co-req or Prereq: STAT 330. Cross-listed with COMM 325 and POLS 325.

CJ 330. Criminal Law and Procedure. 3 Credits.
Examination of criminal law and procedure including search and seizure laws, rights of defendants and victims, and due process in criminal law. Prereq: admission to the professional program in Criminal Justice.

CJ 354. Media, Crime and Justice in America. 2 Credits.
An overview of how mass media presents crime, criminals, and the American criminal justice system. Examines current research using a social constructionist theoretical perspective to better understand the implications of the media's presentation of crime in America.

CJ 379. Study Tour Abroad. 1-6 Credits.

CJ 391. Seminar. 1-5 Credits.

CJ 394. Individual Study. 1-5 Credits.

CJ 399. Special Topics. 1-5 Credits.

CJ 406. Crime and Delinquency. 3 Credits.
Study of the nature and extent of juvenile delinquency. Analysis of causes of juvenile offending and an exploration of policies to combat delinquency. Prereq: Admission to the Criminal Justice professional program. Prereq or Co-req: CJ/POLS 325. {Also offered for graduate credit - see CJ 606.}.

CJ 407. Deviant Behavior. 3 Credits.
Analysis of the precursors, the processes, and the consequences of deviance in Western society. Prereq: SOC 110 or PSYC 111. Cross-listed with SOC 407. {Also offered for graduate credit - see CJ 607.}.

CJ 410. Police & Society. 3 Credits.
This course offers a theoretically-grounded and advanced examination of the role of police in society, with a focus on police effectiveness and accountability. Prereq: CJ 210 and admission to the CJ major or minor. Co-req: CJ 325 or POLS 325.

CJ 460. Criminal Court System. 3 Credits.
Analysis of the structure and function of the criminal court system in the United States, including the prosecutor, defense counsel, judge, and jury. Issues confronting the system are considered from historical, philosophical, and sociological perspectives. Prereq: CJ 325 or POLS 325 and admission to the Criminal Justice professional program. {Also offered for graduate credit - see CJ 660.}.

CJ 461. Corrections. 3 Credits.
Analysis of institutional and community-centered corrections. Emphasis on historical, contemporary, and developing trends regarding structures, program content, and problems. Prereq: CJ 325 or POLS 325 and admission to the Criminal Justice professional program. {Also offered for graduate credit - see CJ 661.}.

CJ 465. Women and Minorities in Criminal Justice. 3 Credits.
Analysis of roles and contributions of women and minorities in criminal justice system as offenders, victims and practitioners. Examines effect of court decisions, rule-making and contemporary criminal justice practices on women and ethnic minorities. Prereq: CJ 325 or POLS 325 and admission to the Criminal Justice professional program. {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. Women and Minorities in Criminal Justice. 3 Credits.
Analysis of roles and contributions of women and minorities in criminal justice system as offenders, victims, and practitioners. Examines effect of court decisions, rule-making and contemporary criminal justice practices on women and ethnic minorities. Restricted to accelerated master's students only {Also offered for undergraduate credit - See CJ 465.}.

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.

CJ 733. Issues in Institutional Corrections. 3 Credits.
Course examining the various issues in adult prisons and jails in the United States. Topics include male and female inmates' life in prison, violence, prisoners' rights, management and staff issues, and differences between prisons and jails.

CJ 734. Advanced Criminal Justice Methods. 3 Credits.
Provides an examination of the research process. Explores how criminologists conduct research, pitfalls of research and importance of discovery and application. Prereq: Undergraduate methods course in the social or behavioral sciences and a statistics course.

CJ 750. Violence. 3 Credits.
Examination of various aspects of criminal violence, including various social settings (e.g., community, domestic, and school) with attention to the causes, consequences, moderating factors and proposed solutions associated with violent criminal behavior. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 752. Crime and the Life Course. 3 Credits.
The life course will be examined as a theoretical orientation, a research methodology, and as an empirical field of study with special reference to crime and deviance. Key conceptual and research issues will be analyzed and discussed.

CJ 754. Police and Society. 3 Credits.
This course provides graduate students with an overview of US law enforcement. Topics covered include officer use of discretion, officer behavior, organizational function, and delivery of police services and will be examined from an advanced research orientation.

CJ 755. Administrative Policing. 3 Credits.
Organizational theory, leadership, communication, labor relations, and crisis management in police administration. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 759. Advanced Research Design in Criminal Justice. 3 Credits.
This course provides an overview of research design used in criminal justice and criminological research. Students will learn how to critique research designs that are most commonly used in criminal justice research. Prereq: CJ 734.

CJ 760. Police and Race Issues. 3 Credits.
Provides an in-depth, historical, and contemporary view of the police and race issues in the United States. Discussions on diversity, use of force, racial profiling, and citizen complaints.

CJ 761. Police Effectiveness. 3 Credits.
Examines effectiveness of police delivery services in the U.S. Examines theories and scrutinizes factors that are associated with police effectiveness.

CJ 762. Community Corrections. 3 Credits.
Evaluation of practices, issues, and trends in community corrections. Focus on probation, parole, halfway houses, and other community alternatives to incarceration. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 763. Correctional Rehabilitation. 3 Credits.
Examines issues related to the implementation and effectiveness of various correctional treatment approaches and programs. In-depth examination of the history, purpose and common targets of correctional treatment interventions. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 764. Punishment and Society. 3 Credits.
Examines the use of punishment in American society. This course is designed as a seminar to discuss past and current literature on the evolution of punishment, the purposes of punishment, and specific types of punishment.

CJ 765. Classics in Policing. 3 Credits.
This course will provide students with an overview of classic writings in policing which provide the foundation for contemporary policing research. Students will learn how policing research has advanced methodologically and theoretically since the first studies were conducted.

CJ 768. Gender and Justice. 3 Credits.
Examination of the role of gender in crime and the criminal justice system, including the changing roles of men and women in society, differential involvement in criminal behavior, and differential criminal justice response. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 793. Individual Study. 1-5 Credits.

CJ 794. Practicum/Internship. 1-8 Credits.

CJ 795. Field Experience. 1-15 Credits.

CJ 796. Special Topics. 1-5 Credits.

CJ 797. Master's Paper. 1-3 Credits.

CJ 798. Master's Thesis. 1-10 Credits.

CJ 893. Individual Study. 1-5 Credits.

CJ 899. Doctoral Dissertation. 1-15 Credits.

Economics (ECON)

ECON 105. Elements of Economics. 3 Credits.
Study of demand and supply, competitive and noncompetitive markets, concepts of national income, unemployment, inflation, money, and fiscal and monetary policies. This course cannot be substituted for ECON 201 and ECON 202.

ECON 189. Skills for Academic Success. 1 Credit.
This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

ECON 194. Individual Study. 1-3 Credits.

ECON 196. Field Experience. 1-15 Credits.

ECON 199. Special Topics. 1-5 Credits.

ECON 201. Principles of Microeconomics. 3 Credits.
Nature, method, and scope of economic analysis; economic scarcity, resources, specialization of labor; supply-demand analysis; production and cost analysis; product and resource market structures; distribution of income; international trade.

ECON 202. Principles of Macroeconomics. 3 Credits.
Aggregate income and employment analysis; business cycles, unemployment, inflation and economic growth; fiscal policy; money and monetary policy; the U.S. economy and the world economy.

ECON 291. Seminar. 1-3 Credits.

ECON 292. Study Abroad. 1-15 Credits.

ECON 294. Individual Study. 1-5 Credits.

ECON 299. Special Topics. 1-5 Credits.

ECON 324. Money and Banking. 3 Credits.
Institutional and theoretical framework of the financial structure including the banking system, Federal Reserve, money markets, and international monetary systems. Prereq: ECON 201, ECON 202.

ECON 341. Intermediate Microeconomics. 3 Credits.
Analysis of markets in terms of efficiency, resource use, and economic welfare. Prereq: ECON 201, ECON 202, MATH 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 379. Study Tour Abroad. 1-6 Credits.

ECON 391. Seminar. 1-3 Credits.

ECON 392. Study Abroad. 1-15 Credits.

ECON 394. Individual Study. 1-3 Credits.

ECON 399. Special Topics. 1-5 Credits.

ECON 410. Econometrics. 3 Credits.
Introduction to estimation, hypothesis-testing techniques and econometric applications in economics, with emphasis on ordinary least squares regression analysis. Use of econometric software reinforces econometric theory and methods through applications to economic data. Prereq: ECON 341, STAT 330. {Also offered for graduate credit - see ECON 610.}.

ECON 440. Game Theory and Strategy. 3 Credits.
This course is an introduction to the economic theory of games: a set of tools used to analyze the interactions among strategic decision-makers. 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 456. History of Economic Thought. 3 Credits.
Development of economic thought from the mercantilists to Keynesian economics. Prereq: ECON 341 or BUSN 487 and ECON 324 or ECON 343. {Also offered for graduate credit - see ECON 656.}.

ECON 461. Economic Development. 3 Credits.
Analysis of the main causes of economic development. Prereq: ECON 341 or BUSN 487. {Also offered for graduate credit - see ECON 661.}.

ECON 465. Labor Economics. 3 Credits.
Theoretical analysis and survey of empirical studies relating to labor markets, human capital formation, and nature and causes of unemployment. Prereq: ECON 341 or BUSN 487. {Also offered for graduate credit - see ECON 665.}.

ECON 470. Public Economics. 3 Credits.
The economics of the public sector, including: taxation, expenditure, public goods, externalities, and program evaluation. The course will be taught from both a traditional perspective and through the lens of political economics. Prereq: ECON 341 or BUSN 487. {Also offered for graduate credit - see ECON 670.}.

ECON 472. International Trade. 3 Credits.
Theories of international trade, payments, and foreign exchange markets. Prereq: ECON 341 or BUSN 487. {Also offered for graduate credit - see ECON 672.}.

ECON 476. Monetary Theory and Policy. 3 Credits.
Analysis of relationships among money, credit, employment, price stability, and national monetary policy. Prereq: ECON 324 or ECON 343. {Also offered for graduate credit - see ECON 676.}.

ECON 480. Industrial Organization. 3 Credits.
Structural analysis of American industry in terms of the markets for business enterprise. Analysis of antitrust policy and its application to large corporations. Prereq: ECON 341 or BUSN 487. {Also offered for graduate credit - see ECON 680.}.

ECON 481. Natural Resource Economics. 3 Credits.
Application of economic tools to evaluate natural resource policies. Concepts such as property rights, non-market goods, resource allocation over time, externalities, open access, and public goods are discussed in an intermediate micro-economics and calculus-based format. Prereq: ECON 201.

ECON 482. Environmental Economics. 3 Credits.
Application of economic tools to evaluate environmental policies. Topics include cost benefit analysis, regulatory versus market pollution control approaches, environmental damage assessment, and green accounting. Prereq: ECON 341 or ECON 481 or BUSN 487. {Also offered for graduate credit - see ECON 682.}.

ECON 491. Seminar. 1-5 Credits.

ECON 492. Study Abroad. 1-15 Credits.

ECON 494. Individual Study. 1-5 Credits.

ECON 496. Field Experience. 1-15 Credits.
Field-oriented supervised learning activities outside the college classroom that include a preplanned assessment of the experience, registration during the term the experience is conducted, and post evaluation with the instructor. Departmental approval.

ECON 499. Special Topics. 1-5 Credits.

ECON 610. Econometrics. 3 Credits.
Introduction to estimation, hypothesis-testing techniques and econometric applications in economics, with emphasis on ordinary least squares regression analysis. Use of econometric software reinforces econometric theory and methods through applications to economic data. {Also offered for undergraduate credit - see ECON 410.}.

ECON 640. Game Theory and Strategy. 3 Credits.
This course is an introduction to the economic theory of games: a set of tools used to analyze the interactions among strategic decision-makers. {Also offered for undergraduate credit - see ECON 440.}.

ECON 656. History of Economic Thought. 3 Credits.
Development of economic thought from the mercantilists to Keynesian economics. {Also offered for undergraduate credit - see ECON 456.}.

ECON 661. Economic Development. 3 Credits.
Analysis of the main causes of economic development. {Also offered for undergraduate credit - see ECON 461.}.

ECON 665. Labor Economics. 3 Credits.
Theoretical analysis and survey of empirical studies relating to labor markets, human capital formation, and nature and causes of unemployment. {Also offered for undergraduate credit - see ECON 465.}.

ECON 670. Public Economics. 3 Credits.
The economics of the public sector, including: taxation, expenditure, public goods, externalities, and program evaluation. The course will be taught from both a traditional perspective and through the lens of political economics. {Also offered for undergraduate credit - see ECON 470.}.

ECON 672. International Trade. 3 Credits.
Theories of international trade, payments, and foreign exchange markets. {Also offered for undergraduate credit - see ECON 472.}.

ECON 676. Monetary Theory and Policy. 3 Credits.
Analysis of relationships among money, credit, employment, price stability, and national monetary policy. {Also offered for undergraduate credit - see ECON 476.}.

ECON 680. Industrial Organization. 3 Credits.
Structural analysis of American industry in terms of the markets for business enterprise. Analysis of antitrust policy and its application to large corporations. {Also offered for undergraduate credit - see ECON 480.}.

ECON 681. Natural Resource Economics. 3 Credits.
Application of economic tools to evaluate natural resource policies. Concepts such as property rights, non-market goods, resource allocation over time, externalities, open access, and public goods are discussed in an intermediate micro-economics and calculus-based format.

ECON 682. Environmental Economics. 3 Credits.
Application of economic tools to evaluate environmental policies. Topics include cost benefit analysis, regulatory versus market pollution control approaches, environmental damage assessment, and green accounting. {Also offered for undergraduate credit - see ECON 482.}.

ECON 696. Special Topics. 1-5 Credits.

ECON 710. Advanced Econometrics. 3 Credits.
Advanced econometric methods applied to time series and panel data analysis, limited dependent variable models, maximum likelihood estimation, systems estimation, and discrete choice models. Prereq: ECON 610.

ECON 793. Individual Study/Tutorial. 1-5 Credits.

Education (EDUC)

EDUC 120. Peer Counseling. 1 Credit.
Designed to bring peer counseling theory and practice together in helping freshmen overcome the hurdles of the first year. May be repeated.

EDUC 121. Approaches to Critical Reading. 1 Credit.
A developmental reading program designed to help the student improve in reading efficiency.

EDUC 122. Interpersonal Relationships. 1 Credit.
Study of the development of interpersonal relationships with a focus on listening and sharing in an experiential manner.

EDUC 123. Study Skills. 1 Credit.
Assistance in the development of study skills necessary for academic achievement through learning and practice.

EDUC 124. Career Planning. 1 Credit.
Study of the world of work with attention to self-assessment, vocational choice, and career planning.

EDUC 125. Assertiveness Training. 1 Credit.
Behavioral approach to assertiveness combining a cognitive approach with role-play and discussion.

EDUC 126. The Art of Living. 1 Credit.
This course is designed to help students transition successfully into adulthood. The course focuses on helping students learn about themselves and the world around them, about how to adapt to the inevitable shortcomings and failures of life, and how to define and plan for a good and/or successful life.

EDUC 194. Individual Study. 1-5 Credits.

EDUC 196. Field Experience. 1-15 Credits.

EDUC 199. Special Topics. 1-5 Credits.

EDUC 291. Seminar. 1-3 Credits.

EDUC 292. Study Abroad. 1-15 Credits.

EDUC 294. Individual Study. 1-5 Credits.

EDUC 299. Special Topics. 1-5 Credits.

EDUC 300. Orientation to Elementary Teaching. 2 Credits.
Overview of elementary education with special emphasis on the role of music and physical education. Required for K-12 certification in music and physical education.

EDUC 321. Introduction to Teaching. 3 Credits.
Nature and aims of education at middle and high school levels; social, philosophical, historical, curricular, and political foundations in a changing multicultural society; analyze teaching as a career choice, initiate teacher education program exit portfolio.

EDUC 322. Educational Psychology. 3 Credits.
Strong emphasis on educational research; review of human development; emphasis on developmental domains and span of students from young child through high school learning theories, learning styles, and individual student differences including gender, exceptionalities, culture.

EDUC 379. Study Tour Abroad. 1-6 Credits.

EDUC 391. Seminar. 1-3 Credits.

EDUC 392. Study Abroad. 1-15 Credits.

EDUC 394. Individual Study. 1-5 Credits.

EDUC 399. Special Topics. 1-5 Credits.

EDUC 416. Teacher Education in International Comparative Perspective. 2 Credits.
Exploring teacher education in international contexts by comparing approaches to program development, examining curriculum characteristics, analyzing policies and investigating practices of teaching and learning in different countries. {Also available for graduate credit - see EDUC 616}.

EDUC 420. STEM Philosophy for Educators. 3 Credits.
This course focuses on what STEM education is, why it is effective, and how to relate STEM education to the core disciplines and beyond. {Also offered for graduate credit - see EDUC 620.}.

EDUC 421. STEM Curriculum for Educators. 3 Credits.
This course focuses integrated use of the Engineering Design Process in STEM education through trans-disciplinary unit implementation and assessment. {Also offered for graduate credit - see EDUC 621.}.

EDUC 422. STEM Methods for Educators. 2 Credits.
This course focuses on how to manage and assess 21st century learning in a STEM environment. Prereq: EDUC 420. Co-req: EDUC 496, STEM Field Experience (2 credits, 60 hours). {Also offered for graduate credit - see EDUC 622.}.

EDUC 423. STEM Strategies for Educators. 2 Credits.
This course focuses on STEM curriculum resources for development of trans-disciplinary STEM units of study in the K-12 classroom. Prereq: EDUC 420. {Also offered for graduate credit - see EDUC 623.}.

EDUC 451. Instructional Planning, Methods and Assessment. 3 Credits.
Planning for teaching, implementing strategies, and assessing student learning. Includes microteaching activities, instructional strategies for middle and high school classrooms, data driven decision-making, assessment design, classroom technology, and other resources for the 21st century classroom. Prereq: EDUC 321, EDUC 322, admission to School of Education.

EDUC 452. Assessment and Testing of Culturally Diverse Students. 2 Credits.
Theories and strategies for selecting and implementing a variety of assessments focused on the needs of English Language Learners. Practice in using assessment results to adjust classroom instruction accordingly. Prereq: Admission to School of Education. {Also offered for graduate credit - see EDUC 652.}.

EDUC 453. Foundations of Teaching English Language Learners. 1 Credit.
This course will explore ELL issues and trends and identify challenges ELLs face in school, outlining what educators need to know to address each learner's needs. Co-req: EDUC 481 and EDUC 496, ELL Field Experience (1 credit). {Also offered for graduate credit - see EDUC 653.}.

EDUC 454. Linguistics for Teachers of English Language Learners. 3 Credits.
This course explores language acquisition and how differences in the structure of languages affect English language learners. {Also offered for graduate credit - see EDUC 654.}.

EDUC 455. Socio-Psycho-Linguistics for Teachers of English Language Learners. 3 Credits.
This course will explore how language shapes culture and vice versa, considering how assumptions, prejudices and biases toward varying language affect the classroom and ELLs. Prereq: EDUC 454. {Also offered for graduate credit - see EDUC 655.}.

EDUC 461. Special Education: Exceptionalities and Education. 2 Credits.
This course will address the historical implications of the concept of disability and what it means within education. Applications and strategies for classroom teachers will be addressed. 10 hours of field experience is required. Prereq: EDUC 321 and EDUC 322 and admission to the School of Education.

EDUC 471. Middle School Philosophy & Curriculum. 2 Credits.
Educational foundations for middle schools, essential to meeting young adolescent needs and improving their learning. Identifies and expands central ideas in philosophy, historical background, curriculum, facilitating learning, organizational structures and practices, assessment, and planning. Prereq: EDUC 451. Admission to the School of Education is required. {Also offered for graduate credit - see EDUC 671.}.

EDUC 472. Middle Level Teaching Methods. 3 Credits.
Instruction and guidance in the design, implementation, and assessment of teaching strategies adapted to young adolescents. Prereq: EDUC 451. Admission to the School of Education is required. {Also offered for graduate credit - see EDUC 672.}.

EDUC 475. Reading in the Content Area. 2 Credits.
Introduction to the relevance and need for incorporating reading and developing reading skills in middle and high school classrooms.

EDUC 480. Stress Managment. 2 Credits.
The dynamics of stress, sources and symptoms of stress, and stress management techniques will be presented and practiced.

EDUC 481. Classroom Practice Methods of Teaching I:. 2-3 Credits.
Specialized methods and classroom practices appropriate to the specific subject area. May be repeated. Prereq: EDUC 321, EDUC 322, admission to School of Education.

EDUC 482. Classroom Practice/Methods of Teaching II:. 2-3 Credits.
Specialized methods and classroom practices appropriate to the specific subject area. May be repeated. Prereq: EDUC 321, EDUC 322, admission to School of Education, EDUC 481. {Also offered for graduate credit - see EDUC 682.}.

EDUC 483. Classroom Practice/Methods of Teaching III:. 2 Credits.
Specialized methods and classroom practices appropriate to the specific subject area. May be repeated. Prereq: EDUC 321, EDUC 322, admission to School of Education, EDUC 481, EDUC 482. {Also available for graduate credit - see EDUC 683P.}.

EDUC 485. Student Teaching Seminar. 1 Credit.
Orientation to student teaching. Analysis of professional issues and concerns associated with education. Prereq: EDUC 389, EDUC 451, EDUC 483, EDUC 486. Coreq: EDUC 487. {Also offered for graduate credit - see EDUC 685P.}.

EDUC 486. Classroom Management for Diverse Learners. 3 Credits.
Teacher candidates develop a plan to establish an effective management system encompassing the total classroom environment. Prereq: EDUC 321, EDUC 322, admission to School of Education. {Also offered for graduate credit - see EDUC 686.}.

EDUC 487. Student Teaching. 9 Credits.
Supervised teaching in an approved and accredited school. Includes an on-campus seminar. May be repeated. Prereq: EDUC 321, EDUC 322, EDUC 389, EDUC 451, EDUC 481, EDUC 482, EDUC 483, EDUC 486, admission to School of Education. Coreq: EDUC 485. {Also offered for graduate credit - see EDUC 687P.}.

EDUC 488. Applied Student Teaching. 3 Credits.
Guided student teaching experience including application of lesson planning, portfolio development, professional goal-setting, and supervised teaching in an approved and accredited school. Prereq: Admission to School of Education, completion of professional education sequence. Coreq: EDUC 485 or H&CE 483P, EDUC 487. Cross-listed with H&CE 488. {Also offered for graduate credit - see EDUC 688P.}.

EDUC 489. Teaching Students of Diverse Backgrounds. 3 Credits.
This class places emphasis on cultural diversity and teaching diverse students including Native Americans. Strategies for creating learning environments that contribute to positive human relationships, and strategies for teaching and assessing diverse learners are included. Prereq: EDUC 321, EDUC 322 and admission to the School of Education. {Also offered for graduate credit - see EDUC 689.}.

EDUC 491. Seminar. 1-5 Credits.

EDUC 492. Study Abroad. 1-15 Credits.

EDUC 494. Individual Study. 1-5 Credits.

EDUC 496. Field Experience. 1-15 Credits.

EDUC 499. Special Topics. 1-5 Credits.

EDUC 616. Teacher Education in International Comparative Perspective. 2 Credits.
Exploring teacher education in international contexts by comparing approaches to program development, examining curriculum characteristics, analyzing policies and investigating practices of teaching and learning in different countries. {Also available for undergraduate credit - see EDUC 416}.

EDUC 620. STEM Philosophy for Educators. 3 Credits.
This course focuses on what STEM education is, why it is effective, and how to relate STEM education to the core disciplines and beyond. {Also offered for undergraduate credit - see EDUC 420.}.

EDUC 621. STEM Curriculum for Educators. 3 Credits.
This course focuses integrated use of the Engineering Design Process in STEM education through trans-disciplinary unit implementation and assessment. {Also offered for undergraduate credit - see EDUC 421.}.

EDUC 622. STEM Methods for Educators. 2 Credits.
This course focuses on how to manage and assess 21st century learning in a STEM environment. Prereq: EDUC 620. Co-req: EDUC 695, STEM Field Experience (2 credits, 60 hours). {Also offered for undergraduate credit - see EDUC 422.}.

EDUC 623. STEM Strategies for Educators. 2 Credits.
This course focuses on STEM curriculum resources for development of trans-disciplinary STEM units of study in the K-12 classroom. Prereq: EDUC 620. {Also offered for undergraduate credit - see EDUC 423.}.

EDUC 651P. Instructional Planning, Methods and Assessment. 3 Credits.
Planning for teaching, implementing strategies, and assessing student learning. Includes microteaching activities, instructional strategies for middle and high school classrooms, data driven decision-making, assessment design, classroom technology, and other resources for the 21st century classroom.

EDUC 652. Assessment and Testing of Culturally Diverse Students. 2 Credits.
Theories and strategies for the assessment of second language competence. Practice in using the Wida Access Assessment in order to guide formal and informal classroom instruction along content assessment. Prereq: Admission to School of Education. {Also offered for undergraduate credit - see EDUC 452.}.

EDUC 653. Foundations of Teaching English Language Learners. 1 Credit.
This course will explore ELL issues and trends and identify challenges ELLs face in school, outlining what educators need to know to address each learner's needs. Co-req: EDUC 681 and EDUC 695, ELL Field Experience (1 credit). {Also offered for undergraduate credit - see EDUC 453.}.

EDUC 654. Linguistics for Teachers of English Language Learners. 3 Credits.
This course explores language acquisition and how differences in the structure of languages affect English language learners. {Also offered for undergraduate credit - see EDUC 454.}.

EDUC 655. Socio-Psycho-Linguistics for Teachers of English Language Learners. 3 Credits.
This course will explore how language shapes culture and vice versa, considering how assumptions, prejudices and biases toward varying language affect the classroom and ELLs. Prereq: EDUC 654. {Also offered for undergraduate credit - see EDUC 455.}.

EDUC 661. Special Education: Exceptionalities and Education. 2 Credits.
This course will address the historical implications of the concept of disability and what it means within education. Applications and strategies for classroom teachers will be addressed. 10 hours of field experience is required. Prereq: EDUC 321 and EDUC 322 and admission to the School of Education.

EDUC 671. Middle School Philosophy and Curriculum. 2 Credits.
Educational foundations for middle schools, essential to meeting young adolescent needs and improving their learning. Identifies and expands central ideas in philosophy, historical background, curriculum, facilitating learning, organizational structures and practices, assessment, and planning. {Also offered for undergraduate credit - see EDUC 471.}.

EDUC 672. Middle Level Teaching Methods. 3 Credits.
Instruction and guidance in the design, implementation, and assessment of teaching strategies adapted to young adolescents. {Also offered for undergraduate credit - see EDUC 472.}.

EDUC 681P. Classroom Practice/Methods of Teaching I. 2-3 Credits.
Specialized methods and classroom practices appropriate to the specific subject area.

EDUC 682. Classroom Practtice/Methods of Teaching II. 2-3 Credits.
Specialized methods and classroom practices appropriate to the specific subject area. {Also offered for undergraduate credit - see EDUC 482.}.

EDUC 683P. Classroom Practice/Methods of Teaching III. 2-3 Credits.
Specialized methods and classroom practices appropriate to the specific subject area. {Also offered for undergraduate credit - see EDUC 483.}.

EDUC 685P. Student Teaching Seminar. 1 Credit.
Orientation to student teaching. Analysis of professional issues and concerns associated with education. Prereq: EDUC 689P, EDUC 651P, EDUC 683P, EDUC 686P. Coreq: EDUC 687P. {Also offered for undergraduate credit - see EDUC 485.}.

EDUC 686. Classroom Management for Diverse Learners. 3 Credits.
Teacher candidates develop a plan to establish an effective management system encompassing the total classroom environment. {Also offered for undergraduate credit - see EDUC 486.}.

EDUC 687P. Student Teaching. 9 Credits.
Supervised teaching in an approved and accredited school. Includes an on-campus seminar. Prereq: EDUC 689P, EDUC 651P, EDUC 681P, EDUC 682P, EDUC 683P, EDUC 686P. Coreq: EDUC 685P. {Also offered for undergraduate credit - see EDUC 487.}.

EDUC 688P. Applied Student Teaching. 3 Credits.
Guided student teaching experience including application of lesson planning, portfolio development, professional goal-setting, and supervised teaching in an approved and accredited school. Coreq: EDUC 685P, EDUC 687P. Cross-listed with H&CE 688P. {Also offered for undergraduate credit - see EDUC 488.}.

EDUC 689. Teaching Students of Diverse Backgrounds. 3 Credits.
This class places emphasis on cultural diversity and teaching diverse students including Native Americans. Strategies for creating learning environments that contribute to positive human relationships, and strategies for teaching and assessing diverse learners are included. {Also offered for undergraduate credit - see EDUC 489.}.

EDUC 690. Graduate Seminar. 1-3 Credits.

EDUC 692. Study Abroad. 1-15 Credits.
Pre-arranged study at accredited foreign institutions or in approved study abroad programs.

EDUC 695. Field Experience. 1-15 Credits.

EDUC 696. Special Topics. 1-5 Credits.

EDUC 702. Statistics In Educational Research. 3 Credits.
Basic theory, techniques for using descriptive and inferential statistics, application of appropriate statistical procedures, analysis and interpretation of results, and practice in the reporting of the results in appropriate formats for scholarly papers and presentations.

EDUC 703. Research, Measurement and Program Evaluation. 3 Credits.
Methodology and design of research studies; organization, reporting analysis, and interpretation of research.

EDUC 710. Philosophy of Education. 2 Credits.
Major philosophical concepts and principles of education from Plato to the present.

EDUC 712. Social, Cultural and Political Dimensions of Schools. 4 Credits.
Social processes and interaction among diverse populations in educational settings. Relationship of schools to society.

EDUC 714. History of American Education. 2 Credits.
Historical and intellectual development of education in the United States from the colonial period to the present.

EDUC 715. The Superintendency. 2 Credits.
This course deals with examining the role and functions of the public school district administrator.

EDUC 718. Community Education. 2 Credits.
Study of the theory base on which community education is founded. Consideration is given to implementing the concept in the community with available resources.

EDUC 720. Supervision of Student Teachers. 2 Credits.
Planning and carrying out effective supervision techniques when supervising student teachers in respective subjects.

EDUC 722. Instructional Systems, Media, Materials. 2 Credits.
Preparation of instructional systems in support of a variety of teaching techniques and alternative media approaches.

EDUC 724. Advanced Educational Psychology. 3 Credits.
Principles of effective human learning. Discussion of learning theories, the teacher as a director of learning experiences, and factors influencing students representing a variety of cultures and abilities in the educational setting.

EDUC 728. Instructional Technology for Teaching and Learning. 3 Credits.
This course provides an advanced understanding of technology concepts and contemporary computer-based programs for the teaching and learning processes. Prereq: Admission to doctoral program.

EDUC 729. Multimodal Education Delivery Systems. 3 Credits.
Examines theoretical underpinnings, instructional design models, and programmatic approaches to effective planning, design, organization, evaluation and management in multimodal education delivery systems. Prereq: Admission to doctoral program.

EDUC 730. Leadersihp, Planning and Organizational Behavior. 3 Credits.
Introduction to models of educational leadership including organizational structure, theory, and leadership styles. Consideration of concepts, problems, and issues in administration.

EDUC 731. Educational Law and Organizational Structure of Schools. 3 Credits.
Examination of the legislative and judicial actions affecting the public schools. Consideration is given to contemporary legal issues for teachers, administrators, and boards.

EDUC 732. Curriculum, Instruction and Learning Theory. 4 Credits.
Investigation of curricular decision-making and program evaluation strategies as they affect the educational program. Problem-solving skills are presented through theory and simulation. Prereq: EDUC 730.

EDUC 733. Technology and Information Systems. 2 Credits.
Provides an understanding of selected computer applications for educational administrators at the building and district office levels.

EDUC 734. Personal Communication & Ethics. 3 Credits.
Prepares aspiring school leaders to plan for their personal and professional development and to understand and use the principles of communication, ethics, and values.

EDUC 735. Personnel, Supervision and Staff Development. 4 Credits.
Specific techniques and systems to supervise instruction. Review of interpersonal communication and group process skills as applied to administrative supervision. Prereq: EDUC 730.

EDUC 736. Policy and Educational Finance. 2 Credits.
Provides school leaders with an understanding of managing and allocating resources in a political climate in which policy decisions are based on historical resource allocations.

EDUC 737. Helping Relationship and the Elderly. 3 Credits.
The theoretical foundations and the techniques of the helping relationship between the helper and people of advanced age will be studied and applied.

EDUC 738. Administration of Elementary Schools. 2 Credits.
Common elements of leadership as they apply to the principalship. Consideration of practical applications in an elementary school setting. Prereq: EDUC 730.

EDUC 739. Administration of Secondary Schools. 2 Credits.
Common elements of leadership as they apply to the principalship. Consideration of practical applications in a secondary school setting. Prereq: EDUC 730.

EDUC 742. Elementary School Curriculum. 2 Credits.
History, development, evaluation, and revision of the curriculum. Review of recent research in elementary school curriculum.

EDUC 743. Secondary School Curriculum. 2 Credits.
Study of contemporary curriculum patterns with emphasis on curricular construction and evaluation.

EDUC 750. Reflective Practice and Research in Education. 3 Credits.
An examination of teaching and professional practice based on reflective practice. Analyze educational research as related to and informs practice.

EDUC 751. Students and Their Learning. 3 Credits.
Exploration of student differences and ways of adjusting teaching practice to meet individual needs and promote the equitable treatment of students. Application of learning theories to educate the whole child (cognitive, affective, social).

EDUC 752. Curriculum Design and Delivery. 3 Credits.
An inquiry-based course for the reflective practitioner to develop deep understandings of curriculum content emphasized by state and national standards documents and to acquire an effective repertoire of instructional skills.

EDUC 753. Managing/ and Monitoring Learning. 3 Credits.
This course is based on the concept that assessment drives instruction. A working definition of student learning will be defined. Multiple measures of assessment will be investigated and impacts in student learning will be explored.

EDUC 755. Exceptional Learners in the Secondary School Classroom. 3 Credits.
Legal and ethical requirements for educating exceptional learners; identification, referral, and placement procedures; development and use of the Individual Education Program; strategies for teaching and evaluating; managing academic and social behaviors of exceptional learners.

EDUC 769. Politics and Policy Analysis in Education. 2 Credits.
The purpose of this course is to examine political and policy development in American public education in order to understand current local, state, and national issues.

EDUC 775. Content Area Reading. 2 Credits.
Examination of content, instructional methodologies, and evaluation techniques for reading in content classes.

EDUC 777. Tort Liability. 2 Credits.
Examination of the legal liability of teachers, administrators, and public school boards for injurious intentional or unintentional acts. Prereq: EDUC 731.

EDUC 778. School Fund Management. 3 Credits.
Proper recording and reporting of financial accounts for elementary and secondary schools. Use of procedures and concepts for governmental fund accounting and financial management. Prereq: M.S. Educational Administration.

EDUC 781. Teaching and Curriculum. 3 Credits.
Overview of recent research on teaching, learning, and curriculum. Special attention given to contemporary theories on teaching models that enhance student understanding. May be repeated for credit.

EDUC 782. Supervisory and Administrative Theories. 4 Credits.
Study of management models and techniques, needs assessment, goal setting, planning and evaluation systems, and decision-making problems as they relate to the school improvement process. Prereq: EDUC 732.

EDUC 784. School Personnel Administration. 2 Credits.
Study of personnel administration in public school systems. Includes an examination of the purposes, policies, plans, procedures, and personnel administration. Prereq: EDUC 782.

EDUC 786. School Facility Planning. 2 Credits.
Overview of the principles in planning, construction, and maintenance of school buildings. Visits to educational facilities and the assessment of school buildings.

EDUC 787. Issues In Education. 2 Credits.
This course delves into the issues of why a person would pursue a doctoral degree in light of the current issues facing educators. Helps define a professional course of study available in respect to educational issues. Leads to studying creators and leaders in different realms by people who have special interest in creativity and ethical pursuits.

EDUC 788. School Finance and Business Management. 4 Credits.
Overview of school fund revenues and expenditures pertaining to local, state, and federal funding. Includes in-depth study of the practices of school business administration pertaining to all fund activities in instruction and ancillary operations.

EDUC 789. School Community Relations. 2 Credits.
Purposes, organization, agencies, and criteria of good school-community relationships; knowledge and techniques for effective public relations. Prereq: EDUC 739, M.S. in Educational Administration.

EDUC 790. Graduate Seminar. 1-5 Credits.

EDUC 791. Temporary/Trial Topics. 1-5 Credits.

EDUC 792. Graduate Teaching Experience. 1-6 Credits.
Graduate student teaching experiences for professional development. S/U grading.

EDUC 793. Individual Study/Tutorial. 1-5 Credits.

EDUC 794. Practicum/Internship. 1-8 Credits.

EDUC 795. Field Experience. 1-15 Credits.

EDUC 796. Special Topics. 1-5 Credits.

EDUC 797. Master's Paper. 1-3 Credits.

EDUC 798. Master's Thesis. 1-10 Credits.

EDUC 798S. Specialist Field Study. 1-3 Credits.

EDUC 801. Foundations of Doctoral Scholarship. 3 Credits.
The expectations and responsibilities of doctoral scholars in the field of Education are examined. Expectations for knowledge acquisition, disciplined inquiry, and scholarly disposition are presented. Collegiality, collaboration, and ethical standards are emphasized. Prereq: Admission to Ed.D. program.

EDUC 802. Foundations of Educational Research. 3 Credits.
Examines various and diverse philosophical/theoretical frameworks, methodologies, techniques and designs for educational research. Explores the nature of educational research and the underpinnings of positivism/post-postivism, interpretive/constructivist and orientational paradigms with emphasis on reflective planning of studies. Prereq: admission to Doctoral program.

EDUC 803. Philosophical Foundations of Education. 3 Credits.
Through the examination of historical contexts and differing philosophical traditions within the field of education, students will reflect on and shape an informed and critical philosophy for their own scholarship and educational praxis. Admission to the Educational Doctoral Program is required.

EDUC 806. International and Comparative Education. 3 Credits.
The aim of this course is to add an international lens to our understanding of learning and education. Emphasizes globalization, comparative methods, policy, education as development, and analyzing teaching and learning within different national contexts.

EDUC 807. Diversity and Educational Policy. 3 Credits.
This course explores diversity in educational settings and investigates the purpose and implementation of educational policies related to access and services for diverse populations historically, presently, and in preparation for potential future needs.

EDUC 808. Empowerment & Transformative Education. 3 Credits.
An examination of theory, research and practice in individual and group transformation, empowerment, and advocacy development within multicultural and diverse learning contexts.

EDUC 831. Institutional Quality Control. 3 Credits.
History and effecting of quality control will be briefly reviewed. Global, U.S. societal, state government, accreditation, and student accountability forces will be elucidated. Successful, failed, and future institutional responses to these forces will be discussed. Prereq: Admission to doctoral program.

EDUC 832. Assessment Techniques for Educational Institutions. 3 Credits.
This course addresses all aspects of educational assessments in order to select the assessment technique that meets specific accountability mandates in the field of education. Prereq: Admission to doctoral program.

EDUC 833. Strategic Planning for Institutional Improvement. 3 Credits.
The role of strategic planning in educational institutions and its relationship to institutional improvement and effectiveness will be explored. Approaches to implementation of strategic plans designed to address institutional goals will also be discussed.

EDUC 841. Organization and Administration of Higher Education. 3 Credits.
This course deals with the organization and administration of higher education and the current and evolving problems and possibilities for higher education. Prereq: Admission to doctoral program.

EDUC 842. Higher Education Student Affairs and Enrollment Management. 3 Credits.
The purpose of this course is to teach about the role of student affairs professionals in schools, colleges, and other educational organizations, including recruitment, selection, orientation, development, compensation, and evaluations. Prereq: Admission to doctoral program.

EDUC 843. Financing Higher Education. 3 Credits.
This course provides funding theories and procedures necessary to develop and maintain financing for higher education institutions. Prereq: Admission to doctoral program.

EDUC 844. Higher Education Law. 3 Credits.
To develop expertise in legal issues for students whose current positions or future career goals include administrative and management positions in higher education where they will work on legal issues with attorneys. Prereq: Admission to doctoral program.

EDUC 851. Adult Learning. 3 Credits.
Contextual influences and theoretical perspectives specific to adult learning. Theories of adult growth and development. Physical and cognitive changes throughout adulthood and other factors that have implications for the learning and teaching of adults.

EDUC 852. Foundations of Occupational & Adult Education. 3 Credits.
This course explores the nature, function, and scope of occupational and adult education. The course provides both knowledge of the history of occupational and adult education and an appreciation of historical and philosophical perspectives.

EDUC 853. Instructional Methods for Adult Learners. 3 Credits.
This course provides educators with ways to understand adult learning and to facilitate the teaching and learning transaction through an array of methods. Emphasis is on the relationship of current research to contemporary practice.

EDUC 861. Curriculum and Instruction Development. 3 Credits.
A five-phase model will be compared and contrasted to provide the skill and knowledge necessary to establish a systematic curriculum and instructional development. Prereq: Admission to doctoral program.

EDUC 862. Instructional Models. 3 Credits.
Investigation of current practices and trends in instructional models. Emphasis is on the relationship of current research to contemporary practice.

EDUC 863. Education and Training for Business and Industry. 3 Credits.
The purpose of this course is to teach the fundamentals necessary to educate and train people for the workforce according to evolving training needs of business, industry, military and government. Prereq: Admission to doctoral program.

EDUC 871. Planning and Conducting Needs Assessment. 3 Credits.
A three-phase model will be compared and contrasted to provide the skill and knowledge necessary for conducting needs assessments for educational schools and institutions. Prereq: Admission to doctoral program.

EDUC 872. Qualitative Research Methods. 3 Credits.
This course introduces foundational theories and approaches to qualitative research for education settings, including the identification and critique of various types of qualitative research, data collection techniques, approaches to coding, analysis, interpretation, and write-up. Prereq: Admission to doctoral program.

EDUC 873. Case-Based Educational Research and Statistics. 3 Credits.
The purpose of this course is to have graduate students understand statistical meanings and concepts which will provide the professional expertise needed to serve schools and institutions with their contemporary research and accountability needs. Prereq: Admission to doctoral program.

EDUC 881. Computer Data Management and Decision Making. 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 899. Doctoral Dissertation. 1-15 Credits.

Electrical & Computer Engineering (ECE)

ECE 111. Introduction to Electrical and Computer Engineering. 3 Credits.
Introduction to electrical and computer engineering problem solving, design and professional issues. 3 lectures. Prereq: MATH 105. F.

ECE 173. Introduction to Computing. 4 Credits.
Programming in a high level language with applications to engineering computation, analysis, and design. 3 lectures, 1 2-hour laboratory. Prereq: MATH 105. F, S.

ECE 193. Undergraduate Research. 1-5 Credits.

ECE 194. Individual Study. 1-5 Credits.

ECE 196. Field Experience. 1-15 Credits.

ECE 199. Special Topics. 1-5 Credits.

ECE 275. Digital Design. 4 Credits.
Introduction to computer arithmetic, designing combinatorial circuits, and designing basic sequential circuits. 3 lectures, 1 two-hour laboratory. Prereq: MATH 105. F, S.

ECE 291. Seminar. 1-3 Credits.

ECE 292. Study Abroad. 1-15 Credits.

ECE 293. Undergraduate Research. 1-5 Credits.

ECE 294. Individual Study. 1-5 Credits.

ECE 299. Special Topics. 1-5 Credits.

ECE 301. Electrical Engineering I. 3 Credits.
Introduction to electrical engineering for non-majors. Fundamental laws of circuit analysis. Steady-state and transient analysis of DC and AC circuits. 3 lectures. Prereq: MATH 259 or MATH 265, PHYS 252. F, S.

ECE 303. Electrical Engineering II. 3 Credits.
Electronic circuits and their applications. Electromechanical energy conversion. Transformers, DC and AC machines. 3 lectures. Prereq: ECE 301. F, S.

ECE 306. Electrical Engineering Lab I. 1 Credit.
Electronic instruments and measurements. Applications to electrical and electronic circuits, power devices, and systems. 1 two-hour laboratory. Coreq: ECE 303. F, S.

ECE 311. Circuit Analysis II. 4 Credits.
Analysis of single-phase and three-phase circuits. Laplace transforms in circuit analysis. Fourier series. Two-port networks. 3 one-hour lectures, 1 two-hour laboratory. Prereq: EE 206 with a grade of C or better. Coreq: MATH 266. F, S.

ECE 320. Electronics I. 3 Credits.
Characterization, modeling, and analysis of digital circuits using diodes, BJTs, FETs, and Op Amps. 4 one-hour lectures, 1 two-hour laboratory each week for 10 weeks. Prereq: EE 206. F, S.

ECE 321. Electronics II. 2 Credits.
Characterization, modeling, and analysis of digital and analog circuits using diodes, BJTs, FETs, and Op Amps. 1 one-hour lecture, 1 two-hour laboratory each week for 6 weeks. Prereq: EE 206. F, S.

ECE 331. Energy Conversion. 4 Credits.
Magnetic circuits, transformers, DC and AC rotating machines. 3 one-hour lectures, 1 two-hour laboratory. Coreq: ECE 311. S.

ECE 341. Random Processes. 3 Credits.
Principles of probability. Application of probability and statistics to electrical and computer engineering problems. 3 lectures. Prereq: MATH 266. F, S.

ECE 343. Signals & Systems. 4 Credits.
Discrete-time and continuous-time signals and systems. Linearity, frequency response, difference and differential equations, transform techniques. 4 lectures. Prereq: EE 206, ECE 320 and ECE 311 or MATH 266. F, S.

ECE 351. Applied Electromagnetics. 4 Credits.
Lecture and laboratory introduction to electromagnetic waves in linear media, effects of boundaries, transmission lines, electrostatics, and magnetostatics. Introduction to time dependence and engineering applications. 4 lectures, 1 two-hour laboratory. Coreq: ECE 311. F, S.

ECE 373. Assembly Programming. 3 Credits.
Machine language, assembly language, and related hardware concepts, assembly language programming, macros and subroutines, system facilities and macros. Prereq: ECE 173, ECE 275 with a grade of C or better. Cross-listed with CSCI 373.

ECE 374. Computer Organization. 4 Credits.
Organization and structure of the major sections of a computer: CPU, memory, and I/O system organization and implementation issues. 3 lectures, 1 two-hour VHDL-based laboratory. Prereq: ECE 173, ECE 275 with a grade of C or better.

ECE 376. Embedded Systems. 4 Credits.
Use of microcontrollers for data acquisition and device control. Includes assembly language and high-level programming, serial and parallel I/O, timers and interface design. 3 lectures, 1 two-hour laboratory. Prereq: ECE 173, ECE 275, EE 206. F, S.

ECE 379. Study Tour Abroad. 1-6 Credits.

ECE 391. Seminar. 1-3 Credits.

ECE 392. Study Abroad. 1-15 Credits.

ECE 393. Undergraduate Research. 1-5 Credits.

ECE 394. Individual Study. 1-3 Credits.

ECE 397. Fe/Coop Ed/Internship. 1-4 Credits.

ECE 399. Special Topics. 1-5 Credits.

ECE 401. Design I. 1 Credit.
Capstone experience in formulation and design of a system or device. Basic project planning and software tools. 1 lecture. Coreq: ECE 320. S.

ECE 403. Design II. 2 Credits.
Capstone experience in formulation and design of a system or device. 2 two-hour design laboratories. Prereq: ECE 401, Senior standing. F.

ECE 405. Design III. 3 Credits.
Capstone experience in formulation and design of a system or device. 3 two-hours design laboratories. Prereq: ECE 403. S.

ECE 411. Optics for Scientists and Engineers. 3 Credits.
Introduction to modern optics. Geometric optics, electromagnetic nature of light, polarization, interference, diffraction, fiber optics. Prereq: PHYS 252. Co-req: ECE 411L. Cross-listed with PHYS 411. {Also offered for graduate credit - see ECE 611.}.

ECE 411L. Optics for Scientists and Engineers Laboratory. 1 Credit.
Required laboratory for ECE/PHYS 411. Ten optics experiments plus a major-related optics project. Prereq: PHYS 252. Co-req: ECE 411. {Also offered for graduate credit - see 611L.}.

ECE 413. Lasers for Scientists and Engineers. 3 Credits.
Lecture and laboratory introduction to lasers. Spontaneous and stimulated transitions, line-broadening, gain, gain saturation, optical resonators, Fabry-Perot interferometers, theory of laser oscillation, rate equations, transverse modes, coherence, and Gaussian beams. Prereq: PHYS 252. Cross-listed with PHYS 413. {Also available for graduate credit - See ECE 613.}.

ECE 415. Elements of Photonics. 3 Credits.
Analysis of optical systems using the matrix formulation, wave propagation in anisotropic media, electro-optic effect and laser modulation, physical origin of optical non-linearities, phase matching, optical second harmonic and parametric generation. Prereq: PHYS 252. Cross-listed with PHYS 415. {Also offered for graduate credit - See ECE 615.}.

ECE 417. Optical Signal Transmission. 3 Credits.
Optical signal transmission including geometric optics and modal analysis for homogeneous and inhomogeneous light guides. Systems studies including coupling, inter-symbol interference, sources, photodetectors, and modulation. Prereq: ECE 351 S/2 Cross-listed with PHYS 417. {Also offered for graduate credit - see ECE 617.}.

ECE 421. Communication Circuits. 3 Credits.
Resonant circuits and tuned amplifiers, oscillators, modulators and demodulators, phase-locked loops, and power amplifiers. Analysis, design, and applications in communication systems. 3 lectures. Prereq: ECE 321. S {Also offered for graduate credit - see ECE 621.}.

ECE 423. VLSI Design. 3 Credits.
Analysis and design of digital integrated circuits. Characteristics and applications of logic gates and regenerative logic circuits. 3 lectures. Prereq: ECE 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 321, ECE 351. F/2 {Also offered for graduate credit - see ECE 625.}.

ECE 427. Packaging for Electronics. 3 Credits.
Processes and materials for packaging of electronic components and devices, including integrated circuit chips, chip packages, and board level packaged systems; boards and substrates technology; quality and reliability of electronic packages. Open to all engineering majors. Prereq: Junior standing. S/2 (odd years). Cross-listed with IME 427. {Also offered for graduate credit - see ECE 627.}.

ECE 429. Introduction to IC Fabrication. 3 Credits.
This course examines issues about fabrication methods and procedures. Topics will include implantation, pattern transfer and process integration. Cross-listed with IME 429. {Also offered for graduate credit - see ECE 629.}.

ECE 431. Power Systems. 3 Credits.
Electrical characteristics of high voltage lines. Symmetrical components, per unit system, and transformers. Matrix methods, load flow, and fault analysis. 3 lectures. Prereq: ECE 311. F {Also offered for graduate credit - see ECE 631.}.

ECE 432. Computational Methods in Power Systems. 3 Credits.
Power flow, optimal power flow, state estimation, contingency analysis, unit commitment, security assessment, small signal and dynamic stability, voltage stability, emerging algorithms for blackout and vulnerability assessment in power systems. Co-req: ECE 431. {Also offered for graduate credit - see ECE 632.}.

ECE 433. Power Systems Design. 3 Credits.
Unbalanced power systems, economic dispatch, transients in power systems, power system stability, power system protection. 3 lectures. Prereq: ECE 311. S {Also offered for graduate credit - see ECE 633.}.

ECE 437. Power Electronics. 3 Credits.
Characteristics and modeling of power electronic devices. Rectifiers, choppers, and inverters and their applications in power supplies and motor drives. 3 lectures. Prereq: ECE 321. F {Also offered for graduate credit - see ECE 637.}.

ECE 438. Electric Drives. 4 Credits.
Characteristics of loads and drive train, power converters, four quadrant ac/dc drives, DSP control, drives for special motors, applications including electric vehicles. 3 lectures, 1 two-hour laboratory. Prereq: ECE 331 with a grade of C or better, ECE 437 with a grade of C or better. S {Also offered for graduate credit - see ECE 638.}.

ECE 443. Communications I. 4 Credits.
Communications theory and design with an emphasis on spectral techniques. Modulation and noise effects. 3 lectures, 1 two-hour laboratory. Prereq: ECE 341 and ECE 343. F, S {Also offered for graduate credit - see ECE 643.}.

ECE 444. Applied Digital Signal Processing. 3 Credits.
Digital signal processing theory balanced with practical application. Includes design of FIR, IIR, and adaptive filters; Fast Fourier Transforms; sampling theory; implementation techniques; multi-rate processing. Emphasizes system implementation using development tools and DSP hardware. 3 lectures. Prereq: ECE 173, ECE 343. F {Also offered for graduate credit - see ECE 644.}.

ECE 445. Communications II. 3 Credits.
Continuation of ECE 443. Digital communications systems. Optimum receivers. Information theory and coding. 2 lectures. Prereq: ECE 443. S/2 {Also offered for graduate credit - see ECE 645.}.

ECE 448. Image Analysis I. 3 Credits.
Image acquisition, resolution, enhancement, restoration, and equalization. Illuminations, reflectance, and noise considerations. Segmentation, shape characterization, and object recognition. Simulation examples, computer problems, and gathering of actual scientific images via camera and computer. Prereq: EC 343 or instructor approval. {Also offered for graduate credit - see ECE 648.}.

ECE 451. RF and Microwave Circuit Analysis and Design for Wireless Systems. 3 Credits.
This course will focus on the analysis and design of Radio Frequency (RF) and microwave circuits. In particular, circuits such as oscillators, filters, power dividers, amplifiers, mixers and modulators will be studied for wireless systems. Prereq: ECE 321 and ECE 351. {Also offered for graduate credit - see ECE 651.}.

ECE 453. Signal Integrity. 3 Credits.
Topics in system level signal integrity are presented. The construction and design of passive printed circuit cards are discussed, with computer aided design software used for analysis and class presentations. Circuit card fabrication issues and case examples of applications are discussed. Prereq: ECE 311, ECE 351. F/2 {Also offered for graduate credit - see ECE 653.}.

ECE 455. Designing for Electromagnetic Compatibility. 3 Credits.
Principles and methods concerning electronic system designs that are not sources of or susceptible to electromagnetic interference. 3 lectures. Laboratory. Prereq: ECE 343, ECE 351. F/2 {Also offered for graduate credit - see ECE 655.}.

ECE 461. Control Systems I. 4 Credits.
Modeling and control of dynamic systems, including root-locus, Bode plots, and Nichols charts. 3 lectures, 1 two-hour laboratory. Prereq: ECE 343. F {Also offered for graduate credit - see ECE 661.}.

ECE 463. Modern Control. 3 Credits.
Analysis and design of controllers for linear and non-linear systems using state-space methods. Design to specifications, controllability, observability, stability, optimization, and state-estimation. 3 lectures. Prereq: ECE 343. {Also offered for graduate credit - see ECE 663.}.

ECE 470. Fault Tolerant Digital Systems. 3 Credits.
Design and analysis of reliable digital systems through robust information coding, fault avoidance, and fault-tolerance. 3 lectures. Prereq: ECE 275. F {Also offered for graduate credit - see ECE 670.}.

ECE 471. Computer Systems Design and Implementation. 3 Credits.
Design and implementation of reliable, interrupt driven systems. Use of development tools. System components issues including co-processors, buses, run-time. Prereq: ECE 376, ECE 401, CSCI 474. S.

ECE 472. Design Automation of VLSI Circuits. 3 Credits.
Electronic design automation algorithms utilized by software tools, which are used for the design automation of VLSI integrated circuits. This course will cover design steps including circuit synthesis, technology mapping, formal verification, floorplanning, placement, and routing. Prereq: ECE 173, 275 with a grade of C or better. {Also offered for graduate credit - see ECE 672.}.

ECE 474. Computer Architecture. 3 Credits.
Topics pertaining to computer architecture will include: pipelining, caches, memory, I/O superscalar and out-of-order instruction execution, speculative execution, vector execution, multithreading, and multiprocessors. Prereq: ECE 374.

ECE 475. Advanced Digital Design. 4 Credits.
Master advanced logic design concepts, including the design and testing of synchronous and asynchronous combinational and sequential circuits using state of the are CAD tools. 3 lectures, 1 two-hour laboratory. Prereq: ECE 173, ECE 275. F.

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 483. Instrumentation for Engineers. 3 Credits.
Study of instrumentation including design, fabrication, and application. Prereq: Senior standing. F {Also offered for graduate credit - see ECE 683.}.

ECE 485. Biomedical Engineering. 3 Credits.
Unified study of engineering techniques and basic principles in physiological systems. Focus on membrane biophysics, biological modeling, compartmental analysis, and systems control theory. Prereq: Senior standing. F {Also offered for graduate credit - see ECE 685.}.

ECE 487. Cardiovascular Engineering. 3 Credits.
This course includes the application of engineering techniques to cardiovascular physiology and medicine. Basic cardiac and vascular physiology will be presented, modeling techniques will be examined. Instrumentation, measurement theory, and assist devices will be discussed. Prereq: Senior standing. S {Also offered for graduate credit - see ECE 687.}.

ECE 488. Cardiovascular Engineering II. 3 Credits.
Analysis, design, and research methods related to modeling and simulating the cardiovascular system. Prereq: ECE 487. {Also offered for graduate credit - see ECE 688.}.

ECE 491. Seminar. 1-5 Credits.

ECE 492. Study Abroad. 1-15 Credits.

ECE 493. Undergraduate Research. 1-5 Credits.

ECE 494. Individual Study. 1-5 Credits.

ECE 496. Field Experience. 1-15 Credits.

ECE 499. Special Topics. 1-5 Credits.

ECE 611. Optics for Scientists and Engineers. 3 Credits.
Introduction to modern optics. Geometric optics, electromagnetic nature of light, polarization, interference, diffraction, fiber optics. Corequisite laboratory with major related optics project. Coreq: PHYS 611L. Cross-listed with PHYS 611. {Also offered for undergraduate credit - see ECE 411.}.

ECE 611L. Optics for Scientists and Engineers Laboratory. 1 Credit.
Required laboratory for PHYS 611 or ECE 611. Ten optics experiments plus a major related optics project. Coreq: PHYS 611. Cross-listed with PHYS 611L. {Also offered for undergraduate credit - see ECE 411L.}.

ECE 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. Prereq: PHYS 252. Cross-listed with PHYS 613. {Also available for undergraduate credit - See ECE 413.}.

ECE 615. Elements of Photonics. 3 Credits.
Analysis of optical systems using the matrix formulation, wave propagation in anisotropic media, electro-optic effect and laser modulation, physical origin of optical non-linearities, phase matching, optical second harmonic and parametric generation. Cross-listed with PHYS 615. {Also offered for undergraduate credit - See ECE 415.}.

ECE 617. Optical Signal Transmission. 3 Credits.
Optical signal transmission including geometric optics and modal analysis for homogeneous and inhomogeneous light guides. Systems studies including coupling, inter-symbol interference, sources, photodetectors, and modulation. S/2 Cross-listed with PHYS 617. {Also offered for undergraduate credit - see ECE 417.}.

ECE 621. Communications Circuits. 3 Credits.
Resonant circuits and tuned amplifiers, oscillators, modulators and demodulators, phase-locked loops, and power amplifiers. Analysis, design, and applications in communication systems. 3 lectures. S {Also offered for undergraduate credit - see ECE 421.}.

ECE 623. VLSI Design. 3 Credits.
Analysis and design of digital integrated circuits. Characteristics and applications of logic gates and regenerative logic circuits. 3 lectures. {Also offered for undergraduate credit - see ECE 423.}.

ECE 624. Analog VLSI. 3 Credits.
Design, analysis, and simulation of analog VLSI circuits including operational amplifiers, current mode circuits, oscillators, translinear circuits, and phase locked-loops. Design automation for analog circuits. {Also offered for undergraduate credit - see ECE 424.}.

ECE 625. Introduction to Semiconductor Devices. 3 Credits.
Properties and applications of semiconductors and solid-state electronic devices. Semiconductors, junctions, and transistors. 3 lectures. F/2 {Also offered for undergraduate credit - see ECE 425.}.

ECE 627. Packaging for Electronics. 3 Credits.
Processes and materials for packaging of electronic components and devices, including integrated circuit chips, chip packages, and board level packaged systems; boards and substrates technology; quality and reliability of electronic packages. Open to all engineering majors. S/2 (odd years). Cross-listed with IME 627. {Also offered for undergraduate credit - see ECE 427.}.

ECE 629. Introduction to IC Fabrication. 3 Credits.
This course examines issues about fabrication methods and procedures. Topics will include implantation, pattern transfer and process integration. Cross-listed with IME 629. {Also offered for undergraduate credit - see ECE 429.}.

ECE 631. Power Systems. 3 Credits.
Electrical characteristics of high voltage lines. Symmetrical components, per unit system, and transformers. Matrix methods, load flow, and fault analysis. 3 lectures. F {Also offered for undergraduate credit - see ECE 431.}.

ECE 632. Computational Methods in Power Systems. 3 Credits.
Power flow, optimal power flow, state estimation, contingency analysis, unit commitment, security assessment, small signal and dynamic stability, voltage stability, emerging algorithms for blackout and vulnerability assessment in power systems. {Also offered for undergraduate credit - see ECE 432.}.

ECE 633. Power Systems Design. 3 Credits.
Unbalanced power systems, economic dispatch, transients in power systems, power system stability, power system protection. 3 lectures. S {Also offered for undergraduate credit - see ECE 433.}.

ECE 637. Power Electronics. 3 Credits.
Characteristics and modeling of power electronic devices. Rectifiers, choppers, and inverters and their applications in power supplies and motor drives. 3 lectures. F {Also offered for undergraduate credit - see ECE 437.}.

ECE 638. Electric Drives. 4 Credits.
Characteristics of loads and drive train, power converters, four quadrant ac/dc drives, DSP control, drives for special motors, applications including electric vehicles. 3 lectures, 1 two-hour laboratory. Prereq: ECE 637. S {Also offered for undergraduate credit - see ECE 438.}.

ECE 643. Communications I. 4 Credits.
Communications theory and design with an emphasis on spectral techniques. Modulation and noise effects. 3 lectures, 1 two-hour laboratory. F, S {Also offered for undergraduate credit - see ECE 443.}.

ECE 644. Applied Digital Signal Processing. 3 Credits.
Digital signal processing theory balanced with practical application. Includes design of FIR, IIR, and adaptive filters; Fast Fourier Transforms; sampling theory; implementation techniques; multi-rate processing. Emphasizes system implementation using development tools and DSP hardware. 3 lectures. F {Also offered for undergraduate credit - see ECE 444.}.

ECE 645. Communications II. 3 Credits.
Continuation of ECE 443. Digital communications systems. Optimum receivers. Information theory and coding. 2 lectures. S/2 {Also offered for undergraduate credit - see ECE 445.}.

ECE 648. Image Analysis I. 3 Credits.
Image acquisition, resolution, enhancement, restoration, and equalization. Illuminations, reflectance, and noise considerations. Segmentation, shape characterization, and object recognition. Simulation examples, computer problems, and gathering of actual scientific images via camera and computer. {Also offered for undergraduate credit - see ECE 448.}.

ECE 651. RF and Microwave Circuit Analysis and Design for Wireless Systems. 3 Credits.
This course will focus on the analysis and design of Radio Frequency (RF) and microwave circuits. In particular, circuits such as oscillators, filters, power dividers, amplifiers, mixers and modulators will be studied for wireless systems. {Also offered for undergraduate credit - see ECE 451.}.

ECE 653. Signal Integrity. 3 Credits.
Topics in system level signal integrity are presented. The construction and design of passive printed circuit cards are discussed, with computer aided design software used for analysis and class presentations. Circuit card fabrication issues and case examples of applications are discussed. F/2 {Also offered for undergraduate credit - see ECE 453.}.

ECE 655. Designing for Electromagnic Compatibility. 3 Credits.
Principles and methods concerning electronic system designs that are not sources of or susceptible to electromagnetic interference. 3 lectures. Laboratory. F/2 {Also offered for undergraduate credit - see ECE 455.}.

ECE 661. Control Systems I. 4 Credits.
Modeling and control of dynamic systems, including root-locus, Bode plots, and Nichols charts. 3 lectures, 1 two-hour laboratory. {Also offered for undergraduate credit - see ECE 461.}.

ECE 663. Modern Control. 3 Credits.
Analysis and design of controllers for linear and non-linear systems using state-space methods. Design to specifications, controllability, observability, stability, optimization and state-estimation. 3 lectures. {Also offered for undergraduate credit - see ECE 463.}.

ECE 670. Fault Tolerant Digital Design. 3 Credits.
Design and analysis of reliable digital systems through robust information coding, fault avoidance, and fault-tolerance. 3 lectures. {Also offered for undergraduate credit - see ECE 470.}.

ECE 672. Design Automation of VLSI Circuits. 3 Credits.
Electronic design automation algorithms utilized by software tools, which are used for the design automation of VLSI integrated circuits. This course will cover design steps including circuit synthesis, technology mapping, formal verification, floorplanning, placement, and routing. {Also offered for undergraduate credit - see ECE 472.}.

ECE 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 683. Instrumentation for Engineers. 3 Credits.
Study of instrumentation including design, fabrication, and application. F {Also offered for undergraduate credit - see ECE 483.}.

ECE 685. Biomedical Engineering. 3 Credits.
Unified study of engineering techniques and basic principles in physiological systems. Focus on membrane biophysics, biological modeling, compartmental analysis, and systems control theory. F {Also offered for undergraduate credit - see ECE 485.}.

ECE 687. Cardiovascular Engineering. 3 Credits.
This course includes the application of engineering techniques to cardiovascular physiology and medicine. Basic cardiac and vascular physiology will be presented, modeling techniques will be examined. Instrumentation, measurement theory, and assist devices will be discussed. S {Also offered for undergraduate credit - see ECE 487.}.

ECE 688. Cardiovascular Engineering II. 3 Credits.
Analysis, design, and research methods related to modeling and simulating the cardiovascular system. Prereq: ECE 687. {Also offered for undergraduate credit - see ECE 488.}.

ECE 690. Graduate Seminar. 1-3 Credits.

ECE 695. Field Experience. 1-15 Credits.

ECE 696. Special Topics. 1-5 Credits.

ECE 701. Advanaced Engineering Problem Solving. 3 Credits.
Application of advanced mathematical and computational methods to engineering problems. 3 lectures. S.

ECE 702. Advanced Research Topics. 1 Credit.
Prepare the student in finding a major adviser; defining the research questions or objectives; beginning a literature search; learning how to prepare a manuscript and/or grant application with their major adviser. F.

ECE 703. Advanced Teaching and Classroom Topics. 1 Credit.
To help prepare the Ph.D. student for the challenge of teaching in a classroom. F.

ECE 705. Stochastic Processes. 3 Credits.
Random variables, probability bounds, random vectors, random sequences, stochastic processes, and statistical signal processing.

ECE 713. Introduction to Lab-on-a-Chip Technology. 3 Credits.
This course introduces the fundamentals of Lab-on-a-chip technology. It also provides a comprehensive picture of instruments, tools and techniques used in various aspects of Lab-on-a-chip technology. Finally, some applications in biomedical engineering will be discussed.

ECE 721. Integrated Circuits. 3 Credits.
Introduction to CMOS circuits. Circuit characterization and performance estimation. CMOS circuit and logic design, CMOS testing. CMOS subsystem design. 3 lectures. Prereq: ECE 623.

ECE 722. Wireless IC Design. 3 Credits.
Basic concepts of wireless IC design. Various radio transceiver architectures and its application. Design of CMOS radio transceiver circuit blocks. Hands-on-experience on IC design and layout using industry-based chip design software Cadence. Prereq: ECE 621.

ECE 723. Advanced Electronics. 3 Credits.
Characteristics and detailed modeling of operational amplifiers. Applications to waveform generation, analog multiplication, modulation, and data conversion. IC and special amplifiers. 3 lectures. Prereq: ECE 621. (alternate years).

ECE 726. Advanced VLSI Design. 3 Credits.
This course covers state-of-the-art design techniques for VLSI at device, circuit, architecture, and application levels. Prereq: ECE 423 or ECE 623.

ECE 731. Power System Protection. 3 Credits.
Power system protective relaying. Generator, transformer, line, bus, motor protection. 3 lectures. Coreq: ECE 633. S.

ECE 733. Power Distribution. 3 Credits.
Power distribution systems. Lines and transformers, characteristics of loads, voltage drops and corrective measures, lightning protection. Fault analysis, fuses, reclosers, sectionalizers. Power system harmonics and power quality. 3 lectures. Coreq: ECE 631. F.

ECE 734. Modeling and Control of High Voltage Direct Current (HVDC) Systems. 3 Credits.
The course covers fundamentals of modeling, analysis and control of LCC and VSC HVDC systems. Applications integrating renewable energy will also be studied. Prereq: ECE 631.

ECE 737. Advanced Power Electronics. 3 Credits.
The course teaches the characteristics and detailed design of power semiconductors, power conversion topologies and controls, passive component design and selection, and advanced control strategies for DC-DC converters and DC-AC Inverters. 3 lectures Prereq: ECE 637.

ECE 741. Signal Processing I. 3 Credits.
Analysis and design of discrete- and continuous time signals and systems. Advanced treatment of transform techniques and Fourier analysis. Classical filter design techniques. Fast Fourier transform algorithms and applications. 3 lectures. Prereq: ECE 643.

ECE 743. Signal Processing II. 3 Credits.
Discrete-time Wiener and Kalman filtering. Least squares signal processing and filter design. Spectral analysis. Adaptive signal processing. 3 lectures. Prereq: ECE 741. S.

ECE 745. Statistical Communications. 3 Credits.
Advanced topics in communications theory including detection theory, estimation theory, and information theory. 3 lectures. Prereq: ECE 643. S.

ECE 748. Elements of Information Theory. 3 Credits.
This course will cover: entropy, asymptotic equipartition property, data compression, channel capacity, differential entropy, the Gaussian channel, an introduction to rate distortion theory and network information theory.

ECE 749. Wireless Communication. 3 Credits.
Wireless channel model, design of transmission and reception techniques for wireless communication systems and their performance analysis.

ECE 751. Electromagnetic Theory and Applictions. 3 Credits.
Theory of radiation, antenna characteristics, complex waves, potential functions and spectral domain methods for wave guides and cavities, and dispersive media. 3 lectures. S/2.

ECE 755. Advanced Topics in Electromagnetics. 3 Credits.
Topics of current interest in electromagnetics, microwaves, and optics. 3 lectures. Prereq: ECE 751. S/2.

ECE 761. Advanced Control Theory I. 3 Credits.
State variable formulation of the control problem; system identification. Introduction to adaptive, distributed, multivariable, nonlinear, optimal, and stochastic control.

ECE 763. Advanced Control Theory II. 3 Credits.
State variable formulation of the control problem; system identification. Introduction to adaptive, distributed, multivariable, nonlinear, optimal, and stochastic control. Prereq: ECE 761.

ECE 772. Low Power Circuit and System Design. 3 Credits.
This course will cover state-of-the-art design techniques for low power digital circuits and systems at device, circuit, architecture, system, and application levels.

ECE 773. Advanced Digital Design. 4 Credits.
Master advanced logic design concepts, including the design and testing of synchronous and asynchronous combinational and sequential circuits using state of the art CAD tools. 3 lectures, 1 two-hour laboratory. S.

ECE 774. Computer Architecture. 3 Credits.
Processor operations, computer arithmetic, control mechanism, instruction sets, classification schemes, pipelining, parallel processing, hierarchical memory and memory management, I/O methods and interrupts, and interconnection buses. 3 lectures.

ECE 775. Hardware For Cryptography. 3 Credits.
This course covers the mathematical background, modern cryptographic techniques like block ciphers, hash functions and public-key cryptosystems. Hardware and embedded implementations of cryptosystems and recent research in hardward implementation are also covered. Prereq: CSCI 669.

ECE 776. Software and Hardware for Cloud Computing. 3 Credits.
The course will focus on the architectural components of cloud computing systems with particular emphasis on service delivery models and management of cloud environment and services. Prereq: ECE 774.

ECE 777. System Level Design and Automation. 3 Credits.
Background, useful abstractions and needed techniques for system-level modeling, performance analysis, synthesis and optimization. Emphasis is on both computation and communication aspects involved in the Systems-On-Chip design of embedded applications.

ECE 778. Computer Networks. 3 Credits.
Examination of computer networks using the ISO-OSI model as a framework. Exploration of practical and theoretical issues in modems, codes, error, impairments, modulation, protocols, and interfaces. 3 lectures. (alternate years).

ECE 779. Computer-Aided Verification. 3 Credits.
Formal verification methods for hardware systems, such as theorem proving, property-based verification, equivalence checking, notions of correctness such as refinement, methods used in computer-aided verification including BDDs and SAT procedures.

ECE 787. Advanced Cardiovascular Engineering III. 3 Credits.
Advanced research topics in multi-scale cardiac modeling such as vetriculo-arterial coupling, organ-level characterization, tissue characterization, cellular properties, and sub-cellular processes culminating in a grant proposal. Prereq: ECE 687 and ECE 688.

ECE 788. Advanced Cardiovascular Engineering IV. 3 Credits.
Advanced research topics in multi-scale cardiac modeling such as ventriculo-arterial coupling, organ-level characterization, tissue characterization, cellular properties, and sub-cellular processes culminating in a research journal manuscript or conference proceeding. Prereq: ECE 787.

ECE 790. Graduate Seminar. 1-3 Credits.

ECE 791. Temporary/Trial Topics. 1-5 Credits.

ECE 793. Individual Study/Tutorial. 1-5 Credits.

ECE 795. Field Experience. 1-15 Credits.

ECE 796. Special Topics. 1-5 Credits.

ECE 797. Master's Paper. 1-3 Credits.

ECE 798. Master's Thesis. 1-10 Credits.

ECE 801. Big Data and Cloud Computing. 3 Credits.
The course will focus on the state-of-the-art cloud infrastructure with primary emphasis on manipulating, storing, and analyzing big data. Prereq: ECE 776.

ECE 802. High Performance Computing in the Cloud. 3 Credits.
The course will focus on a compelling vision of seamless scaling of computational resources in the cloud computing paradigm to achieve high performance. Prereq: ECE 776.

ECE 893. Individual Study. 1-5 Credits.

ECE 899. Doctoral Dissertation. 1-15 Credits.

Electrical Engineering (EE)

EE 206. Circuit Analysis I. 4 Credits.
Linear electric circuits. Component models, circuit laws, transient analysis, design issues, computer tools. 3 lectures, 1 two-hour recitation/laboratory. Prereq: MATH 166 with a grade of C or better. Co-req: MATH 129. F,S.

Emergency Management (EMGT)

EMGT 101. Emergencies, Disasters, and Catastrophes. 3 Credits.
An overview of emergencies, disasters, and catastrophes from a social, political, historical, policy, environmental, international and cross-cultural perspective. Focuses on differences in these events in terms of scale as well as cause from the disaster phase approach.

EMGT 150. Dealing with Terrorism, Cybersecurity and Other Emerging Threats. 3 Credits.
Examines the historical emergence of security threats and how American society has addressed them. Topics include key homeland security concerns and approaches, events, policies, and organizational structures including relationships to emergency management.

EMGT 199. Special Topics. 1-5 Credits.

EMGT 261. Disaster Preparedness. 3 Credits.
Nature and rationale for public awareness of potential hazards that communities face, preparedness for these hazards, and potential strategies to mitigate adverse consequences. Prereq: EMGT 101.

EMGT 262. Disaster Mitigation. 3 Credits.
Role of emergency management programs in community resilience and sustainability; incorporation of preparedness, mitigation, response, and recovery in community comprehensive and strategic planning. Prereq: EMGT 101.

EMGT 263. Disaster Response. 3 Credits.
Principles and procedures related to emergency operations plans, warning, evacuation, search and rescue, mass casualty care, sheltering, donations, management, disaster declaration, and incident debriefing. Prereq: EMGT 101.

EMGT 264. Disaster Recovery. 3 Credits.
Examination of post-disaster policies and programs that protect the natural environment, improve disaster resistance, support diverse populations, improve economic conditions, and preserve community resources. Prereq: EMGT 101.

EMGT 291. Seminar. 1-5 Credits.

EMGT 294. Individual Study. 1-5 Credits.

EMGT 299. Special Topics. 1-5 Credits.

EMGT 379. Study Tour Abroad. 1-6 Credits.

EMGT 391. Seminar. 1-5 Credits.

EMGT 410. Comprehensive Emergency Management Planning. 3 Credits.
Educates students in the preparation of various types of emergency management plans and how to lead an effective planning process within non-profits, businesses, and/or government organizations. Prereq: EMGT 101 and any one of the following: EMGT 261, EMGT 262, EMGT 263 or EMGT 264. {Also offered for graduate credit - see EMGT 610.}.

EMGT 414. Spatial Analysis in Emergency Management. 3 Credits.
This course is designed to provide emergency management students with specific disaster related applications of spatial analysis techniques in state of the art GIS software. Prereq: EMGT 101 and any one of the following; EMGT 261, EMGT 262, EMGT 263 or EMGT 264. {Also offered for graduate credit - see EMGT 614.}.

EMGT 420. Hazard, Risk, and Vulnerability Assessments. 3 Credits.
Educates students in the preparation of hazard, risk, and vulnerability assessments. Prereq: EMGT 414. {Also offered for graduate credit - see EMGT 620.}.

EMGT 425. International Emergency Management. 3 Credits.
Explores hazard events, emergency management processes and structures, and how they vary around the world. {Also offered for graduate credit - see EMGT 625.}.

EMGT 430. Emergency Management Capstone. 3 Credits.
Synthesis of emergency management coursework for evaluation of personal performance related to undergraduate learning objectives and assessment of areas for professional development into the future.

EMGT 435. Issues in Homeland Security and Emergency Management. 3 Credits.
An analysis of homeland security and its relationship to emergency management within the framework of evolving domestic and international hazards.

EMGT 445. Vulnerability and Functional Needs in Emergency Management. 3 Credits.
Using the vulnerability theory as a framework, this course examines research related to groups that have been historically labeled "special populations" and how emergency management might address their functional needs. {Also offered for graduate credit - see EMGT 645.}.

EMGT 461. Business Continuity and Crisis Management. 3 Credits.
This course provides an overview of planning and management principles applicable to business or operational resumption following an emergency. The emphasis will be on minimizing the impact of a disaster on business operations. {Also offered for graduate credit - see EMGT 661.}.

EMGT 463. Voluntary Agency Disaster Services. 3 Credits.
Examination of the roles played by local, state, national, and international voluntary agencies in emergency preparedness, mitigation, response, and recovery. Prereq: EMGT 101. {Also offered for graduate credit - see EMGT 663.}.

EMGT 481. Disaster Analysis. 3 Credits.
Examination of natural and human-made disasters from a multidisciplinary perspective. {Also offered for graduate credit - see EMGT 681.}.

EMGT 491. Seminar. 1-5 Credits.

EMGT 494. Individual Study. 1-5 Credits.

EMGT 496. Field Experience. 1-15 Credits.

EMGT 499. Special Topics. 1-5 Credits.

EMGT 610. Comprehensive Emergency Management Planning. 3 Credits.
Educates students in the preparation of various types of emergency management plans and how to lead an effective planning process within non-profits, businesses, and/or government organizations. {Also offered for undergraduate credit - see EMGT 410.}.

EMGT 614. Spatial Analysis in Emergency Management. 3 Credits.
This course is designed to provide emergency management students with specific disaster related applications of spatial analysis techniques in state of the art GIS software. {Also offered for undergraduate credit - see EMGT 414.}.

EMGT 620. Hazard, Risk, and Vulnerability Assessments. 3 Credits.
Educates students in the preparation of hazard, risk, and vulnerability assessments. Prereq: EMGT 614. {Also offered for undergraduate credit - see EMGT 420.}.

EMGT 625. International Emergency Management. 3 Credits.
Explores hazard events, emergency management processes and structures, and how they vary around the world. {Also offered for undergraduate credit - see EMGT 425.}.

EMGT 635. Issues in Homeland Security and Emergency Management. 3 Credits.
An analysis of homeland security and its relationship to emergency management within the framework of evolving domestic and international hazards.

EMGT 645. Vulnerability and Functional Needs in Emergency Management. 3 Credits.
Using the vulnerability theory as a framework, this course examines research related to groups that have been historically labeled "special populations" and how emergency management might address their functional needs. {Also offered for undergraduate credit - see EMGT 445.}.

EMGT 661. Business Continuity & Crisis Management. 3 Credits.
This course provides an overview of planning and management principles applicable to business or operational resumption following an emergency. The emphasis will be on minimizing the impact of a disaster on business operations. {Also offered for undergraduate credit - see EMGT 461.}.

EMGT 663. Voluntary Agency Disaster Services. 3 Credits.
Examination of the roles played by local, state, national, and international voluntary agencies in emergency preparedness, mitigation, response, and recovery. {Also offered for undergraduate credit - see EMGT 463.}.

EMGT 681. Disaster Analysis. 3 Credits.
Examination of natural and human-made disasters from a multidisciplinary perspective. {Also offered for undergraduate credit - see EMGT 481.}.

EMGT 690. Graduate Seminar. 1-5 Credits.

EMGT 695. Field Experience. 1-15 Credits.

EMGT 696. Special Topics. 1-5 Credits.

EMGT 720. Theory, Research and Practice. 3 Credits.
An integrative review of theories and concepts in emergency management and their link to research conceptualization, design as well as field application and practice.

EMGT 730. Advanced Research Methods. 3 Credits.
This course reviews qualitative and quantitative methodologies and provides additional depth on their application to emergency management research projects. Prereq: SOC 700, SOC 701.

EMGT 761. Preparedness Theory and Practice. 3 Credits.
Examination of natural and human-made disasters from a risk assessment perspective, and preparedness and control procedures for each of these types of disaster.

EMGT 762. Mitigation Theory and Practice. 3 Credits.
Examination of disaster mitigation theory and the rationale and context of mitigation procedures, programs, and planning. Students will acquire both theoretical and applied understandings of mitigation principles and practices. Prereq: EMGT 613.

EMGT 763. Response Theory and Practice. 3 Credits.
Examination of the theory and practice of response including response variance and effectiveness.

EMGT 764. Recovery Theory and Practice. 3 Credits.
Theory, principles, and procedures used in disaster damage assessment and in emergency supply and service dissemination.

EMGT 790. Graduate Seminar. 1-5 Credits.

EMGT 793. Individual Study. 1-5 Credits.

EMGT 794. Practicum/Internship. 1-8 Credits.

EMGT 795. Field Experience. 1-15 Credits.

EMGT 797. Master's Paper. 1-5 Credits.

EMGT 798. Master's Thesis. 1-10 Credits.

EMGT 861. Preparedness Theory II. 3 Credits.
Doctoral students develop specialization in preparedness theory by selecting one or more topical areas within preparedness about which they will broaden and deepen their knowledge with faculty mentorship. Prereq: EMGT 761.

EMGT 862. Mitigation Theory II. 3 Credits.
Doctoral students develop specialization in mitigation theory by selecting one or more topical areas within mitigation about which they will broaden and deepen their knowledge with faculty mentorship. Prereq: EMGT 762.

EMGT 863. Response Theory II. 3 Credits.
Doctoral students develop specialization in response theory by selecting one or more topical areas within response about which they will broaden and deepen their knowledge with faculty mentorship. Prereq: EMGT 763.

EMGT 864. Recovery Theory II. 3 Credits.
Doctoral students develop specialization in recovery theory by selecting one or more topical areas within recovery about which they will broaden and deepen their knowledge with faculty mentorship. Prereq: EMGT 764.

EMGT 893. Individual Study/Tutorial. 1-5 Credits.

EMGT 894. Practicum/Internship. 1-8 Credits.

EMGT 895. Field Experience. 1-15 Credits.

EMGT 899. Doctoral Dissertation. 1-15 Credits.

Engineering General (ENGR)

ENGR 111. Introduction to Engineering. 1 Credit.
Designed to provide general engineering students with an opportunity to review, study, discuss, and evaluate various engineering professions as career choices. F, S.

ENGR 120. Introduction to Engineering. 3 Credits.
Introduction to Engineering is a foundation course for the Project Lead the Way Engineering curriculum. Students will be exposed to the design process, collaboration, research and analysis, communication, technical documentation and engineering standards.

ENGR 121. Principles of Engineering. 3 Credits.
This course is the second foundation course in the Project Lead the Way sequence. This course prepares students for colleges' majors in engineering or engineering technology fields. Course encompasses energy, power, materials and structures, control systems, statistics and kinematics. Prereq: ENGR 120.

ENGR 122. Digital Electronics. 3 Credits.
This course provides a foundation for students who are interested in electrical engineering, electronic, or circuit design in the Project Lead The Way program. Students study topics like combinatorial and sequential logic and are exposed to circuit design tools used in industry. Prereq: ENGR 120.

ENGR 123. Civil Engineering and Architecture. 3 Credits.
This course is intended to serve as a specialization course in the Engineering sequence for Project Lead the Way. Students will use rivet and auto desk to solve and make problems in the course. This includes a long term project that involves the development of a local property site. Prereq: ENGR 120.

ENGR 124. Biotechnical Engineering or Environmental Sustainability. 3 Credits.
Students will investigate and design solutions in response to real-world challenges related to clean and abundant drinking water, food supply issues, and renewable energy. This course is part of the Project Lead The Way program. Prereq: ENGR 120.

ENGR 125. Computer Integrated Manufacturing. 3 Credits.
This course teaches the fundamentals of computerized manufacturing technology. It builds on the solid modeling skills developed in Introduction to Engineering. Students will be able to describe and design a manufacturing process. This course is part of the Project Lead The Way program. Prereq: ENGR 120.

ENGR 126. Aerospace Engineering. 3 Credits.
The major focus of this course is to expose students to the world of aeronautics, flight, and engineering through the fields of aerospace engineering and related areas of study. This course is part of the Project Lead The Way program. Prereq: ENGR 120.

ENGR 127. Engineering Design and Development. 3 Credits.
Engineering Design and Development is the capstone course in the Project Lead the Way high school engineering program. It is an engineering research course in which students work in teams to design and develop an original solution to a valid open ended problem. Prereq: ENGR 120 and ENGR 121.

ENGR 128. Computer Science and Software Engineering. 3 Credits.
This course covers the computer science principles framework. This course teaches multiple programming languages and aims to develop computational thinking. This will help generate excitement in the field of computer and software engineering. This course is part of the Project Lead The Way program. Prereq: ENGR 120.

ENGR 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. Study Abroad. 1-15 Credits.

ENGR 294. Individual Study. 1-5 Credits.

ENGR 299. Special Topics. 1-5 Credits.

ENGR 310. Entrepreneurship for Engineers and Scientists. 3 Credits.
How to turn a great idea into a business by starting a company and/or profiting from a new invention. Developing a product, conducting patent searches, securing intellectual property rights, writing a business plan, obtaining financing, etc. are covered. F.

ENGR 311. History of Technology in America. 3 Credits.
Development of tools, technology, and whole systems, especially the U.S. experience since 1700. Contributions of Jefferson, Richards, Edison and others as models of creativity as a foundation for the emergence of modern conceptions of progress.

ENGR 312. Impact of Technology on Society. 3 Credits.
Study of the impact of technology on the natural environment; discussion of values, ethics, citizenship, social responsibilities, and the relationship of humans to the environment.

ENGR 379. Study Tour Abroad. 1-6 Credits.

ENGR 391. Seminar. 1-3 Credits.

ENGR 392. Study Abroad. 1-15 Credits.

ENGR 394. Individual Study. 1-3 Credits.

ENGR 399. Special Topics. 1-5 Credits.

ENGR 402. Engineering Ethics and Social Responsibility. 1 Credit.
Philosophical basis for ethical decisions, guidance for ethical decision making in engineering practice, ethics of social responsibility, professionalism, case studies, and codes of conduct for engineers. F, S.

ENGR 491. Seminar. 1-5 Credits.

ENGR 492. Study Abroad. 1-15 Credits.

ENGR 493. Undergraduate Research. 1-5 Credits.

ENGR 494. Individual Study. 1-5 Credits.

ENGR 496. Field Experience. 1-15 Credits.

ENGR 499. Special Topics. 1-5 Credits.

ENGR 690. Graduate Seminar. 1-5 Credits.

ENGR 696. Special Topics. 1-5 Credits.

ENGR 715. Engineering Systems. 3 Credits.
Interdisciplinary systems analysis approach to engineering problems. Mathematical and physical stochastic process and control systems.

ENGR 722. Academic Writing in the Engineering Disciplines. 2 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.

ENGR 741. Systems-Linear and Nonlinear Concepts. 3 Credits.
Nonlinear and linear programming methods for engineering design optimization. Formulation and optimization of design problems from all areas of engineering.

ENGR 762. Heat and Mass Transfer. 3 Credits.
Theory and application of transport of heat and mass. Heat diffusion equation in several coordinate systems. Fourier series and transforms and Laplace transform techniques. Mass transfer examples. Introduction to simulations.

ENGR 770. Quantitative Modeling. 3 Credits.
Applications modeling and optimization methods. Domains: transportation, logistics, manufacturing, service systems scheduling, and supply-chain management. Decision models: linear programming and sensitivity analysis, transportation and assignment, network models and algorithms, and integer, dynamic and nonlinear programming. Cross-listed with IME 770.

ENGR 771. Probabilistic and Deterministic Methods. 3 Credits.
Applications modeling. Domains include transportation, logistics, manufacturing, service systems scheduling, and supply-chain management. Quantitative models and tools include Markov chains, stochastic processes, queuing, deterministic and stochastic decision analysis, time series, forecasting, and regression modeling. Prereq: IME 660. Cross-listed with IME 771.

ENGR 780. Electromagnetic Theory. 3 Credits.
Physical concepts and mathematical solutions of Maxwell equations; boundary conditions, force, and energy equations; potential equations; Green's functions; wave equations, radiation, and propagation of electromagnetic waves. F/2.

ENGR 789. Advanced Research Methods in Engineering. 3 Credits.
Advanced study of the philosophy, reasoning, design, methods, and procedures employed in conducting and disseminating scientific research. Includes a survey of current and original research with interpretation and assessment.

ENGR 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. 4 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. Lab component provides additional support, with one-on-one conferences, peer group sessions, and relevant online learning. Prereq: English placement.

ENGL 112. ESL College Composition I. 4 Credits.
Guided practice in college-level reading, writing, and critical thinking, with attention to issues encountered by non-native English speakers. Includes process writing, genres and an introduction to library research. Lab component provides additional support, with one-on-one conferences, peer group sessions, and relevant online learning. Equivalent to ENGL 110.

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. ESL College Composition II. 4 Credits.
Guided advanced practice in college level writing from sources and in rhetorical strategies, with additional support related to higher level language acquisition and usage for non-native speakers of English. Equivalent to ENGL 120. Prereq: ENGL 112.

ENGL 150. Being Human. 3 Credits.
Explore diverse cultures and contexts through fiction, non-fiction, visual, or other texts.

ENGL 167. Introduction to English Studies. 3 Credits.
An introduction to the different areas of English studies including literature, writing studies, and linguistics and the ways in which they are studied.

ENGL 194. Individual Study. 1-3 Credits.

ENGL 196. Field Experience. 1-15 Credits.

ENGL 199. Special Topics. 1-5 Credits.

ENGL 209. Introduction to Linguistics. 3 Credits.
Entry-level knowledge for the scientific study of language, including such topics as phonetics, phonology, morphology, semantics, grammar, social and cultural dimensions, acquisition, variation and similarities among languages of the world, and related cultural history. Cross-listed with ANTH 209.

ENGL 213. Literary Publications. 3 Credits.
Theory and practice in the process of producing a literary magazine. Prereq: ENGL 120.

ENGL 220. Introduction to Literature. 3 Credits.
Reading and discussion of representative examples of poetry, drama, and fiction, with emphasis on the use of common literary terminology. Classic and contemporary works. Focus on enjoyment and appreciation of verbal art.

ENGL 222. Introduction to Poetry. 3 Credits.
Examination of poetic forms including the uses of figurative language and the techniques of rhythm and meter, as well as imagery and structure. Includes traditional and contemporary lyrics. Prereq: ENGL 120.

ENGL 225. Introduction to Film. 3 Credits.
General introduction to film studies, including analysis of narrative and stylistic elements of films for their artistic merits and their reflection of an influence on society.

ENGL 229. Introduction to Creative Writing. 3 Credits.
Introduction to the craft of creative writing with an emphasis on exploring multiple genres and developing a strong cultural awareness through readings and discussion.

ENGL 240. World Literature Masterpieces. 3 Credits.
Study of representative cultural and literary materials from the ancient world to modern times. Prereq or Coreq: ENGL 120.

ENGL 272. Literary Analysis. 3 Credits.
Introduction to traditional and contemporary approaches in the study of literature and the fundamental skills required for the analysis of literary texts. Prereq: ENGL 120.

ENGL 275. Introduction to Writing Studies. 3 Credits.
A broad history of writing and rhetoric as well as an introduction to spheres of writing studies: creative, academic, professional/technical, and public writing. Prereq: ENGL 120.

ENGL 291. Seminar. 1-3 Credits.

ENGL 292. Study Abroad. 1-15 Credits.

ENGL 294. Individual Study. 1-5 Credits.

ENGL 299. Special Topics. 1-5 Credits.

ENGL 301. Peer Tutoring and Writing in the Disciplines. 3 Credits.
Introduction to individual writing instruction and conventions of disciplinary writing. In addition to classroom work and assignments, students will complete a practicum in the Center for Writers. Recommended for prospective educators, writing specialists in all fields, and peer tutors in the Center for Writers. Prereq: ENGL 120.

ENGL 313. Literary Publications II. 3 Credits.
Theory and practice in the process of producing a literary magazine. Prereq: ENGL 120.

ENGL 315. British Literature I. 3 Credits.
Survey of major works and writers in British literature from the Anglo-Saxon period through the 18th century. Prereq: ENGL 120.

ENGL 316. British Literature II. 3 Credits.
Survey of major works and writers in British literature from the Romantic Age to the present. Prereq: ENGL 120.

ENGL 317. American Literature I. 3 Credits.
Survey of major works and writers in American literature from the colonial period through the Civil War. Emphasis on the development of unique American values and literature. Prereq: ENGL 120.

ENGL 318. American Literature II. 3 Credits.
Survey of major works and writers in American literature from the Civil War to the present. Includes traditional as well as experimental, innovative, and counter-cultural works and authors. Prereq: ENGL 120.

ENGL 320. Business and Professional Writing. 3 Credits.
Intensive practice employing the conventions of writing needed in professional genres and settings: writing for specific audiences and purposes. Inform, analyze, evaluate, and persuade. Prereq: ENGL 120, Junior standing.

ENGL 321. Writing in the Technical Professions. 3 Credits.
Intensive practice employing the conventions of professional genres to write about technology development and use for expert, business, and more general audiences. Prereq: ENGL 120, Junior standing.

ENGL 322. Writing and the Creative Process. 3 Credits.
Exploring genres that fuel creativity and critical awareness. Emphasis on flexibility and inventiveness in realizing any personal or professional project. Products may range from poetry/fiction to blogs to student-designed assignments based on major. Prereq: ENGL 120, Junior standing.

ENGL 323. Creative Writing. 3 Credits.
Creative writing with a focus on one literary genre. May be repeated for credit. Prereq: ENGL 120 and any one of the following: ENGL 229, ENGL 275 or ENGL 322.

ENGL 324. Writing in the Sciences. 3 Credits.
The study and practice in written conventions of the sciences for academic, scientific, and public audiences. Prereq: ENGL 120. At least junior standing.

ENGL 325. Writing in the Health Professions. 3 Credits.
Study of and practice in language use and written conventions of the health professions for academic, scientific, and public audiences. Prereq: ENGL 120 and Junior standing.

ENGL 326. Writing in the Design Professions. 3 Credits.
This course provides intensive practice employing the conventions of those professional genres needed to write for professional contexts and audiences in design fields. Prereq: ENGL 120, Junior standing.

ENGL 330. British and American Women Writers. 3 Credits.
Investigation of the literary portrayal of women and its effects on society. Some consideration of problems specific to women writers. Prereq: ENGL 120.

ENGL 331. Contemporary Women Writers. 3 Credits.
Study of the language, imagery, themes, and genres in 20th century literature by women of various cultural, ethnic, and national backgrounds. Prereq: ENGL 120.

ENGL 333. Fantasy and Science Fiction. 3 Credits.
Study of social and psychological implications of fantasy literature and works of fiction concerned with the impact of science and technology on the human imagination. Prereq: ENGL 120.

ENGL 335. Multicultural Writers. 3 Credits.
Major literary figures within and outside the United States. Includes Asian, Mexican, and Canadian, as well as Native-American, Black, Asian-American, and Chicano writers. Prereq: ENGL 120.

ENGL 336. Literature and The Environment. 3 Credits.
Milestones of American writing about nature and culture from Thoreau to the present. Reading and analysis of literary encounters with place and issues that arise when the local is global. Prereq: ENGL 120.

ENGL 340. 19th Century American Fiction. 3 Credits.
Selected fiction reflecting problems and ideas, emphasizing the shift from romanticism to realism and naturalism, of the 19th century. Representative writers: Cooper, Hawthorne, Twain, Jewett, James, and Wharton, and includes minority voices. Prereq: ENGL 120.

ENGL 341. 20th Century American Fiction. 3 Credits.
Selected fiction reflecting social, psychological, and literary trends in the 20th century. Includes multicultural and women authors, as well as experimentations in genre. Prereq: ENGL 120.

ENGL 345. Themes in American Culture. 3 Credits.
A multidisciplinary approach, including art, music, and literature, to various eras and themes in American cultural history. Prereq: ENGL 120.

ENGL 357. Visual Culture and Language. 3 Credits.
This course will cover the rise of visual culture and the impact this historical shift has made on print culture and writing. Students will produce information graphics, photo essays, videos, and other genres. Prereq: ENGL 120, Junior standing.

ENGL 358. Writing in the Humanities and Social Sciences. 3 Credits.
Theory and practice for writing multiple genres in the humanities and social sciences. Prereq: ENGL 120, Junior standing.

ENGL 360. Grammatical Structure/English. 3 Credits.
Examines the system of the English sentence. Emphasis on structures and components with attention to application in teaching, stylistic analysis, and editing.

ENGL 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. Study Tour Abroad. 1-6 Credits.

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. Study Abroad. 1-15 Credits.

ENGL 394. Individual Study. 1-5 Credits.

ENGL 396. Field Experience. 1-15 Credits.
Field Experience.

ENGL 399. Special Topics. 1-5 Credits.

ENGL 413. Literary Publications III. 3 Credits.
Theory and practice in the process of producing a literary magazine. Prereq: ENGL 120.

ENGL 423. Creative Writing Studio. 3 Credits.
Advanced creative writing with an emphasis on the student as working writer. Readings in creative and/or critical texts and participation in community events. Intensive workshop discussion, with the goal of producing a publishable manuscript. Prereq: ENGL 275, ENGL 322 or ENGL 323.

ENGL 435. Young Adult Literature in a Multicultural World. 3 Credits.
Introduction to the field of Young Adult Literature (YAL) with an emphasis on multicultural novels. Recommended for English Education majors, English majors seeking breadth in their reading, and students seeking diverse reading. Prereq: ENGL 120. {Also offered for graduate credit - see ENGL 635.}.

ENGL 449. Usability and User Experience. 3 Credits.
This course will form the basis for teaching the core competencies for working in the English department UX lab. Additionally, it will prepare students to collaborate with design teams to create better documentation, to create fuller user understandings of user inscription preferences, and to craft information strategies. This course will teach user inquiry methods, data collection, genre conventions, and rhetorical strategies for user advocacy. {Also offered for graduate credit - see ENGL 649}.

ENGL 452. History of the English Language. 3 Credits.
Development of the English language from its Germanic origins to the modern period. Prereq: ENGL 120. Recommended: ENGL 209. {Also offered for graduate credit - see ENGL 652.}.

ENGL 453. Social and Regional Varieties of English. 3 Credits.
Study of sociological factors as they relate to language (American English). Examines region, age, gender, ethnicity, self-identity, situation, profession, etc. and their relation to pronunciation, word choice, politeness, formality, turn-taking, etc. Students conduct original research. Prereq: ENGL 120. Recommended: ENGL 209. {Also offered for graduate credit - see ENGL 653.}.

ENGL 454. Language Bias. 3 Credits.
Application of current linguistic, rhetorical, and literary theory to examine and analyze the ways in which the social asymmetries of gender, sexuality, race, and ethnicity are reflected and sustained through discourse practices. Prereq: ENGL 120. {Also offered for graduate credit - see ENGL 654.}.

ENGL 455. International Technical Writing. 3 Credits.
Theories and practical applications of approaches to international technical documents, including globalization, localization, and translation preparations and procedures. Extensive use of case studies and cultural models. Prereq: ENGL 120, Junior standing. {Also offered for graduate credit - see ENGL 655.}.

ENGL 456. Literacy, Culture and Identity. 3 Credits.
Reading, writing, research, and discussion of diverse types of literacy from functional to cultural to technological and their roles in culture and identity formation. Completion of related community projects. Prereq: ENGL 272 or ENGL 275, Junior standing. {Also offered for graduate credit - see ENGL 656.}.

ENGL 457. Electronic Communication. 3 Credits.
This web-based class will explore issues related to electronic communication through selected readings, projects that allow students to develop skills and insight through experiential learning, and though reflection on the dynamics of online education itself. Prereq: ENGL 120.

ENGL 458. Advanced Writing Workshop. 3 Credits.
Writing, revising, and editing projects based on rhetorical principles. Frequent response from peers and instructor. Analysis of selected readings and students' own writing. Prereq: Any one of the following: ENGL 320, ENGL 321, ENGL 322, ENGL 323, ENGL 324, ENGL 325, ENGL 326 or ENGL 358.

ENGL 459. Researching and Writing Grants and Proposal. 3 Credits.
A rhetorical approach to researching and writing academic grants, business proposals, and related professional documents. Students develop a portfolio of professionally designed and edited documents as well as the vocabulary of grants writing and research. Prereq: ENGL 120 and Junior standing. {Also offered for graduate credit - see ENGL 659.}.

ENGL 467. English Studies Capstone Experience. 3 Credits.
Cumulative and integrative study for English majors of English language, literature, and composition. Prereq: ENGL 272.

ENGL 472. 20th Century American Writers. 3 Credits.
Intensive study of major American writers from 1900 to 1950. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 672.}.

ENGL 474. Native American Literature. 3 Credits.
The development of literature by and about Native Americans is traced from 1850 to the present. Focus on Native American identity and contributions to the American culture. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 674.}.

ENGL 476. Topics in American Literature. 3 Credits.
Intensive study of a special theme, form, period, or group of writers central to the formation and development of American literature. May be repeated with change of topic. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 676.}.

ENGL 480. Medieval Literature. 3 Credits.
British poetry and prose from the beginning of the Middle Ages to 1500, excluding Chaucer. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 680.}.

ENGL 482. Renaissance Literature. 3 Credits.
Study of British writers of the 16th and 17th centuries. Prereq: ENGL 272. {Also offered for undergraduate credit - see ENGL 682.}.

ENGL 483. Topics in British Literature. 3 Credits.
Intensive study of a special theme, form, period, or group of writers central to the formation of British literature. May be repeated with change of topic. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 683.}.

ENGL 486. Romantic Literature. 3 Credits.
Study of major British writers from the French Revolution to the coronation of Queen Victoria. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 686.}.

ENGL 491. Seminar. 1-5 Credits.

ENGL 492. Study Abroad. 1-15 Credits.

ENGL 493. Undergraduate Research. 1-5 Credits.

ENGL 494. Individual Study. 1-5 Credits.

ENGL 496. Field Experience. 1-15 Credits.

ENGL 499. Special Topics. 1-5 Credits.

ENGL 635. Young Adult Literature in a Multicultural World. 3 Credits.
Introduction to the field of Young Adult Literature (YAL) with an emphasis on multicultural novels. Recommended for English Education majors, English majors seeking breadth in their reading, and students seeking diverse reading. {Also offered for undergraduate credit - see ENGL 435.}.

ENGL 649. Usability and User Experience. 3 Credits.
This course will form the basis for teaching the core competencies for working in the English department UX lab. Additionally, it will prepare students to collaborate with design teams to create better documentation, to create fuller user understandings of user inscription preferences, and to craft information strategies. This course will teach user inquiry methods, data collection, genre conventions, and rhetorical strategies for user advocacy. {Also offered for undergraduate credit - see ENGL 449}.

ENGL 652. History of the English Language. 3 Credits.
Development of the English language from its Germanic origins to the modern period. {Also offered for undergraduate credit - see ENGL 452.}.

ENGL 653. Social and Regional Varieties of English. 3 Credits.
Study of sociological factors as they relate to language (American English). Examines region, age, gender, ethnicity, self-identity, situation, profession, etc. and their relation to pronunciation, word choice, politeness, formality, turn-taking, etc. Students conduct original research. {Also offered for undergraduate credit - see ENGL 453.}.

ENGL 654. Language Bias. 3 Credits.
Application of current linguistic, rhetorical, and literary theory to examine and analyze the ways in which the social asymmetries of gender, sexuality, race, and ethnicity are reflected and sustained through discourse practices. {Also offered for undergraduate credit - see ENGL 454.}.

ENGL 655. International Technical Writing. 3 Credits.
Theories and practical applications of approaches to international technical documents, including globalization, localization, and translation preparations and procedures. Extensive use of case studies and cultural models. {Also offered for undergraduate credit - see ENGL 455.}.

ENGL 656. Literacy, Culture and Identity. 3 Credits.
Reading, writing, research, and discussion of diverse types of literacy from functional to cultural to technological and their roles in culture and identity formation. Completion of related community projects. {Also offered for undergraduate credit - see ENGL 456.}.

ENGL 659. Researching and Writing Grants and Proposal. 3 Credits.
A rhetorical approach to researching and writing academic grants, business proposals, and related professional documents. Students develop a portfolio of professionally designed and edited documents as well as the vocabulary of grants writing and research. {Also offered for undergraduate credit - see ENGL 459.}.

ENGL 672. 20th Century American Writers. 3 Credits.
Intensive study of major American writers from 1900 to 1950. {Also offered for undergraduate credit - see ENGL 472.}.

ENGL 674. Native American Literature. 3 Credits.
The development of literature by and about Native Americans is traced from 1850 to the present. Focus on Native American identity and contributions to the American culture. {Also offered for undergraduate credit - see ENGL 474.}.

ENGL 676. Topics in American Literature. 3 Credits.
Intensive study of a special theme, form, period, or group of writers central to the formation and development of American literature. May be repeated with change of topic. {Also offered for undergraduate credit - see ENGL 476.}.

ENGL 680. Medieval Literature. 3 Credits.
British poetry and prose from the beginning of the Middle Ages to 1500, excluding Chaucer. {Also offered for undergraduate credit - see ENGL 480.}.

ENGL 682. Renaissance Literature. 3 Credits.
Study of British writers of the 16th and 17th centuries. {Also offered for undergraduate credit - see ENGL 482.}.

ENGL 683. Topics in British Literature. 3 Credits.
Intensive study of a special theme, form, period, or group of writers central to the formation of British literature. May be repeated with change of topic. {Also offered for undergraduate credit - see ENGL 483.}.

ENGL 686. Romantic Literature. 3 Credits.
Study of major British writers from the French Revolution to the coronation of Queen Victoria. {Also offered for undergraduate credit - see ENGL 486.}.

ENGL 690. Graduate Seminar. 1-3 Credits.

ENGL 692. Study Abroad. 1-15 Credits.

ENGL 695. Field Experience. 1-15 Credits.
Field-oriented supervised learning activities outside the college classroom that include a preplanned assessment of the experience, registration during the term the experience is conducted, and post evaluation with the instructor. Departmental approval.

ENGL 696. Special Topics. 1-5 Credits.

ENGL 751. Tools for Academic Writing: Clarity and Style. 1 Credit.
Primary goal: Students will learn and practice using specific strategies for writing clear, correct, and audience-appropriate academic documents. In addition, they will investigate writing expectations and analyze academic writing in their own discipline. S/U grading.

ENGL 752. Tools for Academic Writing: Writing Your Manuscript. 1 Credit.
Semester-long intensive academic writing with extensive individualized feedback. Students develop a writing plan, obtain approval from their advisors, and write intensively, receiving regular individualized assistance from a graduate writing consultant. S/U grading.

ENGL 753. Rhetorics, Poetics Of New Media. 3 Credits.
This web-based class will provide in-depth study of major new media theorists and require students to consider the research and teaching implications of new media for the humanities and social sciences. . Prereq: Graduate standing.

ENGL 754. Rhetorics of Science and Technology. 3 Credits.
The study and critique of the rhetorics of science and technology, informed by rhetorical theory and by the philosophy of and the social studies of science and technology. Prereq: Graduate standing or instructor approval.

ENGL 755. Composition Theory. 3 Credits.
Study of contemporary theories of teaching writing with frequent summary/response papers on assigned readings and a research paper on composition theory.

ENGL 756. Composition Research. 3 Credits.
Study of designs and basic statistics for writing research; analysis of current research; and a research project in composition.

ENGL 758. Topics in Rhetoric, Writing, and Culture. 3 Credits.
Intensive study of a theme, form, period, theory or theorist, writer or group of writers, or issue in rhetoric, writing, and culture. May be repeated with change of topic.

ENGL 759. History of Writing Instruction. 3 Credits.
The study of the history of writing instruction from antiquity to the present, with emphasis on relevance of writing instruction. Prereq: Graduate standing or instructor approval.

ENGL 760. Graduate Scholarship. 3 Credits.
Introduction to scholarship in English studies and to the nature and state of the discipline.

ENGL 761. Writing: Invention to Innovation. 3 Credits.
Exploration of the use of rhetorical canon in writing, spanning a period from the Aristotelian concept of invention to the contemporary manifestation of innovation. Prereq: admission to English graduate program.

ENGL 762. Critical Theory. 3 Credits.
Study of contemporary literary theory and criticism.

ENGL 764. Classroom Strategies For TA'S. 3 Credits.
Introduction to current issues in composition pedagogy, research, and theory, focusing on how they inform teaching practices. Instruction on developing philosophy of and strategies for teaching through short position papers, literacy autobiography, and a sequence of assignments for ENGL 120.

ENGL 765. Upper Division Writing: Pedagogy, Practice, and Technology. 3 Credits.
Theory, practice, and pedagogy for teaching upper-division writing classes. Discussion will include a number of writing studies topics, including Writing across Curriculum (WAC), Writing in the Disciplines (WID), and writing program administration. Prereq: ENGL 764.

ENGL 766. Teaching Literature. 3 Credits.
Theory, practice, and pedagogy for teaching literature at the college and/or university level. This course focuses on literary genres, cultures, and theories in the context of pedagogy. Prereq: ENGL 764 or ENGL 765. Recommended prereq: ENGL 762.

ENGL 770. Studies in American Literature. 3 Credits.
Intensive study of a special period, theme, technique, or group of writers central to the formation, development, or flowering of American literature. May be repeated for credit with change in topic.

ENGL 780. Studies in British Literature. 3 Credits.
Intensive study of a special period, theme, technique, or group of writers central to the formation, development, or flowering of British literature. May be repeated with change of topic.

ENGL 790. Graduate Seminar. 1-3 Credits.

ENGL 791. Temporary/Trial Topics. 1-5 Credits.

ENGL 792. Graduate Teaching Experience. 1-6 Credits.

ENGL 793. Individual Study/Tutorial. 1-5 Credits.

ENGL 794. Practicum. 1-8 Credits.

ENGL 795. Field Experience. 1-15 Credits.

ENGL 796. Special Topics. 1-5 Credits.

ENGL 797. Master's Paper. 1-3 Credits.

ENGL 798. Master's Thesis. 1-10 Credits.

ENGL 892. Graduate Teaching Experience. 1-6 Credits.

ENGL 893. Individual Study/Tutorial. 1-5 Credits.

ENGL 894. Practicum/Internship. 1-8 Credits.

ENGL 895. Field Experience. 1-15 Credits.

ENGL 899. Doctoral Dissertation. 1-15 Credits.

Entomology (ENT)

ENT 194. Individual Study. 1-3 Credits.

ENT 196. Field Experience. 1-15 Credits.

ENT 199. Special Topics. 1-5 Credits.

ENT 210. Insects, Humans and the Environment. 3 Credits.
Insect biology and its relevance to humans and the environment. 2 lectures. F.

ENT 291. Seminar. 1-3 Credits.

ENT 292. Study Abroad. 1-15 Credits.

ENT 294. Individual Study. 1-5 Credits.

ENT 299. Special Topics. 1-5 Credits.

ENT 350. General Entomology. 3 Credits.
Fundamental aspects of Entomology, including: insect classification, identification, structure, biology, adaptations, and impact on human society. 2 lectures, 1 two-hour laboratory. F.

ENT 379. Study Tour Abroad. 1-6 Credits.

ENT 391. Seminar. 1-3 Credits.

ENT 392. Study Abroad. 1-15 Credits.

ENT 394. Individual Study. 1-5 Credits.

ENT 399. Special Topics. 1-5 Credits.

ENT 410. Intergrated Management of Pests. 3 Credits.
How pests are managed and influenced by the environment, society, economics, and pest biology. This class will look at these factors and how they affect pest management practice across taxonomic groups. Prereq: BIOL 151, ENT 350, PPTH 324, PLSC 323.

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 is an introduction to the fundamental concepts of ecology as they relate to insects. We will emphasize how ecological principles help inform many areas of applied and basic entomological research. Prereq: ENT 350. S (odd years) {Also offered for graduate credit - see ENT 670.}.

ENT 491. Seminar. 1-5 Credits.

ENT 492. Study Abroad. 1-15 Credits.

ENT 493. Undergraduate Research. 1-5 Credits.

ENT 494. Individual Study. 1-5 Credits.

ENT 496. Field Experience. 1-15 Credits.

ENT 499. Special Topics. 1-5 Credits.

ENT 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 is an introduction to the fundamental concepts of ecology as they relate to insects. We will emphasize how ecological principles help inform many areas of applied and basic entomological research. S (odd years) {Also offered for undergraduate credit - see ENT 470.}.

ENT 690. Graduate Seminar. 1-3 Credits.

ENT 695. Field Experience. 1-15 Credits.

ENT 696. Special Topics. 1-5 Credits.

ENT 741. Insect-Plant Interactions. 3 Credits.
Insect-plant interactions are a key feature of the terrestrial ecology of our planet. The course will cover plant interactions with both herbivores and pollinators, and will emphasize the behavioral mechanisms insects use to exploit plants.

ENT 750. Systematic Entomology. 5 Credits.
Introduction to systematic methods and principles; identification of common families of insects. F (even years).

ENT 751. Immature Insects. 3 Credits.
Characteristics of the immature forms of the orders and principal families of insects. Prereq: ENT 750. F (odd years).

ENT 760. Insect Structure. 4 Credits.
Structure of insects and physiological functions. The development of adult form from embryonic and larval precursors during growth and metamorphosis; evolutionary development of insect structures. F (odd years).

ENT 761. Insect Physiology. 4 Credits.
Function of major insect organ systems and metabolism, growth, and molting of insects. S (odd years).

ENT 765. Biological Control of Insects and Weeds. 3 Credits.
The natural or applied regulation of pests by predaceous and parasitic insects and pathogens.

ENT 770. Writing a Scientific Literature Review. 3 Credits.
Explore how and why to create a scientific literature review in this writing intensive class. Hands-on exercises will help improve scientific writing, peer-review, and self-assessment while working throughout the semester to create your own review.

ENT 790. Graduate Seminar. 1-3 Credits.

ENT 791. Temporary/Trial Topics. 1-5 Credits.

ENT 792. Graduate Teaching Experience. 1-6 Credits.

ENT 793. Individual Study/Tutorial. 1-5 Credits.

ENT 794. Practicum/Internship. 1-15 Credits.

ENT 795. Field Experience. 1-15 Credits.

ENT 796. Special Topics. 1-5 Credits.

ENT 798. Master's Thesis. 1-10 Credits.

ENT 899. Doctoral Dissertation. 1-15 Credits.

Environment & Conservation Science (ECS)

ECS 740. Environmental Management. 3 Credits.
Regional and global environmental issues, policies, and regulations. Integrated approach to control and prevention of environmental degradation. Methods for environmental data collection, analysis, and management. Environmental modeling. Environmental risk assessment, feasibility study, and decision making.

ECS 750. Environmental Decision Analysis. 3 Credits.
This course will teach students quantitative methods for analyzing problems involving uncertainty and multiple, conflicting objectives. Topics include subjective probability, utility, value of information, and multiple attribute methods. Students will apply these tools to current environmental problems. Prereq: Statistics course.

ECS 760. Environmental Impact Assessment. 3 Credits.
Analysis of environmental protection legislation, biological, physical and socioeconomic impacts. National Environmental Policy Act (NEPA) and related regulations. Prereq: ECS 750.

ECS 770. Environmental Law and Policy. 3 Credits.
Introduction of major federal and state statues and regulatory programs that governs environmental quality, pollution control and wildlife management, including legislative enactment, regulatory development, enforcement, federal/state relationship and judicial interpretation.

ECS 790. Graduate Seminar. 1-3 Credits.

ECS 797. Master's Paper. 1-5 Credits.

ECS 798. Master's Thesis. 1-10 Credits.

ECS 899. Doctoral Dissertation. 1-15 Credits.

Environmental Design (ENVD)

ENVD 101. Introduction to Environmental Design. 3 Credits.
Introduction to the environmental design fields of city planning, urban design, landscape architecture, architecture, and interior design. Particular attention is given to basic design concepts, visualization, visual analysis, imagination, and creativity.

ENVD 102. Drawing Basics for Environmental Designers. 1 Credit.
Introduction to the conventions of graphic expression as employed in architecture and landscape architecture. Co-req: ENVD 130.

ENVD 104. Environmental Design Fundamentals. 1 Credit.
Introduction to environmental design fundamentals, including the elements and principles of design, visual abstraction, visual literacy relating to environmental design problem-solving, visual resolution of form and proportion, and graphic communication. Co-req: ENVD 172.

ENVD 130. Drawing Skills for Environmental Designers. 3 Credits.
Introduction to the skills of graphic expression as employed in architecture and landscape architecture. Co-req: ENVD 102.

ENVD 172. Environmental Design Fundamentals Studio. 3 Credits.
Introduction to design studio, with practice in representational media, techniques and skills exploring drawing, visual abstraction, visual literacy relating to environmental design problem-solving, visual resolution of form and proportion, and graphic communication. Co-req: ENVD 104.

Finance (FIN)

FIN 320. Principles of Finance. 3 Credits.
Various concepts and analytical tools in business finance. Includes financial mathematics, valuation, financial analysis and planning, funding sources, capital budgeting, cost of capital, leverage, dividend policy, and working capital management. Prereq: ACCT 200, ACCT 201, ECON 201, ECON 202, STAT 330. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

FIN 397. Fe/Coop Ed/Internship. 1-15 Credits.

FIN 410. Investment Analysis and Management. 3 Credits.
Evaluation of various securities for investment (stocks, bonds), investment analysis (fundamental and technical), concepts of efficient markets, and market risk. Portfolio management and international investment aspects are briefly covered. Prereq: FIN 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see FIN 610.}.

FIN 413. Finance Service Internship. 1-3 Credits.
Supervised professional finance work experience in a non-paid position. Prereq: FIN 320 with a grade of C or better and students must be a junior or a senior admitted to a professional program in the College of Business with a minimum cumulative NDSU GPA of 2.5.

FIN 420. Options, Futures, and Other Derivatives. 3 Credits.
Evaluation of options, futures, and other derivative securities used for hedging, speculation, and arbitrage. Related market structure, trading strategies, and risks are examined. Prereq: FIN 320 and any FIN 400 level course satisfying finance concentration. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see FIN 620.}.

FIN 430. Management of Financial Institutions. 3 Credits.
Development, role, and functions of depository financial institutions. Emphasis on domestic and international regulation, structure, management, and operations of commercial banks. Prereq: FIN 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see FIN 630.}.

FIN 440. International Finance. 3 Credits.
Concerns international financial markets, exchange rates, currency futures, and options. Includes financial aspects of international corporations such as management of corporate assets and liabilities, capital structure, cost of capital, capital budgeting, and international risks. Prereq: FIN 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see FIN 640.}.

FIN 450. Money and Capital Markets. 3 Credits.
Examination of saving-investment decisions, flow of funds, interest rate theories, risk structure, and function of financial markets. Security pricing and portfolio strategies in money, bond, tax exempt, and foreign exchange markets. Prereq: FIN 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see FIN 650.}.

FIN 460. Corporate Finance. 3 Credits.
This course is an extension of FIN 320 with specific focus on the time value of money, risk and return trade-off, capital structure and firm value, project analysis, dividend policies, and financial case analysis. Prereq: FIN 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

FIN 470. Analysis of Fixed-Income Securities. 3 Credits.
An introduction to the valuation of fixed-income securities and the management of fixed-income investments. Prereq: FIN 320 with a grade of C or better and students must be a junior or a senior admitted to a professional program in the College of Business with a minimum cumulative NDSU GPA of 2.5. {Also offered for graduate credit - See FIN 670.}.

FIN 480. Applied Portfolio Management. 3 Credits.
This course combines theory with practice and provides students with a unique educational opportunity to study portfolio management while managing the Student Managed Investment Fund (Bison Fund). 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 an economic sector or a financial security. Students must be active members of the Bison Fund during the same academic year. Prereq: FIN 410 with a grade of C or better. {Also offered for graduate credit - See FIN 680.}.

FIN 499. Special Topics. 1-5 Credits.

FIN 610. Investment Analysis and Management. 3 Credits.
Evaluation of various securities for investment (stocks, bonds), investment analysis (fundamental and technical), concepts of efficient markets, and market risk. Portfolio management and international investment aspects are briefly covered. {Also offered for undergraduate credit - see FIN 410.}.

FIN 620. Options, Futures, and Other Derivatives. 3 Credits.
Evaluation of options, futures, and other derivative securities used for hedging, speculation, and arbitrage. Related market structure, trading strategies, and risks are examined. {Also offered for undergraduate credit - see FIN 420.}.

FIN 630. Management of Financial Institutions. 3 Credits.
Development, role, and functions of depository financial institutions. Emphasis on domestic and international regulation, structure, management, and operations of commercial banks. {Also offered for undergraduate credit - see FIN 430.}.

FIN 640. International Finance. 3 Credits.
Concerns international financial markets, exchange rates, currency futures, and options. Includes financial aspects of international corporations such as management of corporate assets and liabilities, capital structure, cost of capital, capital budgeting, and international risks. {Also offered for undergraduate credit - see FIN 440.}.

FIN 650. Money and Capital Markets. 3 Credits.
Examination of saving-investment decisions, flow of funds, interest rate theories, risk structure, and function of financial markets. Security pricing and portfolio strategies in money, bond, tax exempt, and foreign exchange markets. {Also offered for undergraduate credit - see FIN 450.}.

FIN 670. Analysis of Fixed-Income Securities. 3 Credits.
An introduction to the valuation of fixed-income securities and the management of fixed-income investments. {Also offered for undergraduate credit - See FIN 470.}.

FIN 680. Applied Portfolio Management. 3 Credits.
This course combines theory with practice and provides students with a unique educational opportunity to study portfolio management while managing the Student Managed Investment Fund (Bison Fund). 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 an economic sector or a financial security. Students must be active members of the Bison Fund during the same academic year. {Also available for undergraduate credit - See FIN 480.}.

FIN 740. Advanced Financial Management. 3 Credits.
In-depth coverage of concepts and decision-making tools in financial analysis, cost of capital, capital structure, capital budgeting, and dividend policy through analyzing competitive situations and developing strategic views of key financial dimensions.

Food Safety (SAFE)

SAFE 401. Food Safety Information & Flow of Food. 1 Credit.
An orientation to food safety. How to find, evaluate and report credible food safety information, and comprehension of the complexity of food systems. {Also offered for graduate credit - see SAFE 601.}.

SAFE 402. Foodborne Hazards. 1 Credit.
This course will lead students into the comprehension of the vast variety of chemical, physical and biological foodborne hazards. Prereq: SAFE 401 or SAFE 601. {Also offered for graduate credit - see SAFE 602.}.

SAFE 403. Food Safety Risk Assessment. 1 Credit.
This course will enforce the concept that no food is 100% safe, and will lead students to understand how to assess the likelihood of foodborne illness events. Prereq: SAFE 402 or SAFE 602. {Also offered for graduate credit - see SAFE 603.}.

SAFE 404. Epidemiology of Foodborne Illness. 1 Credit.
This course will lead students to understand foodborne disease outbreaks, comprehend and apply epidemiologic models of disease causation and causal inference, and apply disease outbreak investigation steps. Prereq: SAFE 403 or SAFE 603. {Also offered for graduate credit - see SAFE 604.}.

SAFE 405. Costs of Food Safety. 1 Credit.
This course will lead students to comprehend and analyze the economic and societal costs of foodborne illness outbreaks. Prereq: SAFE 404 or SAFE 604. {Also offered for graduate credit - see SAFE 605.}.

SAFE 406. Food Safety Crisis Communication. 1 Credit.
This course will lead students to understand the best ways to disseminate food safety information during or following a foodborne illness outbreak. Prereq: SAFE 405 or SAFE 605. {Also offered for graduate credit - see SAFE 606.}.

SAFE 407. Food Safety Risk Management. 1 Credit.
This course will lead students to understand strategies and costs of reducing risk of foodborne illness. Prereq: SAFE 406 or SAFE 606. {Also offered for graduate credit - see SAFE 607.}.

SAFE 408. Food Safety Regulatory Issues. 1 Credit.
This course will lead students to understand the food safety regulatory structure. Prereq: SAFE 407 or SAFE 607. {Also offered for graduate credit - see SAFE 608.}.

SAFE 409. Food Safety Risk Communication & Education. 1 Credit.
This course will lead students to understand the importance of worker training and consumer education in food safety. Prereq: SAFE 408 or SAFE 608. {Also offered for graduate credit - see SAFE 609.}.

SAFE 440. Hazard Analysis Critical Control Point (HACCP) and Food Safety Systems. 2 Credits.
Students will become familiar with hazard analysis, critical control point and food safety plans, including good manufacturing practices and standard operating procedures for safe food production. {Also offered for graduate credit - see SAFE 640.}.

SAFE 452. Food Laws and Regulations. 3 Credits.
Regulations, laws, and dynamics governing development of food policy. Prereq: SAFE 470. Cross-listed with CFS 452 and AGEC 452. {Also offered for graduate credit - see SAFE 652.}.

SAFE 484. Food Safety Practicum. 1-3 Credits.
Supervised experience to give students hands-on practice at addressing food safety problems. Placement with industry, government or academic settings will be arranged. Program permission required for registration. May be repeated for credit. {Also offered for graduate credit - see SAFE 684.}.

SAFE 485. Risk and Crisis Communication. 3 Credits.
Crisis communication practices in organizations of all types with emphasis on planning, emergency communication, image restoration, and organizational learning. Prereq: COMM 110. Cross-listed with COMM 485.

SAFE 494. Individual Study. 1-5 Credits.

SAFE 601. Food Safety Information & Flow of Food. 1 Credit.
An orientation to food safety. How to find, evaluate and report credible food safety information, and comprehension of the complexity of food systems. {Also offered for undergraduate credit - see SAFE 401.}.

SAFE 602. Foodborne Hazards. 1 Credit.
This course will lead students into the comprehension of the vast variety of chemical, physical and biological foodborne hazards. Prereq: SAFE 601. {Also offered for undergraduate credit - see SAFE 402.}.

SAFE 603. Food Safety Risk Assessment. 1 Credit.
This course will enforce the concept that no food is 100% safe, and will lead students to understand how to assess the likelihood of foodborne illness events. Prereq: SAFE 602. {Also offered for undergraduate credit - see SAFE 403.}.

SAFE 604. Epidemiology of Foodborne Illness. 1 Credit.
This course will lead students to understand foodborne disease outbreaks, comprehend and apply epidemiologic models of disease causation and causal inference, and apply disease outbreak investigation steps. Prereq: SAFE 603. {Also offered for undergraduate credit - see SAFE 404.}.

SAFE 605. Costs of Food Safety. 1 Credit.
This course will lead students to comprehend and analyze the economic and societal costs of foodborne illness outbreaks. Prereq: SAFE 604. {Also offered for undergraduate credit - see SAFE 405.}.

SAFE 606. Food Safety Crisis Communication. 1 Credit.
This course will lead students to understand the best ways to disseminate food safety information during or following a foodborne illness outbreak. Prereq: SAFE 605. {Also offered for undergraduate credit - see SAFE 406.}.

SAFE 607. Food Safety Risk Management. 1 Credit.
This course will lead students to understand strategies and costs of reducing risk of foodborne illness. Prereq: SAFE 606. {Also offered for undergraduate credit - see SAFE 407.}.

SAFE 608. Food Safety Regulatory Issues. 1 Credit.
This course will lead students to understand the food safety regulatory structure. Prereq: SAFE 607. {Also offered for undergraduate credit - see SAFE 408.}.

SAFE 609. Food Safety Risk Communication & Education. 1 Credit.
This course will lead students to understand the importance of worker training and consumer education in food safety. Prereq: SAFE 608. {Also offered for undergraduate credit - see SAFE 409.}.

SAFE 640. Hazard Analysis Critical Control Point (HACCP) and Food Safety Systems. 2 Credits.
Students will become familiar with hazard analysis, critical control point and food safety plans, including good manufacturing practices and standard operating procedures for safe food production. {Also offered for undergraduate credit - see SAFE 440.}.

SAFE 652. Food Laws and Regulations. 3 Credits.
Regulations, laws, and dynamics governing development of food policy. Cross-listed with CFS 652 and AGEC 652. {Also offered for undergraduate credit - see SAFE 452.}.

SAFE 684. Food Safety Practicum. 1-3 Credits.
Supervised experience to give students hands-on practice at addressing food safety problems. Placement with industry, government or academic settings will be arranged. Program permission required for registration. May be repeated for credit. {Also offered for undergraduate credit - see SAFE 484.}.

SAFE 720. Food Safety Costs and Benefits Analysis. 3 Credits.
Theoretical and empirical impacts of food safety costs and benefits. Three lectures. Prereq: SAFE 670, AGEC 741. Cross-listed with AGEC 720.

SAFE 725. Food Policy. 3 Credits.
Provides quantitative tools and models used to analyze general food safety policies. Three lectures. Prereq: SAFE 670. Cross-listed with AGEC 725 and CFS 725.

SAFE 753. Food Toxicology. 2 Credits.
Discussions on the properties of toxic substances found both naturally and as contaminants in foods, the hazards they present to humans and their food supplies, and ways to reduce risks.

SAFE 785. Advanced Crisis Communication. 3 Credits.
Long- and short-term issues for managing communication related to organizational crises are discussed in the stages of pre-crisis, crisis and post-crisis.

SAFE 786. Risk Communication. 3 Credits.
Explores the relationship between communication strategies and risk perception, assessment, and management. Cross-listed with COMM 786.

SAFE 790. Graduate Seminar. 1-3 Credits.

SAFE 791. Temporary/Trial Topics. 1-5 Credits.

SAFE 793. Individual Study/Tutorial. 1-5 Credits.

SAFE 794. Practicum/Internship. 1-10 Credits.

SAFE 795. Field Experience. 1-15 Credits.

SAFE 796. Special Topics. 1-5 Credits.

SAFE 797. Master's Paper. 1-3 Credits.

SAFE 798. Master's Thesis. 1-10 Credits.

SAFE 899. Doctoral Dissertation. 1-15 Credits.

French (FREN)

FREN 101. First-Year French I. 4 Credits.
Basic structures and vocabulary of French. Practice in the fundamentals of listening, speaking, reading, and writing. No previous knowledge of French required.

FREN 102. First-Year French II. 4 Credits.
Basic structures and vocabulary of French. Practice in the fundamentals of listening, speaking, reading, and writing. Prereq: FREN 101.

FREN 194. Individual Study. 1-5 Credits.

FREN 196. Field Experience. 1-15 Credits.

FREN 199. Special Topics. 1-5 Credits.

FREN 201. Second-Year French I. 3 Credits.
Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary readings. Prereq: FREN 102.

FREN 202. Second-Year French II. 3 Credits.
Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary readings. Prereq: FREN 201.

FREN 291. Seminar. 1-3 Credits.

FREN 292. Study Abroad. 1-15 Credits.

FREN 294. Individual Study. 1-5 Credits.

FREN 299. Special Topics. 1-5 Credits.

FREN 311. French Conversation and Composition I. 3 Credits.
Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: FREN 202.

FREN 312. French Conversation and Composition II. 3 Credits.
Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: FREN 202.

FREN 315. Contemporary France. 3 Credits.
An interdisciplinary study of present-day France; discussion of the political, social, and cultural context, including a brief historical overview and the role of France within the global community. Taught in French. Prereq: FREN 312.

FREN 340. The French-Speaking World. 3 Credits.
Study of works by Francophone writers and the history and cultures that influence their writings. Taught in English and French.

FREN 345. Women in French Literature. 3 Credits.
Study of works by French and Francophone women writers of different literary periods; portrayals of women by French male and female authors. Taught in English and French.

FREN 350. Introduction to French Linguistics and Pronunciation. 3 Credits.
Study of the basic nature and function of languages as applied to French. Application of principles of phonetics to the pronunciation of the French language, plus extended practice in diction and intonation. Prereq: FREN 312.

FREN 360. Studies in Language and Style. 3 Credits.
Focus on the theory and practice of writing in multiple genres in French. Taught in French. Prereq: FREN 312, ENGL 120 and junior standing.

FREN 365. Advanced Conversation Through Contemporary Culture. 3 Credits.
Advanced practice oral skills in the context of contemporary current events in France and the Francophone world; may be repeated for credit. Taught in French. Prereq: FREN 312.

FREN 370. Translation: Practice and Theory. 3 Credits.
Introduction to basic concepts, strategies, and issues in translation; practice and development of skills and techniques for translation of a wide variety of texts. Taught in French and English. Prereq: FREN 312. May be repeated for credit.

FREN 379. Study Tour Abroad. 1-6 Credits.

FREN 381. Masterpieces of French Literature in Translation. 3 Credits.
Designed for those with no background in French. Introduction to important writers of several periods. Taught in English. Does not count toward a French major or minor.

FREN 391. Seminar. 1-3 Credits.

FREN 392. Study Abroad. 1-15 Credits.

FREN 394. Individual Study. 1-5 Credits.

FREN 399. Special Topics. 1-5 Credits.

FREN 401. Approaches to Literature. 3 Credits.
Introduction to a variety of critical approaches to literature; how to read, understand, and write about French and Francophone texts from various genres and periods. Taught in French. Prereq: FREN 312.

FREN 410. French Literature & Culture before 1800. 3 Credits.
Overview of the cultural and political history of France before the Revolution and an introduction to important writers and artists through representative works. Taught in French. Prereq: FREN 312.

FREN 412. French Literature & Culture since 1800. 3 Credits.
Overview if the cultural and political history of France since the Revolution and an introduction to important authors and artists through representative works. Taught in French. Prereq: FREN 312. (alternate years).

FREN 420. Themes & Topics in French Literature & Culture. 3 Credits.
Exploration of a significant theme or topic in French or Francophone literature and culture (e.g. the comic; philosophy & literature) not routinely included in the curriculum. May be repeated for credit with change in topic or theme. Taught in French. Prereq: FREN 312.

FREN 422. Genres in French Literature. 3 Credits.
In-depth study of works in French on a specific genre. Course may be repeated for credit with change in genre. Taught in French. Prereq: FREN 312.

FREN 489. Senior Thesis. 1 Credit.
Integrative capstone experience for seniors majoring in French; faculty guided research within the context of a 400-level literature or culture course leading to a substantive written project in French and its oral presentation to faculty and departmental majors. Prereq: Senior standing; study abroad.

FREN 491. Seminar. 1-5 Credits.

FREN 492. Study Abroad. 1-15 Credits.

FREN 494. Individual Study. 1-5 Credits.

FREN 496. Field Experience. 1-15 Credits.

FREN 499. Special Topics. 1-5 Credits.

Geography (GEOG)

GEOG 105. Fundamentals of Geographic Information Systems. 3 Credits.
Basics of integration and analyses of spatial data to visualize relationships, seek explanations, and develop solutions to problems. Emphases are placed on the nature of geographic information and the ways digital methods support geographic analyses and modeling.

GEOG 151. Human Geography. 3 Credits.
Non-ethnocentric understanding of geography of human lifestyles and activities; their place and role in human-environment interaction.

GEOG 161. World Regional Geography. 3 Credits.
Study of geographic processes shaping major world regions and inter-relationships in the global village; geographic bases and implications of current world events.

GEOG 194. Individual Study. 1-3 Credits.

GEOG 196. Field Experience. 1-15 Credits.

GEOG 199. Special Topics. 1-5 Credits.

GEOG 262. Geography of North America. 3 Credits.
Spatial approach to the development of the United States and Canada, which stresses changing cultural landscapes and assessing impacts of planning for resource utilization.

GEOG 291. Seminar. 1-3 Credits.

GEOG 292. Study Abroad. 1-15 Credits.

GEOG 294. Individual Study. 1-5 Credits.

GEOG 299. Special Topics. 1-5 Credits.

GEOG 379. Study Tour Abroad. 1-6 Credits.

GEOG 391. Seminar. 1-3 Credits.

GEOG 392. Study Abroad. 1-15 Credits.

GEOG 394. Individual Study. 1-5 Credits.

GEOG 399. Special Topics. 1-5 Credits.

GEOG 412. Geomorphology. 3 Credits.
Land forms and the processes by which they are formed and modified. Prereq: GEOL 105, GEOL 105L. Cross-listed with GEOL 412. {Also offered for graduate credit - see GEOG 612.}.

GEOG 455. Introduction to Geographic Information Systems. 4 Credits.
Application of the principles of geographic information systems and integrally related mapping to solve problems related to environment site characterizations, resource exploration, soil and groundwater contamination, geological and geotechnical investigations, waste management, construction, etc. Comprehensive lab assignments included to give students hands-on experience solving probems with current state-of-the-art software and hardware, digitizers, scanners, and GPS units. {Also offered for graduate credit - see GEOG 655.}.

GEOG 456. Advanced Geographic Information Systems. 3 Credits.
Application and analysis of advanced techniques and principles of geographic information systems and remote sensing technologies to fully address spatial and time related problems related to urban site characterizations, hydrologi analyses, risk assessment, policy making, disaster response and strategis defense techniques. Comprehensive lab assignments included to give students hands-on experience solving problems with current state-of-the-art software and hardware, digitizers, scanners, and GPS units. Prereq: GEOG 455. {Also offered for graduate credit - see GEOG 656.}.

GEOG 465. Remote Sensing of the Environment. 3 Credits.
This course will focus on developing practical skills for using various types of accessible remote sensing technologies as applied to environmental sciences. We will learn to work with aerial photographs, aerial lidar data, Terrestrial Laser Scanning (TLS), structure from motion (sfm), and Unmanned Aerial Vehicles (UAVs). We will explore the drawbacks and benefits of each technology and how it can be used to gather information and measure change in the environment. Cross-listed with GEOL. {Also offered for graduate credit - See GEOG 665}.

GEOG 470. Remote Sensing. 3 Credits.
Application of principles of Remote Sensing technology to integrate multiple interrelated data, to identify and/or accentuate spectral indices, magnetic force, electromagnetic energy and other remotely collected data to analyze temporal and spatial variation. Cross-listed with GEOL. {Also offered for graduate credit - see GEOG 670.}.

GEOG 480. Geographic Information Systems Pattern Analysis and Modeling. 3 Credits.
Application of GIS for determination of: factors or variables that influence geospatial patterns, data limitations in spatial and temporal continuum scales, identification of data anomalies, optimal data prediction, and evaluation of prediction uncertainty. Prereq: GEOG 455. Cross-listed with GEOL 480. {Also offered for graduate credit - see GEOG 680.}.

GEOG 491. Seminar. 1-5 Credits.

GEOG 492. Study Abroad. 1-15 Credits.

GEOG 494. Individual Study. 1-5 Credits.

GEOG 496. Field Experience. 1-15 Credits.

GEOG 499. Special Topics. 1-5 Credits.

GEOG 612. Geomorphology. 3 Credits.
Land forms and the processes by which they are formed and modified. Cross-listed with GEOL 612. {Also offered for undergraduate credit - see GEOG 412.}.

GEOG 655. Introduction to Geographic Information Systems. 4 Credits.
Application of the principles of geographic information systems and integrally related mapping to solve problems related to environment site characterizations, resource exploration, soil and groundwater contamination, geological and geotechnical investigations, waste management, construction, etc. Comprehensive lab assignments included to give students hands-on experience solving probems with current state-of-the-art software and hardware, digitizers, scanners, and GPS units. {Also offered for undergraduate credit - see GEOG 455.}.

GEOG 656. Advanced Geographic Information Systems. 3 Credits.
Application and analysis of advanced techniques and principles of geographic information systems and remote sensing technologies to fully address spatial and time related problems related to urban site characterizations, hydrologi analyses, risk assessment, policy making, disaster response and strategis defense techniques. Comprehensive lab assignments included to give students hands-on experience solving problems with current state-of-the-art software and hardware, digitizers, scanners, and GPS units. Prereq: GEOG 655. {Also offered for undergraduate credit - see GEOG 456.}.

GEOG 665. Remote Sensing of the Environment. 3 Credits.
This course will focus on developing practical skills for using various types of accessible remote sensing technologies as applied to environmental sciences. We will learn to work with aerial photographs, aerial lidar data, Terrestrial Laser Scanning (TLS), structure from motion (sfm), and Unmanned Aerial Vehicles (UAVs). We will explore the drawbacks and benefits of each technology and how it can be used to gather information and measure change in the environment. Cross-listed with GEOL. {Also offered for undergraduate credit - See GEOG 465}.

GEOG 670. Remote Sensing. 3 Credits.
Application of principles of Remote Sensing technology to integrate multiple interrelated data, to identify and/or accentuate spectral indices, magnetic force, electromagnetic energy and other remotely collected data to analyze temporal and spatial variation. Cross-listed with GEOL. {Also offered for undergraduate credit - see GEOG 470.}.

GEOG 680. Geographic Information Systems Pattern Analysis and Modeling. 3 Credits.
Application of GIS for determination of: factors or variables that influence geospatial patterns, data limitations in spatial and temporal continuum scales, identification of data anomalies, optimal data prediction, and evaluation of prediction uncertainty. Prereq: GEOG 655. Cross-listed with GEOL 680. {Also offered for undergraduate credit - see GEOG 480.}.

GEOG 696. Special Topics. 1-5 Credits.

Geology (GEOL)

GEOL 105. Physical Geology. 3 Credits.
Study of the Earth as a physical body; its structure, composition, and the geologic processes acting on and within the Earth.

GEOL 105L. Physical Geology Lab. 1 Credit.
Study of the Earth as a physical body; its structure, composition, and the geologic processes acting on and within the Earth.

GEOL 106L. The Earth Through Time Lab. 1 Credit.
Introduction to the Earth through time; its origin, history, and evolution of animal and plant life.

GEOL 106. The Earth Through Time. 3 Credits.
Introduction to the Earth through time; its origin, history, and evolution of animal and plant life.

GEOL 107L. Eastern North Dakota Field Course. 1 Credit.
Field study of Mesozoic and Cenozoic sediments, landforms, and geological processes that have shaped the landscape of eastern North Dakota. Two-day field excursion and a report. Fee required. Recommended: GEOL 105 or GEOL 106.

GEOL 194. Individual Study. 1-5 Credits.

GEOL 196. Field Experience. 1-15 Credits.

GEOL 199. Special Topics. 1-5 Credits.

GEOL 201. The Geology of Climate Change and Energy. 3 Credits.
Exploration and quantitative analysis of Earth system processes, geologic and instrumental records of global-scale climate change, and the interrelationship of climate change and energy consumption from fossil fuels.

GEOL 210. Dinosaurs: Rulers of the Mesozoic. 2 Credits.
A survey of the dinosaurs: their fossil record, environment and place in Earth history.

GEOL 219. Oceanography. 3 Credits.
Ocean formation and dynamics over geologic time; waves and energy transfer of oceans; oceanic effects on world climates; coastal hazards.

GEOL 291. Seminar. 1-3 Credits.

GEOL 292. Study Abroad. 1-15 Credits.

GEOL 294. Individual Study. 1-5 Credits.

GEOL 299. Special Topics. 1-5 Credits.

GEOL 300. Environmental Geology. 3 Credits.
Human interaction with Earth's environment. Earthquakes, floods, volcanoes, landslides, water use, pollution, energy, mining, and land-use planning. Recommended: GEOL 105, GEOL 105L. (alternate years).

GEOL 301. Lake Superior Field Course. 2 Credits.
Stratigraphy, mineralogy, and economic geology of northern Minnesota and northwestern Ontario. Weekly lecture, plus six-day field excursion. Offered periodically. Fee required. Recommended: GEOL 105, GEOL 105L, GEOL 106, GEOL 106L.

GEOL 302. Black Hills Field Course. 2 Credits.
Stratigraphy, structure, and mineralogy of the Black Hills and Williston Basin. Weekly lectures, plus seven-day field excursion. Offered periodically. Fee required. Recommended: GEOL 105, GEOL 105L, GEOL 106, GEOL 106L.

GEOL 303. Paleontology Field Course. 1 Credit.
Paleozoic stratigraphy and paleontology of southeastern Minnesota and northern Iowa. Lecture by arrangement, 1 three and one-half day field excursion. Fee required. Recommended: GEOL 106, GEOL 106L. (alternate years).

GEOL 310. Planetary Geology. 3 Credits.
Survey of planetary geology reinforcing concepts of physical geology; formation and composition of the solar system, comparative planetary geology and geomorphology, extra-solar systems and habitable worlds, astrobiology. Recommended: GEOL 105.

GEOL 350. Invertebrate Paleontology. 3 Credits.
Survey of invertebrate fossils emphasizing systematics, environments and as stratigraphic markers. Recommended: GEOL 106, GEOL 106L. (alternate years).

GEOL 379. Study Tour Abroad. 1-6 Credits.

GEOL 391. Seminar. 1-3 Credits.

GEOL 392. Study Abroad. 1-15 Credits.

GEOL 394. Individual Study. 1-5 Credits.

GEOL 397. Coop Ed/Internship. 1-4 Credits.

GEOL 399. Special Topics. 1-5 Credits.

GEOL 410. Sedimentology/Stratigraphy. 4 Credits.
Origin and classification of sedimentary rocks and their stratigraphic relationships. 3 lectures, 1 laboratory. Recommended: GEOL 105, GEOL 105L, GEOL 106, GEOL 106L. (alternate years).

GEOL 412. Geomorphology. 3 Credits.
Land forms and the processes by which they are formed and modified. 3 lectures, 1 two-hour laboratory. Recommended: GEOL 105, GEOL 105L. Cross-listed with GEOG. {Also offered for graduate credit - see GEOL 612.}.

GEOL 413. Glacial Geology. 3 Credits.
Glaciers as agents of geologic change; evolution of landforms and landscapes shaped by glaciers; glaciers and glacial landscapes as records of global climate and environmental change; glacial history of North America. Recommended: GEOL 105, GEOL 105L. {Also offered for graduate credit - see GEOL 613.}.

GEOL 414. Hydrogeology. 3 Credits.
Concepts of surface and groundwater hydrogeology in natural systems; the hydrologic cycle; physical properties of aquifers and subsurface flow; open channel flow; aqueous geochemistry. Prereq: GEOL 105, GEOL 105L, MATH 147 or MATH 166, PHYS 212 or PHYS 252, CHEM 122 or CHEM 161. {Also offered for graduate credit - see GEOL 614.}.

GEOL 420. Mineralogy. 3 Credits.
Crystal forms, crystal chemistry, and formation of non-silicate and silicate minerals. Recommended: CHEM 121 or CHEM 150. (alternate years) {Also offered for graduate credit - see GEOL 620.}.

GEOL 421. Mineralogy Laboratory. 1 Credit.
Identification and classification of minerals using morphology, physical properties, XRF and XRD. Coreq: GEOL 420. (alternate years) {Also offered for graduate credit - see GEOL 621.}.

GEOL 422. Petrology. 3 Credits.
Principles of igneous and metamorphic petrology including geochemistry, phase relations, and rock forming processes. Prereq: GEOL 420. (alternate years) {Also offered for graduate credit - see GEOL 622.}.

GEOL 423. Petrography. 1 Credit.
Identification and classification of rocks in hand specimens and thin sections. Optical mineralogy. Field and laboratory projects required. Prereq: GEOL 422. (alternate years) {Also offered for graduate credit - see GEOL 623.}.

GEOL 428. Geochemistry. 3 Credits.
Introduction to geochemistry: chemistry of the Earth, groundwater, isotopes, global geochemical cycles, geochemical modeling, and environmental geochemistry. Recommended: CHEM 121 or CHEM 150. Cross-listed with CHEM 428. (alternate years) {Also offered for graduate credit - see GEOL 628.}.

GEOL 440. Quaternary Biology. 4 Credits.
Biotic responses to climatic changes; the role of adaptation, extinction, and dispersal in response to the climatic changes of the Quaternary. 2 lectures, field and laboratory studies. Offered periodically. Recommended: GEOL 106, GEOL 106L. {Also offered for graduate credit - see GEOL 640.}.

GEOL 450. Field Geology. 3 Credits.
Interpretation of geology in the field; preparation of base maps and plotting geological data. Lectures and one-week fieldwork. Fee required. Prereq: GEOL 410, GEOL 421, GEOL 423, GEOL 457. (alternate years) {Also offered for graduate credit - see GEOL 650.}.

GEOL 457. Structural Geology. 4 Credits.
Dynamics of rock deformation and analyses of Earth structure. Recommended: GEOL 105, GEOL 105L, MATH 105. (alternate years) {Also offered for graduate credit - see GEOL 657.}.

GEOL 460. Biogeochemistry. 3 Credits.
An overview of how life affects Earth's chemistry, examining interactions between the atmosphere, the land surface, and the oceans. Biotic mechanisms will be followed via the global cycles of biologically relevant elements stressing human impacts. Recommended: GEOL 105, GEOL 105L, GEOL 106, GEOL 106L, CHEM 121, CHEM 122, BIOL 150, BIOL 151. {Also offered for graduate credit - see GEOL 660.}.

GEOL 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. {Also offered for graduate credit - See GEOL 665}.

GEOL 470. Remote Sensing. 3 Credits.
Application of principles of Remote Sensing technology to integrate multiple interrelated data, to identify and/or accentuate spectral indices, magnetic force, electromagnetic energy and other remotely collected data to analyze temporal and spatial variation. Cross-listed with GEOG. {Also offered for graduate credit - see GEOL 670.}.

GEOL 480. Geographic Information Systems Pattern Analysis and Modeling. 3 Credits.
Application of GIS for determination of: factors or variables that influence geospatial patterns, data limitations in spatial and temporal continuum scales, identification of data anomalies, optimal data prediction, and evaluation of prediction uncertainty. Prereq: GEOG 455. Cross-listed with GEOG 480. {Also offered for graduate credit - see GEOL 680.}.

GEOL 491. Seminar. 1-5 Credits.

GEOL 492. Study Abroad. 1-15 Credits.

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 640. Quaternary Biology. 4 Credits.
Biotic responses to climatic changes; the role of adaptation, extinction, and dispersal in response to the climatic changes of the Quaternary. 2 lectures, field and laboratory studies. Offered periodically. {Also offered for undergraduate credit - see GEOL 440 .}.

GEOL 650. Field Geology. 3 Credits.
Interpretation of geology in the field; preparation of base maps and plotting geological data. Lectures and one-week fieldwork. Fee required. Prereq: GEOL 610, GEOL 621, GEOL 623, GEOL 657. (alternate years) {Also offered for undergraduate credit - see GEOL 450.}.

GEOL 657. Structural Geology. 4 Credits.
Dynamics of rock deformation and analyses of Earth structure. (alternate years) {Also offered for undergraduate credit - see GEOL 457.}.

GEOL 660. Biogeochemistry. 3 Credits.
An overview of how life affects Earth's chemistry, examining interactions between the atmosphere, the land surface, and the oceans. Biotic mechanisms will be followed via the global cycles of biologically relevant elements stressing human impacts.{Also offered for undergraduate credit - see GEOL 460.}.

GEOL 665. Remote Sensing of the Environment. 3 Credits.
This course will focus on developing practical skills for using various types of accessible remote sensing technologies as applied to environmental sciences. We will learn to work with aerial photographs, aerial lidar data, Terrestrial Laser Scanning (TLS), structure from motion (sfm), and Unmanned Aerial Vehicles (UAVs). We will explore the drawbacks and benefits of each technology and how it can be used to gather information and measure change in the environment. Cross-listed with GEOG. {Also offered for undergraduate credit - See GEOL 465}.

GEOL 670. Remote Sensing. 3 Credits.
Application of principles of Remote Sensing technology to integrate multiple interrelated data, to identify and/or accentuate spectral indices, magnetic force, electromagnetic energy and other remotely collected data to analyze temporal and spatial variation. Cross-listed with GEOL. {Also offered for undergraduate credit - see GEOL 470.}.

GEOL 680. Geographic Information Systems Pattern Analysis and Modeling. 3 Credits.
Application of GIS for determination of: factors or variables that influence geospatial patterns, data limitations in spatial and temporal continuum scales, identification of data anomalies, optimal data prediction, and evaluation of prediction uncertainty. Prereq: GEOG 655. Cross-listed with GEOG 680. {Also offered for undergraduate credit - see GEOL 480.}.

GEOL 695. Field Experience. 1-15 Credits.

GEOL 696. Special Topics. 1-5 Credits.

GEOL 712. Topics in Geomorphology. 3 Credits.
This course focuses on developing an understanding of how Earth surface processes shape the landscape and how these processes relate to research in a broad range of disciplines.

GEOL 760. Advanced Biogeochemistry. 3 Credits.
Examines the nature of the interaction between Earth's biogeochemical cycles and climate and how this interaction has evolved over time and will change in the future. Recommended: GEOL 660.

GEOL 793. Individual Study/Tutorial. 1-5 Credits.

German (GERM)

GERM 101. First-Year German I. 4 Credits.
Basic structures and vocabulary of German. Practice in the fundamentals of listening, speaking, reading, and writing. No previous knowledge of German required.

GERM 102. First-Year German II. 4 Credits.
Basic structures and vocabulary of German. Practice in the fundamentals of listening, speaking, reading, and writing. Prereq: GERM 101.

GERM 194. Individual Study. 1-5 Credits.

GERM 196. Field Experience. 1-15 Credits.

GERM 199. Special Topics. 1-5 Credits.

GERM 201. Second-Year German I. 3 Credits.
Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary reading. Prereq: GERM 102.

GERM 202. Second-Year German II. 3 Credits.
Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary reading. Prereq: GERM 201.

GERM 220. German Culture & Society. 3 Credits.
Exploration of German culture (including everyday culture, film, and literature), politics, history, geography, and religion. A broad overview with particular emphasis on Germany since 1945. Taught in English.

GERM 291. Seminar. 1-3 Credits.

GERM 292. Study Abroad. 1-15 Credits.

GERM 294. Individual Study. 1-5 Credits.

GERM 299. Special Topics. 1-5 Credits.

GERM 311. German Conversation and Composition I. 3 Credits.
Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: GERM 202.

GERM 312. German Conversation and Composition II. 3 Credits.
Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings.

GERM 379. Study Tour Abroad. 1-6 Credits.

GERM 391. Seminar. 1-3 Credits.

GERM 392. Study Abroad. 1-15 Credits.

GERM 394. Individual Study. 1-5 Credits.

GERM 399. Special Topics. 1-5 Credits.

GERM 491. Seminar. 1-5 Credits.

GERM 492. Study Abroad. 1-15 Credits.

GERM 494. Individual Study. 1-5 Credits.

GERM 496. Field Experience. 1-15 Credits.

GERM 499. Special Topics. 1-5 Credits.

Health, Nutrition & Exercise Sciences (HNES)

HNES 100. Concepts of Fitness & Wellness. 2 Credits.
Facts about exercise and physical fitness.

HNES 108. Tae Kwon Do I. 1 Credit.
The purpose of this course is to teach basic technique and practice of Tae Kwon Do.

HNES 110. Introduction to Health and Physical Education. 3 Credits.
This course will acquaint students with historical insights and current trends in the fields of health and physical education. Students will also identify various career opportunities within their field of study and acquaint themselves with the professional field.

HNES 111. Wellness. 3 Credits.
Examination of personal lifestyle choices related to emotional, nutritional, and mental well-being.

HNES 112. Activity II. 1 Credit.
Basic techniques and practice of individual and dual sports activities. May be repeated in different activities/subjects only.

HNES 114. Racquetball. 1 Credit.
Basic techniques and practice of racquetball.

HNES 115. Bowling. 1 Credit.
Basic techniques and practice of bowling.

HNES 116. Billiards. 1 Credit.
Basic technique and practice of billiards.

HNES 117. Judo. 1 Credit.
Basic techniques and practice of judo.

HNES 119. Beginning PADI Open Water Scuba. 2 Credits.
Beginning level scuba skills.

HNES 122. Advanced PADI Open Water Scuba. 2 Credits.
Advanced level scuba skills. Prereq: HNES 119.

HNES 123. Yoga. 1 Credit.
Basic technique and practice of yoga.

HNES 124. Tai Chi. 1 Credit.
Basic technique and practice of tai chi.

HNES 126. Social Dance. 1 Credit.
Basic techniques and practice of social and ballroom dance forms such as foxtrot, waltz, jitterbug, polka, schottische, and Latin American dances.

HNES 127. Self Defense. 1 Credit.
Basic technique and practice of self defense.

HNES 128. Golf. 1 Credit.
Basic technique and practice of golf.

HNES 130. Rock Climbing. 1 Credit.
Basic technique and practice of rock climbing.

HNES 133. Volleyball. 1 Credit.
In this course you will learn the basic principles, rules and practice of volleyball.

HNES 134. Basketball. 1 Credit.
Basic technique and practice of basketball.

HNES 135. Badminton. 1 Credit.
Basic technique and practice of badminton.

HNES 136. Beginners Open Water Scuba Diving - SSI. 2 Credits.
Beginning level scuba skills for Scuba Schools International (SSI).

HNES 139. Dodgeball. 1 Credit.
Basic technique and practice of dodgeball.

HNES 141. Food Sanitation. 1 Credit.
Principles of safe food handling practices designed for foodservice operators. Includes Food Safety Managers' Certification. Restricted to Dietetics, Hospitality, Family Consumer Science, Food Science, and Food Safety majors and minors only.

HNES 142. Yoga II. 1 Credit.
This intermediate yoga educational course is based upon asansas (postures), pranayama (breathing techniques), and shamata practice (mindfulness). Emphasis is placed on combining awareness, stability and fluidity in the creation of a personal practice.

HNES 148. Team Sports. 1 Credit.
Basic principles, rules, and practices of various team sports.

HNES 170. Introduction to Exercise Science. 2 Credits.
Investigation of various Exercise Science career opportunities within the field and the professional track at NDSU.

HNES 190. Introduction to Sport Management. 3 Credits.
This course is designed to introduce students to various concepts that make up the foundation and underlying principles of sport management. In addition, program expectations are covered and a focus is placed on professional development.

HNES 194. Individual Study. 1-5 Credits.

HNES 196. Field Experience. 1-15 Credits.

HNES 199. Special Topics. 1-5 Credits.

HNES 200. Principles of Nutrition. 3 Credits.
Current nutrition facts and philosophy as a basis for meeting nutritional needs in a changing society. 3 lectures.

HNES 210. Professional Rescuer CPR/AED and First Aid. 1 Credit.
This course will provide the student with the knowledge and skills necessary in an emergency to help sustain life and minimize pain and the consequences of injury or sudden illness until medical help arrives. Successful completion leads to American Red Cross CPR/AED for the Professional Rescuer and Health Care Providers and First Aid certifications. Restricted to Exercise Science, Physical Education, Health Education, Sport Management, Radiologic Sciences and Respiratory Care majors only.

HNES 211. Successful Coaching. 1 Credit.
This course is designed to help potential coaches develop a successful coaching philosophy. Students will complete an examination through the American Sport Education Program that will certify them to coach in 35 states.

HNES 217. Personal and Community Health. 3 Credits.
Study of vital personal and community health issues. Particular attention to current health facts, habits, and attitudes as they relate to home, school, and community.

HNES 224. Sport and Event Management. 3 Credits.
Introductory course in sport and event management that will provide students the opportunity to investigate the facilitation of sports events. A major component of this course will be working in a management or leadership role within a major sports event. Prereq: HNES 190.

HNES 226. Socio-Cultural Dimension in Sport. 3 Credits.
Students will gain a level of understanding of how sport has and does contribute to the notion of nation building in North America and across the world. Prereq: HNES 190 and Sport Management professional program students only.

HNES 231. Officiating Football. 1 Credit.
Rules and techniques of officiating football.

HNES 232. Officiating Basketball. 1 Credit.
Rules and techniques of officiating basketball.

HNES 250. Nutrition Science. 3 Credits.
Scientific principles of nutrition based on chemical structure and function of the nutrients. 3 lectures. Prereq or Coreq: CHEM 117 or CHEM 121.

HNES 251. Nutrition, Growth and Development. 3 Credits.
Examination of growth and nutrient needs through the lifecycle. Prereq: HNES 200 or HNES 250.

HNES 254. Curriculum, Standards and Assessment in Physical Education. 3 Credits.
This course bridges the gap between theory and practice by providing a practical approach to curriculum writing, standards development and assessment techniques used in K-12 physical education programs. Prereq: HNES 255, HNES 256, HNES 301 and HPE professional standing.

HNES 255. Professional Preparation in Middle School Physical Education. 3 Credits.
Instruction of various fundamental movement for middle school students. Students will be exposed to such activities as team sports, intermediate movement skills, and games. Prereq: HNES 110.

HNES 256. Professional Preparation in High School Physical Education. 3 Credits.
Instruction in the fundamentals of teaching high school physical education activities. Prereq: HNES 110.

HNES 257. Professional Preparation in Elementary School Activities. 3 Credits.
Instruction of various fundamental movements for elementary aged students. Students will be exposed to such activities as dance, gymnastics, fundamental movement skills, and games. Prereq: HNES 254 and professional standing.

HNES 260. Athletic Training Medical Terminology. 1 Credit.
Medical terminology related to athletic training and other allied health professions.

HNES 261. Food Selection and Preparation Principles. 3 Credits.
Scientific principles underlying food selection, preparation, and preservation; integration of nutrition principles, food standards, cost comparisons, and new food developments. 3 lectures. Prereq: HNES 141 and CHEM 117 or CHEM 121.

HNES 261L. Food Selection and Preparation Principles Laboratory. 2 Credits.
Illustrates and extends lecture topics and stresses practical application of scientific food preparation principles. Prereq: HNES 141. Coreq: HNES 261.

HNES 276. Professional Observation. 1 Credit.
Observation in a setting providing established health-fitness services. Prereq: HNES 170 and HNES 272.

HNES 291. Seminar. 1-5 Credits.

HNES 292. Study Abroad. 1-15 Credits.

HNES 294. Individual Study. 1-3 Credits.

HNES 299. Special Topics. 1-5 Credits.

HNES 301. Motor Learning and Performance. 3 Credits.
Study of the principles of motor learning and development and how those principles apply in physical education and sport skill development. Prereq: HNES 110, HNES 154, HNES 254, HNES 255, HNES 256 and professional level 2 students only.

HNES 304. Sport Promotion and Public Relations. 3 Credits.
This course explores the aspects of the sports promotion industry and how industry interfaces with the consumer. Theories of sport promotion and public relations will be related to promotion efficacy. Prereq: HNES 190, HNES 224 and students must be admitted to the Sport Management professional program.

HNES 335. Coaching Volleyball. 2 Credits.
Rules, theory, principles, and fundamentals of coaching volleyball. Prereq: Knowledge of the sport.

HNES 336. Methods Of Coaching. 3 Credits.
Provides information necessary to coach at any level from elementary to college. Includes broad overview of the philosophy, methodology, and management of sport. Prereq: professional level 2 PE major or coaching minor.

HNES 341. Psychosocial Aspects of Health. 3 Credits.
Study of the interaction of the person and his/her environment. Discussion of emotional states, physiological responses and behaviors influencing a person's health, and the health of those around them. Prereq: PSYC 111, HNES 110 and HNES 217 and students must be professional level 2 Health Ed majors.

HNES 345. Materials and Concepts of Health Education. 3 Credits.
Development and dissemination of health content helping community and school health educators place health instruction in a perspective that relates it to efforts aimed at protecting and promoting the health of children, youth and adults. Prereq: HNES 367 and Health Education majors only.

HNES 350. Fitness Education Activities and Materials. 3 Credits.
Topics related to teaching concepts-based fitness in high school physical education. Prereq: HNES 367.

HNES 351. Metabolic Basis of Nutrition. 4 Credits.
Biochemical and physiological principles of human nutrition. Nutrients in relation to metabolic regulation. 4 lectures. Prereq: HNES 250, BIOC 260 or BIOC 460 and Dietetics professional standing.

HNES 353. Adapted Physical Education. 3 Credits.
Current concepts and trends in adapted physical education, including the planning and implementation of adapted physical education curriculum and lessons designed to meet the needs of individuals with disabilities. Prereq: HNES 367.

HNES 354. Introduction to Medical Nutrition Therapy. 4 Credits.
Introduction to the role and skills in nutritional care and application of skills necessary for beginning competency as a clinical dietitian. Prereq: HNES 251, HNES 351 and Dietetics professional standing.

HNES 354L. Introduction to Medical Nutrition Therapy Laboratory. 2 Credits.
Supervised practice in dietetics, for Coordinated Program Dietetics students, in a health care setting. 1 three-hour laboratory. Prereq: HNES 251, HNES 351. Coreq: HNES 354.

HNES 361. Foodservice Systems Management I. 3 Credits.
Principles and methods of purchasing, production, and management for quantity foodservice operations. 3 lectures. Prereq: HNES 261, HNES 261L.

HNES 361L. Foodservice Systems Management I Laboratory. 3 Credits.
Menu and special event planning, food production, recipe analysis, and safety & sanitation for student-led "made-from-scratch" lab experience. Coreq: HNES 361.

HNES 365. Kinesiology. 3 Credits.
Study of movement analysis with emphasis on anatomical and movement principles. Prereq: BIOL 220, BIOL 220L. Restricted to Exercise Science majors only.

HNES 367. Principles of Conditioning. 3 Credits.
Scientific theory and application of principles and techniques of physical conditioning to optimize training programs. Introduction of a wide variety of sports activities and associated training protocols. Prereq: HNES 254.

HNES 368. Biomechanics of Exercise. 3 Credits.
Study of the application of the principles of biomechanics and physics to human movement. Prereq: HNES 365. Restricted to Exercise Science professional majors only.

HNES 370. Exercise and Disease. 3 Credits.
Focus on the role physical activity or inactivity plays in the development, inhibition, and/or treatment of common chronic and metabolic conditions. Prereq: BIOL 221, BIOL 221L and HNES 375. Co-Req: HNES 465.

HNES 371. Worksite Health Promotion. 3 Credits.
Design and implementation of worksite health promotion programs and the benefits for employees and employers. Prereq: HNES 375 and Exercise Science professional majors only.

HNES 374. Methods in Resistance Training and Cardiovascular Conditioning. 3 Credits.
This course is designed to provide the student knowledge in the techniques of resistance training, cardiovascular conditioning, and program design. Prereq: HNES 365. Restricted to Exercise Science professional students only.

HNES 375. Research Methods and Design in Exercise Science. 3 Credits.
Understanding and application of a wide variety of research design principles and methodology in exercise science. Prereq: STAT 330 and Exercise Science professional majors only.

HNES 376. Adapted Physical Activity. 3 Credits.
Current concepts and trends in adapted physical activity, including the planning and implementation of physical activity programs and sports designed to meet the needs of individuals with disabilities. Prereq: Exercise Science professional status.

HNES 379. Study Tour Abroad. 1-6 Credits.

HNES 388. Prevention and Care of Athletic Injuries. 3 Credits.
This course is designed to introduce the student to basic care, treatment, and prevention of athletic related injuries. Other sports medicine concepts will also be discussed.

HNES 391. Seminar. 1-3 Credits.

HNES 392. Study Abroad. 1-15 Credits.

HNES 394. Individual Study. 1-5 Credits.

HNES 399. Special Topics. 1-5 Credits.

HNES 400. Interprofessional Health Care Practice. 3 Credits.
This course is designed for pharmacy, nursing, allied sciences, and other allied health students focusing on the necessary knowledge, skills, and attitudes to function as an effective member of the health care team. Prereq: HNES 354. Cross-listed with CHP.

HNES 420. Needs Assessment and Program Planning in Health Education. 3 Credits.
This course provides students with the practical knowledge and skills to assess health resources and needs, and to develop and implement health promotion programs to meet specific needs in particular populations.

HNES 426. Sport Administration. 3 Credits.
This course is intended to familiarize sport management majors with common administrative practices in sport. Prereq: HNES 190, HNES 224, HNES 226, HNES 304, HNES 431, HNES 436, junior standing and Sport Management professional program students only.

HNES 431. Governance, Policy, Legal Liability and Ethics in Sport. 3 Credits.
This course examines how sport organizations interact and coordinate with numerous policy actors from inside and outside the sport realm to facilitate and coordinate the mechanisms of governance. Prereq: HNES 190, HNES 224 and students must be admitted to the Sport Management professional program.

HNES 436. Contemporary Issues in Sport Management. 3 Credits.
Students will gain a level of understanding of issues and current events in sport management. Prereq: HNES 190, HNES 224, HNES 226 and students must be admitted to the Sport Management professional program as prerequisites and HNES 304 as a co-requisite.

HNES 442. Community Health and Nutrition Education. 3 Credits.
Nutrition education in community settings. Topics include behavior change, education and counseling theory, needs assessment, planning, implementation, and evaluation in a community setting. Prereq: HNES 251. {Also offered for graduate credit - see HNES 642.}.

HNES 442L. Community Health and Nutrition Laboratory. 2 Credits.
Application of nutrition education and program development in community settings. Coreq: HNES 442. {Also offered for graduate credit - see HNES 642L.}.

HNES 445. Organization and Administration of Coordinated School Health Programs. 3 Credits.
Examination of coordinated school health programs (CSHP). Analysis of the components of and approaches to development of CSHP. Emphasis on skills required for entry-level health educators. Prereq: HNES 345, senior standing.

HNES 452. Nutrition,Health and Aging. 3 Credits.
Physiological changes with aging and their relationship to food habits and nutritional need. Common nutritional health problems with emphasis on prevention and treatment. 3 lectures. Prereq: HNES 200 or HNES 250. {Also offered for graduate credit - see HNES 652.}.

HNES 455. Sports Nutrition. 3 Credits.
Provides both current research and the translation of research findings into practical advice, offering unique insights on how nutrition can be used to design and effectively implement the optimal diet for performance. Prereq: HNES 200 or equivalent and at least sophomore standing. {Also offered for graduate credit - see HNES 655.}.

HNES 458. Advanced Medical Nutrtion Therapy. 4 Credits.
Principles in the nutrition care of patients with conditions requiring nutrition care. 4 lectures. Prereq: HNES 354 and Dietetics professional standing. {Also offered for graduate credit - see HNES 658.}.

HNES 458L. Advanced Medical Nutrition Therapy Laboratory. 3 Credits.
Supervised practice for CP students in nutrition care to accompany HNES 458. 1 eight-hour laboratory. Coreq: HNES 458.

HNES 460. Foodservice Systems Management II. 3 Credits.
Role of foodservice in today's society. Application of administration concepts in foodservice operation including equipment, layout, marketing, and budget management. 3 lectures. Prereq: HNES 361. {Also offered for graduate credit - see HNES 660.}.

HNES 460L. Foodservice Systems Management II Laboratory. 3 Credits.
Supervised practice for CP students in foodservice to accompany HNES 460. 1 eight-hour laboratory. Coreq: HNES 460.

HNES 461. Administrative and Social Aspects of Physical Education and Athletics. 3 Credits.
Study of administrative principles and social aspects that influence the development of physical education and athletic programs. Prereq: EDUC 451 (PE) and professional level 2 PE standing.

HNES 465. Physiology Of Exercise. 3 Credits.
Effects of exercise on the physiology of the human body. Includes aerobic systems, strength/muscle adaptations, body composition, training programs, and other areas related to training. Prereq: BIOL 221, BIOL 221L and HNES 365, HNES 366. Restricted to Exercise Science professional majors only.

HNES 466. Physiology Exercise Laboratory. 1 Credit.
Laboratory exercises to test aerobic and anaerobic capacity, strength, body composition, dietary analysis. Coreq: HNES 465. Restricted to Exercise Science, Human Performance & Fitness or Athletic Training professional majors only.

HNES 467. EKG Monitoring. 3 Credits.
Introduction of the student to the monitoring and interpretation of an electrocardiogram. Prereq: HNES 465, HNES 466 and Exercise Science professional majors only.

HNES 472. Exercise Assessment and Prescription. 3 Credits.
Physiological testing procedures applicable to physical activity and fitness settings, with application to exercise prescription. Prereq: HNES 370, 465 and 466 and Exercise Science professional majors only. Co-req: HNES 476.

HNES 473. Anaerobic Exercise Prescription and Advanced Resistance Training Techniques. 3 Credits.
Designing resistance training programs for various sports and activities, with hands on experience leading people through advanced resistance training exercises. Prereq: HNES 368.

HNES 475. Exercise Science Internship. 12 Credits.
Capstone course for human performance and fitness majors. Supervised field work in a professional setting with emphasis on administration, supervision, and program leadership.

HNES 476. Exercise Testing Laboratory. 2 Credits.
The student will learn different physiological testing procedures applicable to physical activity and fitness settings. Prereq: HNES 465, HNES 466 and Exercise Science professional majors only. Co-req: HNES 472.

HNES 480. Dietetics Practicum (Capstone Experience). 12 Credits.
Practical experience for students in the Coordinated Program in Dietetics with the responsibility equal to that of an entry-level dietitian. 40 hours laboratory per week in a clinical facility. Prereq: HNES 458L and HNES 460L.

HNES 481. Dietetics: Capstone Course for DPD. 1 Credit.
Capstone for Dietetics majors in the Didactic program in Dietetics.

HNES 482. Community Health Internship. 12 Credits.
Capstone course for Health Education Majors' Community Health Option. Supervised field work in an approved professional setting with an emphasis on administration, supervision and program implementation leadership. Prereq: Senior standing and admission to the professional program.

HNES 485. Sport Management Internship. 1-12 Credits.
This course provides comprehensive learning experiences for students majoring in Sport Management. It includes 43 hours per credit of on-site work experience with approved organizations and may be repeated for a total of 12 credits. Prereq: HNES 190, HNES 224, HNES 226 and students must be admitted to the Sport Management professional program.

HNES 491. Seminar. 1-5 Credits.

HNES 492. Study Abroad. 1-15 Credits.

HNES 494. Individual Study. 1-5 Credits.

HNES 496. Field Experience. 1-15 Credits.

HNES 499. Special Topics. 1-5 Credits.

HNES 642. Community Health and Nutrition Education. 3 Credits.
Nutrition education in community settings. Topics include behavior change, education and counseling theory, needs assessment, planning, implementation, and evaluation in a community setting. {Also offered for undergraduate credit - see HNES 442.}.

HNES 642L. Community Health and Nutrition Laboratory. 2 Credits.
Application of nutrition education and program development in community settings. Coreq: HNES 642. {Also offered for undergraduate credit - see HNES 442L.}.

HNES 652. Nutrition, Health and Aging. 3 Credits.
Physiological changes with aging and their relationship to food habits and nutritional need. Common nutritional health problems with emphasis on prevention and treatment. 3 lectures. {Also offered for undergraduate credit - see HNES 452.}.

HNES 655. Sports Nutrition. 3 Credits.
Provides both current research and the translation of research findings into practical advice, offering unique insights on how nutrition can be used to design and effectively implement the optimal diet for performance. {Also offered for undergraduate credit - see HNES 455.}.

HNES 658. Advanced Medical Nutrition Therapy. 3-4 Credits.
Principles in the nutrition care of patients with conditions requiring nutrition care. 3-4 lectures. Prereq: HNES 354. {Also offered for undergraduate credit - see HNES 458.}.

HNES 660. Foodservice Systems Management II. 3 Credits.
Role of foodservice in today's society. Application of administration concepts in foodservice operation including equipment, layout, marketing, and budget management. {Also offered for undergraduate credit - see HNES 460.}.

HNES 690. Graduate Seminar. 1-3 Credits.

HNES 696. Special Topics. 1-5 Credits.

HNES 700. Research in Physical Education and Sport. 3 Credits.
This course is designed to help teachers and coaches in the field better understand the process of conducting classroom/sport setting research through practitioner inquiry.

HNES 701. Leadership and Entrepreneurship. 3 Credits.
This course provides an introduction to leadership and entrepreneurship in physical education and sport settings. The course is designed to provide students with skills, techniques and practices for successful leadership and entrepreneurship.

HNES 702. Introduction to Advanced AT and Professionalism. 1 Credit.
This course will include discussion of the expectations and responsibilities of the post-professional athletic trainer's transition into graduate school and as a professional healthcare provider. The content will be focused on information and tools to adjust to the new roles and responsibilities.

HNES 703. Graduate Biomechanics of Sport and Exercise. 3 Credits.
This course is designed to increase the knowledge and students understanding of the biomechanical principles behind training, sport, and physical activity.

HNES 704. Psychological Foundation of Sport & Physical Activity. 3 Credits.
Comprehensive description of sport psychology, application of concepts to sport performance improvements as well as other areas in physical activity.

HNES 705. Analysis of Sport Skill Instruction and Acquisition. 3 Credits.
This course is designed to discuss theories of instruction in physical education and sport and the principles of motor learning. It includes the analysis of the learning process in relation to motor development and the role of the teacher and/or coach.

HNES 706. Injury Prevention, Care and Management. 3 Credits.
This course is designed to help students understand the guidelines and recommendations for preventing injuries, recognizing injuries, and how to best manage an injury situation.

HNES 707. Sport in American Society. 3 Credits.
This course provides students with a better understanding of the relationship of sport to American culture and society. Course materials focus on the application of the sociological perspective to a variety of topics.

HNES 710. Introduction to Research Design and Methods in HNES. 3 Credits.
This course is intended to prepare students to conduct research by discussing basic research designs and methods. Students will begin to develop topics, write research questions and identify appropriate methods to answer the questions for a thesis or research project. During this course students will write section(s) of their proposals or chapters and receive feedback. This course also reviews grant writing.

HNES 711. Physical Education Curriculum. 3 Credits.
To provide an understanding of the role and importance of physical education in today's society, steps involved in curriculum planning, trends and issues in physical education curriculum and to orient students to various ideas in physical education curriculum design.

HNES 712. Principles of Management. 3 Credits.
This course is designed to study the principles of management for the improvement of various phases of the learning process of teaching, coaching, and leadership. Students will develop a comprehensive foundation on the fundamentals of management. Prereq: Must be accepted into the MS option of Leadership in Physical Education and Sport.

HNES 713. Graduate Exercise Physiology. 3 Credits.
Comprehensive state-of-the-art review of the current knowledge of the physiological responses to exercise.

HNES 714. Legal Liability in HPER. 3 Credits.
Focused on risk management and legal liability in health, physical education, and recreation. Overview of civil and criminal law related to sports and recreation.

HNES 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. Health Promotion Programming. 3 Credits.
This course is designed to help students understand and develop skills for health promotion programming, regardless of settings.

HNES 722. 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 725. Promoting Health through Policy, System and Environment. 3 Credits.
This course will focus on health promotion at community, state, and national levels through policy, system, and environmental (PSE) changes by examining laws, system changes, changes to economic, social, or physical environments.

HNES 726. Nutrition in Wellness. 3 Credits.
Course will address wellness promotion through nutrition. Nutritional risk and protective factors will be examined as they relate to public health and individual nutrition.

HNES 727. Physical Activity Epidemiology. 3 Credits.
Review of the evidence on the associations between physical activity and chronic diseases, and effects of physical activity on health. Understanding and discussion regarding how the methods of epidemiology are being used to scientifically confirm that physical inactivity is a burden on public health and what can be done about it.

HNES 728. Current Issues in Dietetics. 3 Credits.
Environmental scanning of trends in dietetics, with the impact of changes in global, economic, social, ethical, political, legal, technological, and ecological areas on healthcare and on dietetics practice.

HNES 729. Grant Writing for the Health Professional. 3 Credits.
Steps needed for successful grant applications. Identification of funding sources and completion of the application form. Designed for Registered Dietitians.

HNES 730. Fundamentals of Leadership. 3 Credits.
An appreciation of the basic principles of leadership by gaining an insight into one's own leadership abilities and developing the practical skills necessary to function as a leader in a realistic context.

HNES 731. Governance in Sport. 3 Credits.
This course examines how sport organizations interact and coordinate with numerous policy actors from inside and outside the sport realm to facilitate and coordinate the mechanisms of governance.

HNES 732. Foodservice Operation Management. 3 Credits.
In-depth analysis of several critical foodservice operations management decisions and development of analytical skills needed in solving operation management problems encountered in the foodservice industry.

HNES 733. Food Writing for Professionals. 3 Credits.
This course focuses on the writing skills needed by the food professional in order to communicate effectively in writing about food and food-related topics.

HNES 734. Foodservice Systems within Healthcare. 3 Credits.
A comprehensive review of today's health care institutions and their response to the economic, social/ethical, political/legal, technological, and ecological environments. Prereq: must be enrolled in the GPIDEA HNES: Option in Dietetics.

HNES 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 745. Community Health Leadership. 3 Credits.
This course will focus on developing leadership and collaboration skills required by public health leaders to work with community leaders and organizations.

HNES 746. Nutrition and Health Disparities. 3 Credits.
This course is an examination of nutrition and health disparities in the U.S. Identification of sociocultural determinants of health and their influence on nutrition and health outcomes. Exploration of interdisciplinary strategies to reduce nutrition and health disparities.

HNES 747. Understanding Food Culture. 3 Credits.
This course is designed as a survey of topics that affect how we perceive food in the modern world. Food is examined as a badge of cultural identity, a focus of media scrutiny and promotion, a symbol of religion, and a driver of technology.

HNES 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 765. Orthopedic Appliances. 3 Credits.
Application of common casting and bracing techniques.

HNES 770. Evidence Based Research and Practice. 2 Credits.
This course introduces students to current evidence based research methods and the importance of conducting and interpreting athletic training research. Prereq: HNES 780.

HNES 772. Prevention and Health Promotion in Athletic Training. 2 Credits.
General nutrition, prevention and health promotion concepts, and psychosocial and mental health aspects in athletic training. Prereq: HNES 770.

HNES 773. Athletic Training Capstone. 2 Credits.
Comprehensive review of patient case scenarios using evidence-based practice for clinical integration as a healthcare professional. Prereq: HNES 774, HNES 776.

HNES 774. Therapeutic Exercise. 3 Credits.
Therapeutic interventions involving rehabilitative techniques, equipment, and activities using body movements to enhance function, prevent impairments and activity restrictions to maximize participation and health-related quality of life.. Prereq: HNES 782.

HNES 775. Therapeutic Modalities. 3 Credits.
Therapeutic interventions involving contemporary modalities to prevent and treat orthopedic injuries to restore and enhance function and maximize participation and health-related quality of life. Prereq: HNES 770.

HNES 776. Non-Orthopedic Assessment. 2 Credits.
Clinical evaluation and diagnosis of non orthopedic conditions and illnesses. Prereq: HNES 782.

HNES 777. Scholarly Writing and Presenting in HNES. 3 Credits.
This course is designed for students pursuing their Master or Doctorate degree who are currently writing a proposal or a chapter of their thesis or dissertation. Class sessions cover the conventions for each chapter of the thesis/dissertation, analytical reading of research articles in the areas of HNES, and effective methods of presenting research.

HNES 778. Athletic Training Administration and Professional Development. 3 Credits.
Understand the health care system and professional competence as related to athletic training. Prereq: HNES 776.

HNES 780. Athletic Training Techniques. 3 Credits.
Exposure to a variety of fundamental athletic training skills and techniques. Prereq: Admission to the Master of Athletic Training program.

HNES 781. Orthopedic Assessment I. 4 Credits.
Clinical evaluation and diagnosis of the lower extremity. Prereq: HNES 780.

HNES 782. Orthopedic Assessment II. 5 Credits.
Clinical evaluation and diagnosis of the upper extremity, head, and spine. Prereq: HNES 781.

HNES 783. Athletic Training Clinical Education I. 2 Credits.
Clinical experiences and mastery of assigned proficiencies. Didactic learning will include environmental conditions/illnesses and protective devices. Prereq: HNES 780.

HNES 784. Athletic Training Clinical Education II. 2 Credits.
Clinical experiences and mastery of assigned proficiencies. Didactic learning will include general nutrition concepts and prevention and health promotion concepts. Prereq: HNES 783.

HNES 785. Athletic Training Clinical Education III. 2 Credits.
Clinical experiences and mastery of assigned proficiencies. Didactic learning will include mental health conditions and therapeutic medications. Prereq: HNES 784.

HNES 786. Diagnostic 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 789. Athletic Training Clinical Education IV. 2 Credits.
Clinical experiences and comprehensive mastery of assigned proficiencies. Didactic learning will include psychosocial strategies and referral, and cultural competence. Prereq: HNES 785.

HNES 790. Graduate Seminar. 1-3 Credits.

HNES 791. Temporary/Trial Topics. 1-5 Credits.

HNES 792. Graduate Teaching Experience. 1-6 Credits.

HNES 793. Individual Study. 1-5 Credits.

HNES 794. Practicum/Internship. 1-15 Credits.

HNES 795. Field Experience. 1-15 Credits.

HNES 796. Special Topics. 1-5 Credits.

HNES 797. Master's Paper. 1-3 Credits.

HNES 798. Master's Thesis. 1-10 Credits.

HNES 892. Graduate Teaching Experience. 1-6 Credits.

HNES 893. Individual Study/Tutorial. 1-5 Credits.

HNES 894. Practicum/Internship. 1-8 Credits.

HNES 899. Doctoral Dissertation. 1-15 Credits.

History (HIST)

HIST 101. Western Civilization I. 3 Credits.
Introductory survey of Western Civilization from prehistory to 1648, emphasizing major political, social, cultural, and intellectual developments.

HIST 102. Western Civilization II. 3 Credits.
Introductory survey of Western Civilization from 1648 to the present, emphasizing major political, social, cultural, and intellectual developments.

HIST 103. U.S. to 1877. 3 Credits.
Survey of United States history to 1877, emphasizing major political, economic, social, and cultural developments.

HIST 104. U.S. Since 1877. 3 Credits.
Survey of United States history since 1877, emphasizing major political, economic, social, and cultural developments.

HIST 135. Race in U.S. History. 3 Credits.
The historical development of racism and racial ideas and the interactions among Native Americans, European-Americans, and groups of various races from pre-contact to the present.

HIST 194. Individual Study. 1-5 Credits.

HIST 196. Field Experience. 1-15 Credits.

HIST 199. Special Topics. 1-5 Credits.

HIST 220. North Dakota History. 3 Credits.
Survey of North Dakota history. Includes social, economic, cultural, and political history of North Dakota from prehistoric times to the present.

HIST 251. Introduction To Public History. 3 Credits.
Introduction to history career paths outside of the classroom including museums, historical societies, historic preservation, and historic sites.

HIST 252. Introduction to Museum Work. 3 Credits.
Introduction to the variety of careers available and procedures used in museums and historical societies: curatorial, administrative, conservation, research, and educational. Prereq: HIST 251.

HIST 254. The United States in the Long 1960s. 3 Credits.
This course examines the major social, cultural, economic, and political changes within American society and the United States from 1956 to 1974.

HIST 259. Women in European History 1400-1800. 3 Credits.
Exploration of what it meant to be female in early modern Europe: women's options, how women saw themselves, how they were perceived, and origins of these perceptions.

HIST 260. Women In America. 3 Credits.
A survey of the political, social, economic, and cultural development of American women from colonial times to the present with a focus on the lived experiences of diverse groups of women. CCN.

HIST 261. American Indian History. 3 Credits.
Survey of Native American history, emphasizing diversity of historical experience. Themes include cultural persistence, leadership and activism, and strategies adopted by Indian communities for coping with change.

HIST 270. American Religious History. 3 Credits.
Introduction to the basic issues in American history including the study of Puritans, immigration, church and state, revivalism, civil and military religion, apocalypticism, and new age religion. Cross-listed with RELS 270.

HIST 271. Introduction to Latin American History. 3 Credits.
Study of important social, economic, and cultural developments in Latin American history. Emphasizes the socio-economic and cultural topical developments and the political and international factors influencing the region.

HIST 280. History of East Asia to 1600. 3 Credits.
The history of East Asia to 1600, focusing on the political, economic, and cultural phenomena critical to the development of traditional China, Japan, and Korea.

HIST 281. History of East Asia from 1600. 3 Credits.
The history of modern East Asia from 1600 to the present, focusing on the political, economic, and cultural phenomena critical to the development of modern China, Japan, and Korea.

HIST 291. Seminar. 1-5 Credits.

HIST 292. Study Abroad. 1-15 Credits.

HIST 294. Individual Study. 1-5 Credits.

HIST 299. Special Topics. 1-5 Credits.

HIST 320. History of Christianity. 3 Credits.
Major developments in the Christian religion including scriptures, persecution, monasticism, papacy, Reformation, science and religion, and the ecumenical movement. Cross-listed with RELS 320.

HIST 352. Museum Collections Management. 3 Credits.
This course focuses on the fundamental principles of museum collections management, registration, and preservation issues in museums through lectures, hands-on practice, and field trips. Prereq: HIST 251.

HIST 355. History of Global Islam. 3 Credits.
Examination of the foundational history, texts, laws and rituals of Islam, in addition to the lived experience of Islam and related political dynamics in the Middle East, Europe, Asia, Africa and North America.

HIST 379. Study Tour Abroad. 1-6 Credits.

HIST 381. Australia & New Zealand. 3 Credits.
Comprehensive, but not exhaustive, historical comparison of Australia and New Zealand with emphasis on formation of national identity(ies). Organized topically to facilitate comparisons.

HIST 382. Canada. 3 Credits.
Topical treatment of the history of Canada, beginning with First Nations and charting the evolution of a bi-cultural, multi-cultural nation-state.

HIST 390. Historical Research and Writing. 3 Credits.
Techniques and skills of historical research and writing. Includes researching in libraries and archives, constructing thesis statements, outlining papers, building logical arguments, writing clear and concise English, using primary sources, footnoting, and copyediting. Prereq: ENGL 120, junior standing.

HIST 391. Seminar. 1-5 Credits.

HIST 392. Study Abroad. 1-3 Credits.

HIST 394. Individual Study. 1-5 Credits.

HIST 396. Field Experience. 1-15 Credits.

HIST 399. Special Topics. 1-5 Credits.

HIST 401. Archival Theory and Practice. 3 Credits.
Archival theory and its practical application in supervised projects utilizing the resources of the Institute for Regional Studies and University Archives. {Also offered for graduate credit - see HIST 601.}.

HIST 403. Archival Preservation. 3 Credits.
This course examines the history, theory and practice of archival preservation, which includes the preservation of manuscripts, photographs, audio-visual and electronic records. Prereq: HIST 251. {Also offered for graduate credit - see HIST 603.}.

HIST 404. Digital History. 3 Credits.
This course will focus on creating digital history, and incorporate readings, discussion, digital fundamentals, creative thinking, and hands-on-learning in a collaborative environment and develop a project based on local history resources. Prereq: at least junior standing. {Also offered at the graduate level - HIST 604}.

HIST 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. U.S. History 1829-1917 I. 3 Credits.
Political, social, and economic history of the United States 1829-1877; emphasizing socioeconomic change, the Sectional Crisis, the Civil War, and Reconstruction. {Also offered for graduate credit - see HIST 622.}.

HIST 423. U.S. History 1829-1917 II. 3 Credits.
Political, social, and economic history of the United States 1877-1917; emphasizing industrialization, urbanization, and progressive reform. {Also offered for graduate credit - see HIST 623.}.

HIST 424. U.S. History 1917-Present I. 3 Credits.
Political, social, and economic history of the United States 1917-1960; emphasizing the New Deal, the world wars, and the Cold War era. {Also offered for graduate credit - see HIST 624.}.

HIST 425. U.S. History 1917-Present II. 3 Credits.
Political, social, diplomatic, and economic history of the United States since 1960; emphasizing foreign policy, domestic developments, and socioeconomic change. {Also offered for graduate credit - see HIST 625.}.

HIST 426. Women in American History. 3 Credits.
A survey of political, social, economic, and cultural development of American women from colonial times to the present with a focus on the lived experiences of diverse groups of women. Central themes are: the incongruity of ideal and reality, the fluidity of gender expectations and the "public" sphere, women's ability to navigate different power structures successfully, work and sexual division of labor, and the role family and personal life. Cross-listed with WGS. {Also available for graduate credit - See HIST 626.}.

HIST 428. War and Society in Early America. 3 Credits.
This course examines the fundamental changes that military conflict wrought on American society from the seventeenth century through the Civil War. Among other topics, readings and discussions will consider the effects of war on gender roles, ideas of racial difference, social and economic organization, imperial and national politics, and early America's relationship to the rest of the world. {Also available for graduate credit - See HIST 628.}.

HIST 430. Prairie Earth, Prairie Homes: A Field School. 3 Credits.
Exploration, investigation, and restoration of earth buildings on the northern plains. Students study the cultures that created earth buildings; encounter the buildings as cultural artifacts; and engage in hands-on restoration work. Prereq: Junior standing. {Also offered for graduate credit - see HIST 630.}.

HIST 431. The North American Plains. 3 Credits.
Historical treatment of the Great Plains of North America as an international region, comprising the Canadian prairies and the American plains. {Also offered for graduate credit - see HIST 631.}.

HIST 434. Environmental History. 3 Credits.
Traces the changing relationship between human cultures and the natural world through time, mainly in North America. Examines the causes and consequences of major changes to landscapes and plant and animal species and ecosystems, analyzes the emergence of the conservation and environmental movements, identifies shifts in environmental thought, and traces the development of environmental laws and policies. {Also offered for graduate credit - see HIST 634.}.

HIST 435. World Environmental History. 3 Credits.
The course examines the relationship between peoples and their environment over time in selected areas of the world. It focuses on the past two thousand years from the Roman Empire to the present. {Also offered for graduate credit - see HIST 635.}.

HIST 436. American Frontier to 1850. 3 Credits.
Early American frontier from 1500's to mid-1800's, emphasizing Indian-White relations, colonial wars, social life in the backcountry, and exploration and settlement. {Also offered for graduate credit - see HIST 636.}.

HIST 437. American West Since 1850. 3 Credits.
Centers on a century of enormous change in the trans-Mississippi west. Major topics include the Plains Indian wars, post-conquest Indian history, mining, cattle, homesteading frontiers, the urban West, and environmental history. {Also offered for graduate credit - see HIST 637.}.

HIST 440. The Ottoman Empire. 3 Credits.
This course examines the growth of the Ottoman Empire after 1300 and then analyzes its responses to a variety of challenges after 1683. We examine Balkan states such as Greece and Serbia, Arab lands such as Iraq and Egypt, and Turkey itself. Topics examined include the role of Islam in Ottoman administration, the rights of religious minorities such as Christians and Jews, and the evolution of Arab nationalism. {Also offered for graduate credit - see HIST 640.}.

HIST 450. Ancient History. 3 Credits.
Cultural, political, economic, and social history of the ancient Near East, Greece, and Rome. {Also offered for graduate credit - see HIST 650.}.

HIST 451. Medieval History. 3 Credits.
Cultural, political, economic, and social history of the Middle Ages. {Also offered for graduate credit - see HIST 651.}.

HIST 454. Renaissance And Reformation. 3 Credits.
Political, social, and economic history of continental Europe from 1400 to 1650; with a focus on Renaissance and Reformation. {Also offered for graduate credit - see HIST 654.}.

HIST 455. The Eighteenth Century. 3 Credits.
Political, social, and economic history of continental Europe from 1650 to 1815; with a focus on Enlightenment and French Revolution. {Also offered for graduate credit - see HIST 655.}.

HIST 456. Europe 1815-1914. 3 Credits.
Political, social, and economic history of Europe from the defeat of Napoleon to outbreak of World War I. {Also offered for graduate credit - see HIST 656.}.

HIST 457. Europe Since 1914. 3 Credits.
Political, social, and economic history of Europe including World War I, the Russian Revolution, Nazism, World War II, and the postwar era. {Also offered for graduate credit - see HIST 657.}.

HIST 464. Imperial Spain. 3 Credits.
The history of Spain as a global imperial power, beginning with the marriage of Ferdinand and Isabella in 1469 and concluding with the Latin American wars for independence in the early nineteenth century. {Also offered for graduate credit - see HIST 664.}.

HIST 465. Germany since 1750. 3 Credits.
This course traces the evolution of the main German-speaking regions of Europe into modern, industrialized nation-states. From the time of Bach to the fall of the Berlin Wall and beyond, we analyze key trends and events in the politics, society, and culture of Prussia, Imperial Germany, the Weimar Republic, Austria, the Nazi dictatorship, East and West Germany, and the expanded Federal Republic after 1989. {Also offered for graduate credit - see HIST 665.}.

HIST 466. History Of Russia I. 3 Credits.
Cultural, diplomatic, intellectual and political history of Russia; evolution of the Russian state, expansion of Imperial Russia, Great Reforms, populism, and socialism.

HIST 467. History Of Russia II. 3 Credits.
Cultural, diplomatic, intellectual, and political history of Russia and the Soviet Union; agriculture, industry, Marxism in Russia, revolution of 1905 and 1917, and the Soviet Union from Lenin to present. {Also offered for graduate credit - see HIST 667.}.

HIST 470. Modern Latin America I. 3 Credits.
Examines the social, economic, political, and cultural developments in Latin American history. Begins with the wars of independence (circa 1800) and concludes with the emergence of modern states at the close of the 19th century. {Also offered for graduate credit - see HIST 670.}.

HIST 471. Modern Latin America II. 3 Credits.
Study of important social, economic, political, and cultural developments in Latin America from the late 19th century through the modern epoch. {Also offered for graduate credit - see HIST 671.}.

HIST 473. Colonial Mexico. 3 Credits.
Study of the important social, economic, political, and cultural developments in Mexican history from the pre-Columbian epoch through the wars for independence, ending in 1821. {Also offered for graduate credit - see HIST 673.}.

HIST 474. Modern Mexico. 3 Credits.
Study of the important social, economic, political, and cultural developments in Mexican history from independence in 1821 through the contemporary era. {Also offered for graduate credit - see HIST 674.}.

HIST 475. The Aztec, Maya, and Inca. 3 Credits.
The history of native peoples in Latin America, including the Aztec, Maya, and Inca, from the pre-Columbian era to the present day. {Also offered for graduate credit - see HIST 675.}.

HIST 477. Slavery in the Atlantic World. 3 Credits.
This course examines the social, economic, political, and cultural aspects of the history of slavery in the Atlantic world from the 1400s to 1888 with an emphasis on Brazil and the Caribbean. {Also offered for graduate credit - see HIST 677.}.

HIST 479. Study Tour Abroad. 1-6 Credits.

HIST 480. History of Modern China from 1600. 3 Credits.
The history of modern China from 1600 to the present focusing on the expansion of China's empire, confrontation with the West, and the dramatic political and social changes of the 20th century.

HIST 481. History of Japan. 3 Credits.
This course surveys the history of Japan from its myths of creation to the present, focusing on the development of traditional Japanese culture, the rise of the samurai, Japan's response to the West, and the militarization and modernization of Japan during the 20th century.

HIST 482. Vietnam: 125 Years of Conflict. 3 Credits.
The history of Vietnam from the 1850s to the present focusing on French colonial rule, American involvement in the region, revolutionary warfare, and Vietnam's emergence as an autonomous, independent state.

HIST 484. Cultures and Civilizations of the Pre-modern World. 3 Credits.
This course examines the history of human societies in the pre-modern world until 1500, focusing particularly upon the cultural, social, economic and intellectual developments catalyzed by the rise and evolution of civilizations across the globe.

HIST 485. Cultural Exchange and the Making of the Modern World. 3 Credits.
This course examines the globalization of the modern world since 1200, focusing particularly upon the cultural, social, economic and biological exchanges catalyzed by exploration, colonialism, and 19th and 20th century Diasporas.

HIST 489. Senior Seminar. 3 Credits.
Capstone experience focused on understanding major concepts and applying knowledge of basic methods and problems. Students evaluate secondary literature, conduct primary research, and master standard forms of historical writing. Prereq: HIST 390.

HIST 491. Seminar. 1-5 Credits.

HIST 492. Study Abroad. 1-15 Credits.

HIST 494. Individual Study. 1-5 Credits.

HIST 496. Field Experience. 1-15 Credits.

HIST 499. Special Topics. 1-5 Credits.

HIST 601. Archival Theory and Practice. 3 Credits.
Archival theory and its practical application in supervised projects utilizing the resources of the Institute for Regional Studies and University Archives. {Also offered for undergraduate credit - see HIST 401.}.

HIST 603. Archival Preservation. 3 Credits.
This course examines the history, theory and practice of archival preservation, which includes the preservation of manuscripts, photographs, audio-visual and electronic records. {Also offered for undergraduate credit - see HIST 403.}.

HIST 604. Digital History. 3 Credits.
This course will focus on creating digital history, and incorporate readings, discussion, digital fundamentals, creative thinking, and hands-on-learning in a collaborative environment and develop a project based on local history resources. {Also offered at the undergraduate level - HIST 404}.

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. U.S. History 1829-1917 I. 3 Credits.
Political, social, and economic history of the United States 1829-1877; emphasizing socioeconomic change, the Sectional Crisis, the Civil War, and Reconstruction. {Also offered for undergraduate credit - see HIST 422.}.

HIST 623. U.S. History 1829-1917 II. 3 Credits.
Political, social, and economic history of the United States 1877-1917; emphasizing industrialization, urbanization, and progressive reform. {Also offered for undergraduate credit - see HIST 423.}.

HIST 624. U.S. History 1917-Present I. 3 Credits.
Political, social, and economic history of the United States 1917-1960; emphasizing the New Deal, the world wars, and the Cold War era. {Also offered for undergraduate credit - see HIST 424.}.

HIST 625. U.S. History 1917-Present II. 3 Credits.
Political, social, diplomatic, and economic history of the United States since 1960; emphasizing foreign policy, domestic developments, and socioeconomic change. {Also offered for undergraduate credit - see HIST 425.}.

HIST 626. Women in American History. 3 Credits.
A survey of political, social, economic, and cultural development of American women from colonial times to the present with a focus on the lived experiences of diverse groups of women. Central themes are: the incongruity of ideal and reality, the fluidity of gender expectations and the "public" sphere, women's ability to navigate different power structures successfully, work and sexual division of labor, and the role family and personal life. Cross-listed with WGS. {Also offered for undergraduate credit - See HIST 426.}.

HIST 628. War and Society in Early America. 3 Credits.
This course examines the fundamental changes that military conflict wrought on American society from the seventeenth century through the Civil War. Among other topics, readings and discussions will consider the effects of war on gender roles, ideas of racial difference, social and economic organization, imperial and national politics, and early America's relationship to the rest of the world. {Also available for undergraduate credit - See HIST 428.}.

HIST 630. Prairie Earth, Prairie Homes: A Field School. 3 Credits.
Exploration, investigation, and restoration of earth buildings on the northern plains. Students study the cultures that created earth buildings; encounter the buildings as cultural artifacts; and engage in hands-on restoration work. {Also offered for undergraduate credit - see HIST 430.}.

HIST 631. The North American Plains. 3 Credits.
Historical treatment of the Great Plains of North America as an international region, comprising the Canadian prairies and the American plains. {Also offered for undergraduate credit - see HIST 431.}.

HIST 634. Environmental History. 3 Credits.
Traces the changing relationship between human cultures and the natural world through time, mainly in North America. Examines the causes and consequences of major changes to landscapes and plant and animal species and ecosystems, analyzes the emergence of the conservation and environmental movements, identifies shifts in environmental thought, and traces the development of environmental laws and policies. {Also offered for undergraduate credit - see HIST 434.}.

HIST 635. World Environmental History. 3 Credits.
The course examines the relationship between peoples and their environment over time in selected areas of the world. It focuses on the past two thousand years from the Roman Empire to the present. {Also offered for undergraduate credit - see HIST 435.}.

HIST 636. American Frontier to 1850. 3 Credits.
Early American frontier from 1500's to mid-1800's, emphasizing Indian-White relations, colonial wars, social life in the backcountry, and exploration and settlement. {Also offered for undergraduate credit - see HIST 436.}.

HIST 637. American West Since 1850. 3 Credits.
Centers on a century of enormous change in the trans-Mississippi west. Major topics include the Plains Indian wars, post-conquest Indian history, mining, cattle, homesteading frontiers, the urban West, and environmental history. {Also offered for undergraduate credit - see HIST 437.}.

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 654. Renaissance and Reformation. 3 Credits.
Political, social, and economic history of continental Europe from 1400 to 1650; with a focus on Renaissance and Reformation. {Also offered for undergraduate credit - see HIST 454.}.

HIST 655. The Eighteenth Century. 3 Credits.
Political, social, and economic history of continental Europe from 1650 to 1815; with a focus on Enlightenment and French Revolution. {Also offered for undergraduate credit - see HIST 455.}.

HIST 656. Europe 1815-1914. 3 Credits.
Political, social, and economic history of Europe from the defeat of Napoleon to outbreak of World War I. {Also offered for undergraduate credit - see HIST 456.}.

HIST 657. Europe Since 1914. 3 Credits.
Political, social, and economic history of Europe including World War I, the Russian Revolution, Nazism, World War II, and the postwar era. {Also offered for undergraduate credit - see HIST 457.}.

HIST 664. Imperial Spain. 3 Credits.
The history of Spain as a global imperial power, beginning with the marriage of Ferdinand and Isabella in 1469 and concluding with the Latin American wars for independence in the early nineteenth century. {Also offered for undergraduate credit - see HIST 464.}.

HIST 665. Germany since 1750. 3 Credits.
This course traces the evolution of the main German-speaking regions of Europe into modern, industrialized nation-states. From the time of Bach to the fall of the Berlin Wall and beyond, we analyze key trends and events in the politics, society, and culture of Prussia, Imperial Germany, the Weimar Republic, Austria, the Nazi dictatorship, East and West Germany, and the expanded Federal Republic after 1989. {Also offered for undergraduate credit - see HIST 465.}.

HIST 666. History Of Russia I. 3 Credits.
Cultural, diplomatic, intellectual and political history of Russia; evolution of the Russian state, expansion of Imperial Russia, Great Reforms, populism, and socialism.

HIST 667. History of Russia II. 3 Credits.
Cultural, diplomatic, intellectual, and political history of Russia and the Soviet Union; agriculture, industry, Marxism in Russia, revolution of 1905 and 1917, and the Soviet Union from Lenin to present. {Also offered for undergraduate credit - see HIST 467.}.

HIST 670. Modern Latin America I. 3 Credits.
Examines the social, economic, political, and cultural developments in Latin American history. Begins with the wars of independence (circa 1800) and concludes with the emergence of modern states at the close of the 19th century. {Also offered for undergraduate credit - see HIST 470.}.

HIST 671. Modern Latin America II. 3 Credits.
Study of important social, economic, political, and cultural developments in Latin America from the late 19th century through the modern epoch. {Also offered for undergraduate credit - see HIST 471.}.

HIST 673. Colonial Mexico. 3 Credits.
Study of the important social, economic, political, and cultural developments in Mexican history from the pre-Columbian epoch through the wars for independence, ending in 1821. {Also offered for undergraduate credit - see HIST 473.}.

HIST 674. Modern Mexico. 3 Credits.
Study of the important social, economic, political, and cultural developments in Mexican history from independence in 1821 through the contemporary era. {Also offered for undergraduate credit - see HIST 474.}.

HIST 675. The Aztec, Maya, and Inca. 3 Credits.
The history of native peoples in Latin America, including the Aztec, Maya, and Inca, from the pre-Columbian era to the present day. {Also offered for undergraduate credit - see HIST 475.}.

HIST 677. Slavery in the Atlantic World. 3 Credits.
This course examines the social, economic, political, and cultural aspects of the history of slavery in the Atlantic world from the 1400s to 1888 with an emphasis on Brazil and the Caribbean. {Also offered for undergraduate credit - see HIST 477.}.

HIST 679. Study Tour Abroad. 1-6 Credits.

HIST 690. Graduate Seminar. 1-3 Credits.

HIST 695. Field Experience. 1-15 Credits.

HIST 696. Special Topics. 1-5 Credits.

HIST 701. Methods of Historical Research. 3 Credits.
Techniques and frameworks of historical research, introduction to types of evidence, and evaluation of sources. Taken during the student's first semester in the program.

HIST 702. Historiography. 3 Credits.
An introduction to the history of historical thought, from the classical Greeks to the present, with examination of some of the works of important historians writing in the Western tradition.

HIST 705. Directed Research. 1-4 Credits.
Directed research on the student's thesis prospectus. Taken close to the end of the student's course work. Prereq: HIST 701.

HIST 706. Seminar in the Teaching Of History. 1-4 Credits.
Includes methods appropriate to college-level teaching. Class consists of discussion, demonstration, and practice. S/U grading only.

HIST 710. Research Seminar in North American History. 3 Credits.
This course requires preparation of a research paper. The subject of the research will be within an announced general topic area of North American history. May be repeated.

HIST 712. Research Seminar in European History. 3 Credits.
This course requires preparation of a research paper. The subject of the research will be within an announced general topic area of European history. May be repeated.

HIST 714. Research Seminar in World History. 3 Credits.
This course requires preparation of a research paper. The subject of the research will be within an announced general topic area of World history. May be repeated.

HIST 730. Readings in North American History. 3 Credits.
A historiographical survey of a selected topic in North American history. Topics vary by semester. May be repeated. Recommended Coreq: HIST 701.

HIST 760. Readings in European History. 3 Credits.
Historiographical survey of a selected topic in European history. Topics vary by semester. May be repeated. Recommended Coreq: HIST 701.

HIST 780. Readings in World History. 3 Credits.
Historiographical survey of a selected topic in World history. Topics vary by semester. May be repeated. Recommended Coreq: HIST 701.

HIST 790. Graduate Seminar. 1-3 Credits.

HIST 791. Temporary/Trial Topics. 1-5 Credits.

HIST 793. Individual Study/Tutorial. 1-5 Credits.

HIST 794. Practicum. 1-8 Credits.

HIST 795. Field Experience. 1-15 Credits.

HIST 796. Special Topics. 1-5 Credits.

HIST 797. Master's Paper. 1-3 Credits.

HIST 798. Master's Thesis. 1-10 Credits.

HIST 899. Doctoral Dissertation. 1-15 Credits.

Honors (HON)

HON 191. Seminar. 1-5 Credits.

HON 193. Undergraduate Research. 1-5 Credits.

HON 291. Seminar. 1-5 Credits.
A group of students engaged, under a professor or professors, in research or criticism and in presentation of reports pertaining thereto.

HON 340. Colloquium in the Humanities. 3 Credits.
Interdisciplinary exploration of selected topics in the humanities; emphasis on integrating information and perspectives from multiple disciplines and on student participation through discussion, research, writing, and projects. May be repeated for credit with change in topic. Prereq: Admission to Honors program.

HON 341. Colloquium in the Social Sciences. 3 Credits.
Interdisciplinary exploration of selected topics in the social sciences; emphasis on integrating information and perspectives from multiple disciplines and on student participation through discussion, research, writing, and projects. May be repeated for credit with change in topic. Prereq: Admission to Honors program.

HON 342. Colloquium in the Sciences. 3 Credits.
Interdisciplinary exploration of selected topics in the sciences; emphasis on integrating information and perspectives from multiple disciplines and on student participation through discussion, research, writing, and projects. May be repeated for credit with change in topic. Prereq: Admission to Honors program.

HON 386. World Literature: Imaginary Homelands. 3 Credits.
Reading and discussion of works from literatures around the world, including philosophical non-fiction, emphasizing the diversity of responses to the human condition. Prereq: Admission to Honors Program.

HON 391. Seminar. 1-5 Credits.

HON 394. Individual Study. 1 Credit.

HON 396. Field Experience. 1-15 Credits.

HON 489. Senior Thesis. 1-6 Credits.
Primary research or creative activity under the guidance of a faculty member.

HON 491. Seminar. 1-5 Credits.

HON 494. Individual Study. 1-5 Credits.

Human & Community Education (H&CE)

H&CE 194. Individual Study. 1-5 Credits.

H&CE 196. Field Experience. 1-15 Credits.

H&CE 199. Special Topics. 1-5 Credits.

H&CE 232. Philosophy and Policy. 3 Credits.
Principles, philosophies, development, and implementation of agricultural education, family and consumer sciences education, and extension programs. Analysis of evolving concepts with emphasis on history, legislation, and principles underlying organization and practice.

H&CE 291. Seminar. 1-3 Credits.

H&CE 292. Study Abroad. 1-15 Credits.

H&CE 294. Individual Study. 1-5 Credits.

H&CE 299. Special Topics. 1-5 Credits.

H&CE 379. Study Tour Abroad. 1-6 Credits.

H&CE 391. Seminar. 1-3 Credits.

H&CE 392. Study Abroad. 1-15 Credits.

H&CE 394. Individual Study. 1-5 Credits.

H&CE 399. Special Topics. 1-5 Credits.

H&CE 444. Planning the Community Program in Agricultural Education. 3 Credits.
Determining resources and trends of local communities. Emphasis on agricultural education program policies; planning and managing the primary program components; strategies for the management and organization of youth and adult programming in agricultural education. Prereq: Admission to School of Education.

H&CE 445. Technology Transfer In Agriculture. 3 Credits.
Methods of formal and informal educational programs. Attitudes and values as influences on the introduction and acceptance of new and emerging technologies. Emphasizes global issues. Prereq: H&CE 341.

H&CE 446. Extension Education. 2 Credits.
Determining resources and trends of local communities. Emphasis on agricultural education program policies; planning and managing the primary program components; strategies for the management and organization of youth and adult programming in agricultural education. {Also offered for graduate credit - see H&CE 646.}.

H&CE 467. Advising Family, Career, and Community Leaders of America. 3 Credits.
This course prepares advisors of Family, Career, and Community Leaders of America chapters: prepares Family and Consumer Sciences teachers to build student leadership; and raises awareness of FCCLA resources available to FCS teachers.{Also offered for graduate credit - see H&CE 667.}.

H&CE 468. Methods of Teaching Family and Consumer Sciences I: Techniques. 3 Credits.
Preparation for teaching in the unique field of Family and Consumer Sciences by providing a foundation of practical methods, techniques, and assessments for students of all ages and in various environments. Prereq: Admission to the School of Education.

H&CE 469. Housing Education and Issues. 3 Credits.
Issues, curricula, and techniques for teaching and evaluating K-12 and adult housing programs.

H&CE 474. Extension Internship. 4 Credits.
Supervised full-time family and consumer sciences extension internship in an approved location. Prereq: H&CE 345.

H&CE 480. Science, Technology, Engineering & Mathematics Teaching Methods in Agricultural Education. 3 Credits.
Methods of planning and teaching in agricultural education laboratories at secondary and post-secondary levels. Learning theories, innovations, and advanced principles in science, technology, engineering and mathematics teaching methods, materials, and ethics.

H&CE 481. Methods of Teaching Agriculture. 3 Credits.
Methods of planning and teaching agricultural education in secondary and post-secondary settings. Learning theories, innovations and advanced principles in teaching methods and materials, and ethics. Prereq: EDUC 321, EDUC 322, admission to School of Education. {Also offered for graduate credit - see H&CE 681P.}.

H&CE 482. Methods of Teaching Family and Consumer Sciences II: Professional Practices. 3 Credits.
Preparation for teaching in the unique field of Family and Consumer Sciences through discussion of programmatic issues; experiences in planning and implementing lessons, units, and courses; and opportunities to examine and practice professionalism. Prereq: EDUC 451 and H&CE 468. {Also offered for graduate credit - see 682P.}.

H&CE 483. Student Teaching Seminar. 1 Credit.
Orientation to student teaching in agricultural education and analysis of professional issues, concerns, and problems associated with AGED, FFA/SAE, and the student teaching experience. Prereq: EDUC 489, EDUC 451, EDUC486, H&CE 232, H&CE 341. For AGED: H&CE 444, H&CE 481. For FACS: H&CE 468, H&CE 482. Coreq: H&CE 487. {Also offered for graduate credit - see H&CE 683P.}.

H&CE 487. Student Teaching. 9 Credits.
Supervised teaching in an approved and accredited school. Includes an on-campus seminar. Prereq: EDUC 489, EDUC 451, EDUC 486, H&CE 232, H&CE 341. For AGED: H&CE 444, H&CE 481. For FACS: H&CE 468, H&CE 482. Coreq: H&CE 483. {Also offered for graduate credit - see H&CE 687P.}.

H&CE 487P. Student Teaching. 12 Credits.
Supervised teaching in an approved and accredited school. Includes an on-campus seminar.

H&CE 488. Applied Student Teaching. 3 Credits.
Guided student teaching experience including application of lesson planning, portfolio development, professional goal-setting, and supervised teaching in an approved and accredited school. Prereq: Admission to School of Education, completion of professional education sequence. Coreq: EDUC 485 or H&CE 483P, EDUC 487. Cross-listed with H&CE 488. {Also offered for graduate credit - see H&CE 688P.}.

H&CE 491. Seminar. 1-5 Credits.

H&CE 492. Study Abroad. 1-15 Credits.

H&CE 494. Individual Study. 1-5 Credits.

H&CE 496. Field Experience. 1-15 Credits.

H&CE 499. Special Topics. 1-5 Credits.

H&CE 646. Extension Education. 2 Credits.
Determining resources and trends of local communities. Emphasis on agricultural education program policies; planning and managing the primary program components; strategies for the management and organization of youth and adult programming in agricultural education. {Also offered for undergraduate credit - see H&CE 446.}.

H&CE 667. Advising Family, Career, and Community Leaders of America. 3 Credits.
This course prepares advisors of Family, Career, and Community Leaders of America chapters: prepares Family and Consumer Sciences teachers to build student leadership; and raises awareness of FCCLA resources available to FCS teachers. {Also offered for undergraduate credit - see H&CE 467.}.

H&CE 668. Methods of Teaching Family and Consumer Sciences I: Techniques. 3 Credits.
Preparation for teaching in the unique field of Family and Consumer Sciences by providing a foundation of practical methods, techniques, and assessments for students of all ages and in various environments. Prereq: Admission to the School of Education. {Also offered for undergraduate credit - see H&CE 468}.

H&CE 681P. Methods of Teaching Agriculture. 3 Credits.
Methods of planning and teaching agricultural education in secondary and post-secondary settings. Learning theories, innovations and advanced principles in teaching methods and materials, and ethics. {Also offered for undergraduate credit - see H&CE 481.}.

H&CE 682P. Methods of Teaching Family and Consumer Sciences II: Professional Practices. 3 Credits.
Preparation for teaching in the unique field of Family and Consumer Sciences through discussion of programmatic issues; experiences in planning and implementing lessons, units, and courses; and opportunities to examine and practice professionalism. {Also offered for undergraduate credit - see H&CE 482.}.

H&CE 683P. Student Teaching Seminar. 1 Credit.
Orientation to student teaching in agricultural education and analysis of professional issues, concerns, and problems associated with AGED, FFA/SAE, and the student teaching experience. Prereq: EDUC 689P, EDUC 651P, EDUC 686P. For AGED: H&CE 681P. For FACS: H&CE 682P. Coreq: H&CE 687P. {Also offered for undergraduate credit - see H&CE 483.}.

H&CE 687P. Student Teaching. 9 Credits.
Supervised teaching in an approved and accredited school. Includes an on-campus seminar. Prereq: EDUC 689P, EDUC 651P, EDUC 686P. For AGED: H&CE 681P. For FACS: H&CE 682P. Coreq: H&CE 683P. {Also offered for undergraduate credit - see H&CE 487.}.

H&CE 688P. Applied Student Teaching. 3 Credits.
Guided student teaching experience including application of lesson planning, portfolio development, professional goal-setting, and supervised teaching in an approved and accredited school. Coreq: EDUC 685P, EDUC 687P. Cross-listed with H&CE 688P. {Also offered for undergraduate credit - see H&CE 488.}.

H&CE 724. Program Development In Vocational Education. 2 Credits.
Methods and curricula development in vocational family and consumer sciences education in accordance with state and federal guidelines. Includes long-range and strategic planning competencies.

H&CE 740. Vocational Philosophy and Policy. 3 Credits.
Philosophy in developing, planning, and conducting vocational education programs at federal, state, and local levels. Importance of legislation on state and local policy-making.

H&CE 743. SAE/Adult Programs. 3 Credits.
Principles of leadership, design, analysis, record keeping, student organizations, and activities in adult/youth programs. Community-based programs in adult farm business management education. Prereq: Teaching experience.

H&CE 746. International Extension. 3 Credits.
The ideological and theoretical basis of world agricultural assistance programs and their effects on different sectors and classes.

H&CE 751. Rural Survey in Agricultural Education. 3 Credits.
Research-type survey of the agricultural education resources unique to the local area/community, research data implications, and current technology implementation. Prereq: Teaching experience, EDUC 702.

H&CE 756. Program Development and Evaluation. 3 Credits.
Methods and procedures of long-range planning, strategic planning techniques, integrating new/emerging biotechnology, guidance and counseling, and evaluating program effectiveness.

H&CE 771. Human Relations for Educators. 3 Credits.
This course will develop an awareness of the constructivist approach to learning and the importance of effective human relations skills needed to enhance learning and well-being for all students.

H&CE 772. Curriculum Development in Family and Consumer Sciences. 3 Credits.
Examination of the major concepts, philosophies, and strategies that influence curriculum decisions in family and consumer sciences programs at all educational levels. Includes assessment of curriculum goals and materials.

H&CE 773. Occupational Programs in Family and Consumer Science. 3 Credits.
Planning and implementing occupational Family and Consumer Science programs in career and technical education. Focus on cooperative education, career pathways and work-based education.

H&CE 774. Teaching Family and Consumer Science with Technology. 3 Credits.
This course will prepare family and consumer science teachers to use technology as a tool in their classrooms by focusing on the knowledge, skills, and attitudes necessary to effectively use a variety of technological applications.

H&CE 775. Internship. 1-3 Credits.
Supervised experience in a formal or informal environment relevant to the application of educational principles. Setting may include middle, secondary, post-secondary, and adult programs.

H&CE 776. Research Design in Family and Consumer Sciences. 3 Credits.
Methods of research in family and consumer sciences; applications in educational settings.

H&CE 777. Evaluation in Family and Consumer Sciences. 3 Credits.
Examination of the role of course assessment, teacher effectiveness, facilities, equipment, and staffing patterns in program evaluation. Review of research on evaluation and exploration of alternative evaluation models.

H&CE 778. Administration of Family and Consumer Sciences Programs. 3 Credits.
Administration of family and consumer sciences programs. Emphasis on educational leadership and related issues in a variety of educational settings.

H&CE 779. Techniques of Supervision in Family and Consumer Sciences. 3 Credits.
This course will cover the philosophy, responsibilities, and techniques of supervision in family and consumer sciences and other learning environments.

H&CE 781. Professional Development in Agricultural Education. 1-3 Credits.
Continued professional development in technical and pedagogical subjects of current importance for professionals in agricultural education.

H&CE 787. Issues In Education. 1-3 Credits.
Exploration and assessment of a current issue associated with middle and secondary applied academic programs. Prereq: Current employment or experience as middle/secondary teacher.

H&CE 790. Graduate Seminar. 1-3 Credits.

H&CE 793. Individual Study/Tutorial. 1-5 Credits.

H&CE 794. Practicum/Internship. 1-15 Credits.

H&CE 795. Field Experience. 1-15 Credits.

H&CE 797. Master's Paper. 1-3 Credits.

H&CE 798. Master's Thesis. 1-10 Credits.

Human Development & Education, General (HD&E)

HD&E 189. Skills for Academic Success. 1 Credit.
This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation. Cross-listed with ABEN 189, AGRI 189, BUSN 189, ME 189 and UNIV 189. F, S.

HD&E 191. Seminar. 1-5 Credits.

HD&E 194. Individual Study. 1-3 Credits.

HD&E 196. Field Experience. 1-15 Credits.

HD&E 199. Special Topics. 1-5 Credits.

HD&E 291. Seminar. 1-3 Credits.

HD&E 292. Study Abroad. 1-15 Credits.

HD&E 294. Individual Study. 1-5 Credits.

HD&E 299. Special Topics. 1-5 Credits.

HD&E 320. Professional Issues. 1 Credit.
Analysis and integration of professional perspectives and trends; life career development skills (self-assessment, resume writing, interviewing, and correspondence.) 1 lecture. Prereq: Junior standing.

HD&E 379. Study Tour Abroad. 1-6 Credits.

HD&E 391. Seminar. 1-5 Credits.

HD&E 392. Study Abroad. 1-15 Credits.

HD&E 394. Individual Study. 1-5 Credits.

HD&E 396. Field Experience. 1-15 Credits.

HD&E 399. Special Topics. 1-5 Credits.

HD&E 491. Seminar. 1-5 Credits.

HD&E 492. Study Abroad. 1-15 Credits.

HD&E 494. Individual Study. 1-5 Credits.

HD&E 496. Field Experience. 1-15 Credits.

HD&E 499. Special Topics. 1-5 Credits.

HD&E 690. Graduate Seminar. 1-5 Credits.

HD&E 696. Special Topics. 1-5 Credits.

HD&E 777. Advanced Stress Management. 3 Credits.
The dynamics of stress, sources and symptoms of stress, and stress management techniques will be presented. Research in stress from the interdisciplinary perspectives of wellness, applied gerontology, and counseling.

HD&E 790. Graduate Seminar. 1-5 Credits.

HD&E 793. Individual Study. 1-5 Credits.

HD&E 794. Practicum/Internship. 1-8 Credits.

Human Development & Family Science (HDFS)

HDFS 110. Introduction to Human Development and Family Science. 1 Credit.
Introduction to the Human Development and Family Science department and field. Prereq: restricted to HDFS majors only.

HDFS 135. Family Science. 3 Credits.
Introduction to family science concepts including family life cycle, different styles of family life, and the influence of society on the family.

HDFS 182. Wellness and Aging. 3 Credits.
Study of wellness in the later years with a focus on the positive aspects of aging and the contributions of elders in society including emphases on research, theory, and wellness resources.

HDFS 185. Financial Survival for College Students. 2 Credits.
This course provides a foundation for personal financial planning focusing on the skills and tools needed to organize and manage personal finances in the real world.

HDFS 186. Consumer and Society. 3 Credits.
Consumer rights, responsibilities, and consequences of consumer decision-making. Overview of advertising, fraud, and other issues.

HDFS 194. Individual Study. 1-5 Credits.

HDFS 196. Field Experience. 1-15 Credits.

HDFS 230. Life Span Development. 3 Credits.
Study of human growth and development throughout the life span.

HDFS 242. Couples, Marriages and Families. 3 Credits.
Study of the formation of relationships in varied contexts: examines the diversity of couples, marriages, and families that exists in our contemporary society. Emphasis will be on relationship health as well as barriers to relationship wellness.

HDFS 250. Introduction to Research Methods in Human Development and Family Sciences. 3 Credits.
Undergraduate orientation to research methods in human development and marital/family relationships; students will explore the scientific method as applied to HDFS, methods/issues related to data collection, and methods of data analysis.

HDFS 291. Seminar. 1-5 Credits.

HDFS 310. Citizenship & Social Activism. 3 Credits.
This course is designed to help students understand and promote civic engagement and leadership. Students will learn to analyze social, economic, and political problems through a theoretical framework and practical application. Leadership development will be emphasized using tools of social change.

HDFS 320. Prenatal, Infant and Toddler Development. 3 Credits.
Study of growth and development of the child from conception to age 3.

HDFS 330. Child Development. 3 Credits.
Study of children, three years through middle childhood. Emphasis on social, cognitive, physical, and emotional development. Prereq: HDFS 230, HDFS 320, or PSYC 250.

HDFS 340. Adolescent Development. 3 Credits.
Study of physical, social, cognitive, and emotional development of adolescents. Includes examination of contemporary issues related to this age group. Prereq: HDFS 230 or HDFS 320 or HDFS 330 or PSYC 250.

HDFS 341. Parent-Child Relations. 3 Credits.
Contemporary parenting principles and strategies. Emphasis on application in the home and professional settings. Prereq: HDFS 135 and HDFS 230 or HDFS 320 or HDFS 330 or HDFS 450 or PSYC 250.

HDFS 353. Children, Families and Public Policy. 3 Credits.
Interaction of the national economy and the family economy with regard to the public programs affecting well-being of families. Emphasis on philosophies of service delivery and policy alternatives. Prereq: HDFS 135 and junior or senior standing.

HDFS 357. Personal and Family Finance. 3 Credits.
Factors influencing decisions on acquiring and using financial resources and budgeting to achieve goals. Overview of credit, taxation, savings, insurance, and investments. Recommended: HDFS 186. This course is restricted to HDFS majors and minors or FACS Ed majors or pre-FACS majors or WGS majors or minors.

HDFS 360. Adult Development and Aging. 3 Credits.
Study of development during adulthood and later life. Emphasis on perceptual-motor and cognitive functioning, personality, adjustment, social, familial, and cultural aspects of adulthood.

HDFS 394. Individual Study. 1-5 Credits.

HDFS 424. Observation and Assessment of Children. 3 Credits.
Overview of observation/assessment of children for research and practice application. Prereq: HDFS 320, 330.

HDFS 430. Topics in Cognitive Development. 3 Credits.
Understanding the fundamentals of cognitive development in children, adolescents and/or adults. Topics vary each time the course is offered and may include cognition, perception, concepts, reasoning, memory, and language. May be repeated for credit with change in subtopic. Prereq: HDFS 250 or PSYC 350 or SOC 340 and junior or senior standing.

HDFS 435. Topics in Socioemotional Development. 3 Credits.
Understanding the fundamentals of socio-emotional development in children, adolescents and/or adults. Topics vary each time the course is offered and may include temperament, peer relations, moral development, emotional development, gender development, or development of self-concept. May be repeated for credit with change in subtopic. Prereq: HDFS 250 or PSYC 350 or SOC 340 and junior or senior standing.

HDFS 445. Topics in Family Science. 3 Credits.
Advanced study of specific topic areas in Family Science. Topics vary each time the course is offered and may include mate selection, divorce, step-families, poverty, etc. May be repeated for credit with change in subtopic. Prereq: HDFS 135, HDFS 242, HDFS 250 and students must be a major with junior or senior standing in HDFS, WGS or FACS.

HDFS 448. Issues In Sexuality. 3 Credits.
Study of personal, interpersonal, and societal meanings of human sexuality. Decision making relevant to sexual behavior. Prereq: junior or senior standing.

HDFS 462. Methods of Family Life Education. 3 Credits.
Introduces students to the study of various family issues including crisis, stress, diversity and change and the role of family life education as a method of preventing or mediating family distress. Prereq: HDFS 135, HDFS 242, junior or senior standing, HDFS majors or minors, WGS majors or minors, FACS majors or pre-FACS majors only. Recommended: HDFS 341. {Also offered for graduate credit - see HDFS 662.}.

HDFS 468. Families and Work. 3 Credits.
Issues, opportunities and problems related to the interface of work and family. Topics include household division of labor, trends in the labor market, and work-family policy. Prereq: Junior or Senior standing. {Also offered for graduate credit - see HDFS 668.}.

HDFS 475. Children and Families Across Cultures. 3 Credits.
Study of developmental and family issues as viewed from a cross-cultural diversity perspective.

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 HDFS 360.

HDFS 482. Family Dynamics of Aging. 3 Credits.
Examination of issues related to family life in the later years from the perspectives of aging individuals and their families. Prereq: HDFS 135 or HDFS 230 or HDFS 360 or PSYC 250 or PSYC 471.

HDFS 483. Developmentally Appropriate Practices from Birth Through Adolescence. 3 Credits.
This course will provide guidance in planning, implementing, and evaluating developmentally appropriate activities and programming from birth through adolescence including infancy, preschool-age, childhood, and adolescence A strong emphasis on careers from birth through adolescence in child development and family science will be incorporated into this course. Recommended Prereq: HDFS 320, 330, 450.

HDFS 491. Seminar. 1-5 Credits.

HDFS 494. Individual Study. 1-5 Credits.

HDFS 496. Field Experience. 1-15 Credits.

HDFS 499. Special Topics. 1-5 Credits.

HDFS 677. Financial Counseling. 3 Credits.
Advanced analysis of family financial issues. Evaluation of alternative financial programs. {Also offered for undergraduate credit - see HDFS 477.}.

HDFS 696. Special Topics. 1-5 Credits.

HDFS 703. Research Methods in Human Development and Family Science. 3 Credits.
Introduction to research methods in child development and marital and family relationships. Includes instrument selection/construction, data collection, interpretation of results, and proposal writing. Emphasis on the unique methodological features associated with the field.

HDFS 705. Quantitative Methods in Developmental Science. 4 Credits.
This course is an introduction to research methods and quantitative analyses commonly used in developmental science. Special emphasis will be placed on the unique methodological features associated with the field. Prereq: Graduate standing in HDFS or Developmental Science.

HDFS 710. Foundations of Youth Development. 1 Credit.
This course will examine the fundamentals of youth development and the youth development profession. Through this introduction to the field, students will explore the ethical, professional, and historical elements of youth development as it has evolved toward professionalization.

HDFS 711. Youth Development. 3 Credits.
An introduction to theory and research in positive youth development. The course emphasizes how the developmental tasks of this life stage are influenced by (and influence) family and home, school, peers, and other contextual forces. The course will help students recognize and become familiar with the major issues and transitions of adolescents.

HDFS 712. Community Youth Development. 3 Credits.
Focuses upon community youth development from a strength-based approach. This approach is a holistic and dynamic understanding of youth and communities encompassing both individual development (i.e. positive youth development) and adolescents' interrelationships with their environments. Emphasis is placed upon research, theory, and practice.

HDFS 713. Adolescents and Their Families. 3 Credits.
This course explores adolescent development in the context of the family. The bi-directional influences between adolescents and their families will be examined. Implications for professionals working with youth and families will be explored and highlighted.

HDFS 714. Contemporary Youth Issues. 3 Credits.
This course presents issues faced by youth today and associated risk and resiliency factors. A different topic is presented each year. Past topics have included Youth Violence, Youth and Appearance, and Volunteerism. The course may be taken more than once, as long as the topic areas are different each time.

HDFS 715. Youth in Cultural Contexts. 3 Credits.
This course will examine the cultural contexts that affect youth from within and outside the family. Students will be encouraged to think critically about society and culture, gain further knowledge of how ethnic groups fit historically into society, and examine how history has shaped the current cultural climate of the U.S.

HDFS 716. Youth Professionals as Consumers of Research. 3 Credits.
Students will learn the basics of quantitative and qualitative research approaches that will enable them to understand, evaluate, and critique research articles. Students will be able to judge the validity and usefulness of research articles in order to guide their educational or therapeutic interventions or public policy decisions.

HDFS 717. Program Design, Implementation and Evaluation. 3 Credits.
Focuses on hands-on tools for conducting strategic planning, designing program logic model, and evaluating the performance of programs for youth and families. Students will develop knowledge through participating in a community-based project involving the practical application of program design and evaluation methods.

HDFS 718. Administration and Program Management. 3 Credits.
This course introduces students to the development, administration and management of youth-serving organizations.

HDFS 719. Youth Policy. 3 Credits.
This course examines federal and state policies that impact the developmental opportunities for youth. A guiding question that will be used to evaluate these existing (and prospective) policies is whether they contribute to, or act as barriers to desired developmental outcomes.

HDFS 720. Basic Grant Development and Management. 1 Credit.
This course introduces students to the grant development and management process. Restricted to HDFS MS or PhD program students only.

HDFS 721. Adult Development and Aging. 3 Credits.
Study of development during adulthood and later life. Emphasis on perceptual-motor and cognitive functioning, personality, adjustment, social, familial, and cultural aspects of adulthood.

HDFS 722. Methods and Theories in Gerontology. 3 Credits.
Study of theories and methods (quantitative and qualitative) in Gerontology.

HDFS 723. Perspectives in Gerontology. 3 Credits.
Examination of current research, theories and controversies within the field of gerontology.

HDFS 729. Professional Seminar in Gerontology. 3 Credits.
Integrative experience for gerontology students; designed to be taken near the end of the degree program.

HDFS 740. Theories & Research in Family Financial Planning I. 3 Credits.
Introduction to the social science of family financial planning: Theories of family functioning, microeconomic theory related to family resource allocation decisions, the family as an economic unit, and interaction of the family and the economy.

HDFS 741. Theories & Research in Family Financial Planning II. 3 Credits.
Macroeconomic theory as it relates to family resource allocation decisions, theories of household behavior, lifecycle hypothesis, behavioral economics, behavioral finance, theories of behavioral change, and psychological theories of family well-being. Focus on empirical research investigating household financial decision-making. Prereq: HDFS 740.

HDFS 750. Culture and Aging: Global and Multicultural Perspectives. 3 Credits.
Using a cross-cultural perspective, this course explores the developmental processes of aging in various social and cultural contexts, both within the U.S. and across the globe. Focus will be specifically on how culture influences the processes and experience of aging as well as well-being during late-life.

HDFS 760. Aging Policy. 3 Credits.
Formation, implementation and impact of policies that affect the well-being of the elderly in the United States.

HDFS 761. Applications in Gerontology. 3 Credits.
Study of the applications of gerontology research and theory. The course will provide an overview of programs, methods and evaluations of services for older adults.

HDFS 762. Retirement Planning, Employee Benefits and the Family. 3 Credits.
Critical examination of micro and macro considerations in retirement planning for individuals and families.

HDFS 763. Personal Income Taxation. 3 Credits.
Study of principles and concepts of personal income tax planning as they relate to families.

HDFS 764. Family Economics. 3 Credits.
Overview of basic concepts and theories in family economics with emphasis on the economics situation of families in the United States.

HDFS 765. Insurance Planning for Families. 3 Credits.
An in-depth study of risk management concepts, tools, and strategies for individuals and families.

HDFS 766. Estate Planning for Families. 3 Credits.
Study of principles and concepts of estate planning as they relate to families.

HDFS 767. Professional Practices in Family Financial Planning. 3 Credits.
Study of strategies and methods for managing private family financial planning practices including ethics, compensation, client-centered marketing and practice management.

HDFS 768. Housing/Real Estate. 3 Credits.
Overview of the role of housing and real estate in the family financial planning process including taxation, law, mortgages, ethics and financial calculations.

HDFS 769. Financial Planning Case Studies. 3 Credits.
Examines professional issues in family financial planning including ethics, regulation on certification, communication, and professional responsibility. Emphasis on personal finance case studies and investment policy.

HDFS 770. Fundamentals of Financial Planning. 3 Credits.
Survey of personal/family financial planning including process, time value of money, cash management, credit, taxation, insurance, housing, investments, retirement, and estate planning.

HDFS 771. Investing for the Family's Future. 3 Credits.
Study of the concepts of time and risk value of money in evaluating investment markets.

HDFS 772. Military Personal Financial Readiness. 3 Credits.
Preparation of Financial Counselors and Planners regarding the unique needs and resources of military service members and their families. Focus on mission readiness and overall financial well-being.

HDFS 790. Graduate Seminar. 1-3 Credits.

HDFS 791. Temporary/Trial Topics. 1-5 Credits.

HDFS 793. Individual Study/Tutorial. 1-5 Credits.

HDFS 794. Practicum/Internship. 1-8 Credits.

HDFS 795. Field Experience. 1-15 Credits.

HDFS 796. Special Topics. 1-5 Credits.

HDFS 797. Master's Paper. 1-3 Credits.

HDFS 797S. Comprehensive Project. 1-6 Credits.

HDFS 798. Master's Thesis. 1-10 Credits.

HDFS 801. Graduate Orientation Seminar. 1 Credit.
Introduction to graduate program, faculty, policies and procedures.

HDFS 802. Teaching Developmental Science. 3 Credits.
Introduction to research and theory on college teaching, including course preparation, grading, and classroom management. Emphasis on acquiring skills related to teaching in developmental science.

HDFS 805. Professional Development in Developmental Science. 1 Credit.
This course serves to facilitate professional development among graduate students in developmental science. Students will discuss methods for succeeding in graduate school, presenting and publishing research, and searching for jobs.

HDFS 811. Developmental Concepts and Theories. 3 Credits.
This course is an advanced study of the theories and concepts of development throughout the lifespan. Students will be introduced to relevant historical and current theoretical work on biological, cognitive, and socio-emotional human development. Using interdisciplinary lifespan perspectives, we will explore conceptualizations of developmental change and examine implications for research and applications.

HDFS 813. Social and Emotional Development Across the Lifespan. 3 Credits.
This course is an advanced study of the concepts and research of social and emotional development throughout the lifespan. Students will critically evaluate historical, recent, and current empirical research on social and emotional development in the field of developmental science, and explore applications across the lifespan.

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.

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. Restricted to Human Development and Family Science doctoral students only.

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.

HDFS 890. Graduate Seminar. 1-5 Credits.

HDFS 892. Graduate Teaching Experience. 1-6 Credits.

HDFS 893. Individual Study/Tutorial. 1-5 Credits.

HDFS 894. Practicum/Internship. 1-8 Credits.

HDFS 899. Doctoral Dissertation. 1-15 Credits.

Humanities (HUM)

HUM 194. Individual Study. 1-5 Credits.

HUM 196. Field Experience. 1-15 Credits.

HUM 199. Special Topics. 1-5 Credits.

HUM 291. Seminar. 1-5 Credits.

HUM 292. Study Abroad. 1-15 Credits.

HUM 294. Individual Study. 1-5 Credits.

HUM 299. Special Topics. 1-5 Credits.

HUM 379. Study Tour Abroad. 1-6 Credits.

HUM 385. Comparative Arts. 3 Credits.
Study of Western arts in light of the aesthetic, social, and philosophical ideas that nurtured them.

HUM 391. Seminar. 1-3 Credits.

HUM 392. Study Abroad. 1-15 Credits.

HUM 394. Individual Study. 1-5 Credits.

HUM 399. Special Topics. 1-5 Credits.

HUM 487. Aesthetics. 3 Credits.
Principles of aesthetics as revealed by artists, writers, and philosophers. Cross-listed with PHIL 487.

HUM 491. Seminar. 1-5 Credits.

HUM 491H. Seminar. 3 Credits.

HUM 492. Study Abroad. 1-15 Credits.

HUM 494. Individual Study. 1-5 Credits.

HUM 494H. Individual Study. 1-5 Credits.

HUM 496. Field Experience. 1-15 Credits.

HUM 499. Special Topics. 1-5 Credits.

Industrial and Manufacturing Engineering (IME)

IME 111. Introduction to Industrial and Manufacturing Engineering. 3 Credits.
Overview of industrial engineering and manufacturing engineering professional careers and work environments. Basic skill acquisition using computer software tools to solve engineering problems, prepare reports, plan projects, deliver professional presentations, and manage data.

IME 194. Individual Study. 1-5 Credits.

IME 196. Field Experience. 1-15 Credits.

IME 199. Special Topics. 1-5 Credits.

IME 291. Seminar. 1-3 Credits.

IME 292. Study Abroad. 1-15 Credits.

IME 294. Individual Study. 1-5 Credits.

IME 299. Special Topics. 1-5 Credits.

IME 311. Work/Station Design and Measurement. 3 Credits.
Analytical methods for measuring human performance in industrial, commercial and manufacturing settings. Development of work procedures and design of workstations. Considerations of ergonomics, safety, performance effectiveness and efficiency, interactions between workstations, information and data requirements, production throughput, training and skill requirements, and resources. Weekly laboratory. S.

IME 330. Manufacturing Processes. 3 Credits.
Traditional manufacturing processing methods as employed in contemporary practice. Includes properties of materials, machining, casting, forming, and fabrication techniques. Several experiments will be conducted on various manufacturing processes in the laboratory. Prereq: ME 212.

IME 335. Welding Technology. 3 Credits.
Study of arc and gas welding technology together with related metallurgy. Laboratory instruction in welding techniques and skills. 1 recitation, 1 two-hour laboratory. F.

IME 379. Study Tour Abroad. 1-6 Credits.

IME 380. CAD/CAM for Manufacturing. 3 Credits.
Coverage of CAD, numerical control, and CAM software. Use of manufacturing standards for geometric dimensioning and tolerancing. Prereq: ME 212. F.

IME 391. Seminar. 1-3 Credits.

IME 392. Study Abroad. 1-15 Credits.

IME 394. Individual Study. 1-5 Credits.

IME 397. Fe/Coop Ed/Internship. 1-4 Credits.

IME 399. Special Topics. 1-5 Credits.

IME 411. Human Factors Engineering. 3 Credits.
A survey of human factors engineering topics with an emphasis on optimizing person-machine and person-system interactions. Human physical and cognitive capabilities will be investigated to improve work design, interface design, and usability. Prereq: IME 311, IME 460. F/2 (even years) {Also offered for graduate credit - see IME 611.}.

IME 427. Packaging for Electronics. 3 Credits.
Processes and materials for packaging of electronic components and devices, including integrated circuit chips, chip packages, and board level packaged systems; boards and substrates technology; quality and reliability of electronic packages. Open to all engineering majors. Prereq: Junior standing. S/2 (odd years). Cross-listed with ECE 427. {Also offered for graduate credit - see IME 627.}.

IME 429. Introduction to IC Fabrication. 3 Credits.
This course examines issues about fabrication methods and procedures. Topics will include implantation, pattern transfer and process integration. Cross-listed with ECE 429. {Also offered for graduate credit - see IME 629.}.

IME 430. Process Engineering. 3 Credits.
Comprehensive analysis of selected manufacturing processes; development of process flow maps, schematic and mathematical modeling of process dynamics, and evaluation of processing alternatives. Design of effective and efficient processes for selected industrial products. Seminar/case study format. Prereq: IME 330. F {Also offered for graduate credit - see IME 630.}.

IME 431. Production Engineering. 3 Credits.
Design of a production system for selected manufactured products, development of production system flow maps and linked process dynamic models, evaluation of throughput and identification of constraints. Evaluation of alternative solutions for production constraints. Undergraduate: design of fixtures, dies and tooling for economical production. Graduate: In-depth analysis of contemporary production systems for selected manufactured products; development of production systems issues. Seminar/case study format. Prereq: IME 330. Recommended: IME 430/630. S {Also offered for graduate credit - see IME 631.}.

IME 432. Composite Materials Manufacturing. 3 Credits.
Processes for manufacturing products from fiber-reinforced composite materials. Analysis of tooling, process variables and quality management during processing. Design of processes for manufacture of selected composite parts. Weekly laboratory. Prereq: IME 330, ME 331. S.

IME 433. Additive Manufacturing. 3 Credits.
A synchronized approach considering functional design, analysis and manufacturing that support seamless integration of geometry with performance. The course will address additive manufacturing principles; scope of additive manufacturing; bio-manufacturing. Prereq: IME 330. {Also offered for graduate credit - see IME 633.}.

IME 435. Plastics and Injection Molding Manufacturing. 3 Credits.
Product and process engineering for manufacturers of plastic products; material evaluation and selection, mold design, process design, quality evalutaion of manufactured plastic parts. Cross-listed with ME 435. {Also offered for graduate credit - see IME 635.}.

IME 437. Methods for Precision Manufacturing. 3 Credits.
Fundamental principles and applications of methods of precision micro- and nano-scale manufacturing of discrete parts and assembled products made of metalllic and non-metallic engineering materials. Prereq: IME 430 and ME 331. {Also offered for graduate credit - see IME 637.}.

IME 440. Engineering Economy. 2-4 Credits.
Capital investment decision foundation within the rules of general and project accounting. Analysis of benefits and returns against cost for engineering installation, operation, life cycle, and buy-rent-lease decisions. Prereq: Junior standing or IME major. {Also offered for graduate credit - see IME 640.}.

IME 450. Systems Engineering and Management. 3 Credits.
Integration of technical disciplines through the stages of systems life cycle: needs and requirements determination, operating and support concepts, design and prototyping, test and evaluation, facilitation, manuals, training, and supportability. Prereq: Junior standing. F {Also offered for graduate credit - see IME 650.}.

IME 451. Logistics Engineering and Management. 3 Credits.
This course emphasizes integrated logistics management methods to improve the effectiveness and efficiency of material flow, information flow and cash flow for the entire supply chains. Prereq: IME 470. Coreq: IME 450. F/2 (odd years) {Also offered for graduate credit - see IME 651.}.

IME 452. Integrated Industrial Information Systems. 3 Credits.
Integration of technical, business, and operational information for status, progress, and decision making in product development, manufacturing, and logistical support of product and customers. Prereq: IME 450. S {Also offered for graduate credit - see IME 652.}.

IME 453. Hospital Management Engineering. 3 Credits.
Survey of management engineering roles in the delivery of health care. Review of functional relationships present in health care delivery systems. Application of industrial engineering tools to solve health care delivery problems focused on cost reduction, process redesign, facility design, quality improvement, and systems integration. Prereq: Core IME courses. S/2 (even years) {Also offered for graduate credit - see IME 653.}.

IME 455. Management of People Systems. 2 Credits.
Study of traditional management functions (planning, organizing, influencing, and controlling) in the context of engineering and management system interactions. Emphasis on communication skills, teaming, job design, leadership, facilitation, and improving employee productivity. Prereq: Junior standing. F {Also offered for graduate credit - see IME 655.}.

IME 456. Program and Project Management. 3 Credits.
Integrated approaches to managing engineering, technology and business projects, addressing the project management lifecycle including initiating, planning, executing, controlling and closing. Additional topics include program management, portfolio management, and applying principles in a business environment. Prereq: Junior standing. S {Also offered for graduate credit - see IME 656.}.

IME 460. Evaluation of Engineering Data. 3 Credits.
Design of engineering experiments and evaluations, curve fitting, regression, hypothesis testing, ANOVA, Taguchi methods in engineering design. Coreq: MATH 166. F, S {Also offered for graduate credit - see IME 660.}.

IME 461. Quality Assurance and Control. 3-4 Credits.
Proactive and reactive quality assurance and control techniques; emphasis on quality planning, statistical process control, acceptance sampling, and total quality management. Issues in reliability and maintainability engineering. Prereq: IME 460. S {Also offered for graduate credit - see IME 661.}.

IME 462. Total Quality In Industrial Management. 3 Credits.
The meaning and means for achieving 'total quality' in all dimensions of industrial activities and organizations. Topics include continuous improvement, statistical process control, leadership, and training. F/2 (even years) {Also offered for graduate credit - see IME 662.}.

IME 463. Reliability Engineering. 3 Credits.
Study and application of statistical models and methods for defining, measuring and evaluating reliability of products, processes and services: life distributions, reliability functions, reliability configurations, reliability estimation, parametric reliability models, accelerate life testing, reliability improvement. Prereq: IME 460. S/2 (odd years) {Also offered for graduate credit - see IME 663.}.

IME 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 470. Operations Research I. 3 Credits.
Techniques to optimize and analyze industrial operations. Use of linear programming, transportation models, networks, integer programming, goal programming, dynamic programming, and non-linear programming. Prereq: MATH 129. Co-req: IME 460. S {Also offered for graduate credit - see IME 670.}.

IME 472. Simulation of Business and Industrial Systems. 3 Credits.
Development of the fundamentals and techniques of simulating business and industrial systems. Monte-Carlo techniques and computer usage. Prereq: IME 460, high-level computer language. S {Also offered for graduate credit - see IME 672.}.

IME 480. Production and Inventory Control. 3 Credits.
Planning and controlling of industrial production and inventory: demand forecasting, master scheduling, materials requirements planning, job scheduling, assembly line balancing, and just-in-time production. Prereq: IME 460. F {Also offered for graduate credit - see IME 680.}.

IME 482. Automated Manufacturing Systems. 3 Credits.
Design of integrated production systems including flexible, programmed automatic control for fabrication, assembly, packaging, movement, and storage. Numerical control, flexible manufacturing systems, and computer integrated manufacturing. 2 recitations, 1 three-hour laboratory. Prereq: IME 311, IME 330, PHYS 252. F {Also offered for graduate credit - see IME 682.}.

IME 485. Industrial and Manufacturing Facility Design. 3 Credits.
Capstone integration of analysis and design tools to convert product design into production plans and plants. Prereq: Senior standing. S {Also offered for graduate credit - see IME 685.}.

IME 489. Industrial and Manufacturing Engineering Capstone. 3 Credits.
Capstone experience. Student projects in design, analysis, and experimental investigation related to industrial and manufacturing engineering. Prereq: Senior standing. S.

IME 491. Seminar. 1-5 Credits.

IME 492. Study Abroad. 1-15 Credits.

IME 493. Undergraduate Research. 1-5 Credits.
Student research, scholarly project or creative investigation completed under the guidance of a faculty mentor. Directed independent project, collaborative work or ongoing participation in faculty research should culminate in a presentation, article or scholarly project.

IME 494. Individual Study. 1-5 Credits.

IME 496. Field Experience. 1-15 Credits.

IME 499. Special Topics. 1-5 Credits.

IME 611. Human Factors Engineering. 3 Credits.
A survey of human factors engineering topics with an emphasis on optimizing person-machine and person-system interactions. Human physical and cognitive capabilities will be investigated to improve work design, interface design, and usability. F/2 (even years) {Also offered for undergraduate credit - see IME 411.}.

IME 627. Packaging for Electronics. 3 Credits.
Processes and materials for packaging of electronic components and devices, including integrated circuit chips, chip packages, and board level packaged systems; boards and substrates technology; quality and reliability of electronic packages. Open to all engineering majors. S/2 (odd years). Cross-listed with ECE 627. {Also offered for undergraduate credit - see IME 427.}.

IME 629. Introduction to IC Fabrication. 3 Credits.
This course examines issues about fabrication methods and procedures. Topics will include implantation, pattern transfer and process integration. Cross-listed with ECE 629. {Also offered for undergraduate credit - see IME 429.}.

IME 630. Process Engineering. 3 Credits.
Comprehensive analysis of selected manufacturing processes; development of process flow maps, schematic and mathematical modeling of process dynamics, and evaluation of processing alternatives. Design of effective and efficient processes for selected industrial products. Seminar/case study format. F {Also offered for undergraduate credit - see IME 430.}.

IME 631. Production Engineering. 3 Credits.
Design of a production system for selected manufactured products, development of production system flow maps and linked process dynamic models, evaluation of throughput and identification of constraints. Evaluation of alternative solutions for production constraints. Undergraduate: design of fixtures, dies and tooling for economical production. Graduate: In-depth analysis of contemporary production systems for selected manufactured products; development of production systems issues. Seminar/case study format. Recommended: IME 630. S {Also offered for undergraduate credit - see IME 431.}.

IME 633. Additive Manufacturing. 3 Credits.
A synchronized approach considering functional design, analysis and manufacturing that support seamless integration of geometry with performance. The course will address additive manufacturing principles; scope of additive manufacturing; bio-manufacturing. {Also offered for undergraduate credit - see IME 433.}.

IME 635. Plastics and Injection Molding Manufacturing. 3 Credits.
Product and process engineering for manufacturers of plastic products; material evaluation and selection, mold design, process design, quality evalutaion of manufactured plastic parts. Cross-listed with ME 635. {Also offered for undergraduate credit - see IME 435.}.

IME 637. Methods for Precision Manufacturing. 3 Credits.
Fundamental principles and applications of methods of precision micro- and nano-scale manufacturing of discrete parts and assembled products made of metalllic and non-metallic engineering materials. {Also offered for undergraduate credit - see IME 437.}.

IME 640. Engineering Economy. 2-4 Credits.
Capital investment decision foundation within the rules of general and project accounting. Analysis of benefits and returns against cost for engineering installation, operation, life cycle, and buy-rent-lease decisions. Prereq: Junior standing or IME major. {Also offered for undergraduate credit - see IME 440.}.

IME 650. Systems Engineering and Management. 3 Credits.
Integration of technical disciplines through the stages of systems life cycle: needs and requirements determination, operating and support concepts, design and prototyping, test and evaluation, facilitation, manuals, training, and supportability. F {Also offered for undergraduate credit - see IME 450.}.

IME 651. Logistics Engineering and Management. 3 Credits.
This course emphasizes integrated logistics management methods to improve the effectiveness and efficiency of material flow, information flow and cash flow for the entire supply chains. F/2 (odd years) {Also offered for undergraduate credit - see IME 451.}.

IME 652. Integrated Industrial Information Systems. 3 Credits.
Integration of technical, business, and operational information for status, progress, and decision making in product development, manufacturing, and logistical support of product and customers. S {Also offered for undergraduate credit - see IME 452.}.

IME 653. Hospital Management Engineering. 3 Credits.
Survey of management engineering roles in the delivery of health care. Review of functional relationships present in health care delivery systems. Application of industrial engineering tools to solve health care delivery problems focused on cost reduction, process redesign, facility design, quality improvement, and systems integration. Prereq: Core IME courses. S/2 (even years) {Also offered for undergraduate credit - see IME 453.}.

IME 655. Management Of People Systems. 2 Credits.
Study of traditional management functions (planning, organizing, influencing, and controlling) in the context of engineering and management system interactions. Emphasis on communication skills, teaming, job design, leadership, facilitation, and improving employee productivity. Prereq: Junior standing. F {Also offered for undergraduate credit - seeIME 455.}.

IME 656. Program and Project Management. 3 Credits.
Integrated approaches to managing engineering, technology and business projects, addressing the project management lifecycle including initiating, planning, executing, controlling and closing. Additional topics include program management, portfolio management, and applying principles in a business environment. S {Also offered for undergraduate credit - see IME 456.}.

IME 660. Evaluation of Engineering Data. 3 Credits.
Design of engineering experiments and evaluations, curve fitting, regression, hypothesis testing, ANOVA, Taguchi methods in engineering design. F, S {Also offered for undergraduate credit - see IME 460.}.

IME 661. Quality Assurance and Control. 3-4 Credits.
Proactive and reactive quality assurance and control techniques; emphasis on quality planning, statistical process control, acceptance sampling, and total quality management. Issues in reliability and maintainability engineering. Prereq: IME 660. S {Also offered for undergraduate credit - see IME 461.}.

IME 662. Total Quality In Industrial Management. 3 Credits.
The meaning and means for achieving 'total quality' in all dimensions of industrial activities and organizations. Topics include continuous improvement, statistical process control, leadership, and training. F/2 (even years) {Also offered for undergraduate credit - see IME 462 .}.

IME 663. Reliability Engineering. 3 Credits.
Study and application of statistical models and methods for defining, measuring and evaluating reliability of products, processes and services: life distributions, reliability functions, reliability configurations, reliability estimation, parametric reliability models, accelerated life testing, reliability improvement. Prereq: IME 660. S/2 (odd years) {Also offered for undergraduate credit - see IME 463.}.

IME 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. S {Also offered for undergraduate credit - see IME 470.}.

IME 672. Simulation of Business and Industrial Systems. 3 Credits.
Development of the fundamentals and techniques of simulating business and industrial systems. Monte-Carlo techniques and computer usage. Prereq: IME 660, high-level computer language. S {Also offered for undergraduate credit - see IME 472.}.

IME 680. Production and Inventory Control. 3 Credits.
Planning and controlling of industrial production and inventory: demand forecasting, master scheduling, materials requirements planning, job scheduling, assembly line balancing, and just-in-time production. Prereq: IME 660. F {Also offered for undergraduate credit - see IME 480.}.

IME 682. Automated Manufacturing Systems. 3 Credits.
Design of integrated production systems including flexible, programmed automatic control for fabrication, assembly, packaging, movement, and storage. Numerical control, flexible manufacturing systems, and computer integrated manufacturing. 2 recitations, 1 three-hour laboratory. F {Also offered for undergraduate credit - see IME 482.}.

IME 685. Industrial and Manufacturing Facility Design. 3 Credits.
Capstone integration of analysis and design tools to convert product design into production plans and plants. Prereq: Senior standing. S {Also offered for undergraduate credit - see IME 485.}.

IME 690. Graduate Seminar. 1-3 Credits.

IME 696. Special Topics. 1-5 Credits.

IME 711. Advanced Human Factors Engineering. 3 Credits.
Research-based study of current human factors engineering problems. Students will review current human factors topics, design and conduct research studies, and produce technical papers reporting results. Prereq: IME 611 and IME 660. F/2 (odd years).

IME 720. Surface Engineering. 3 Credits.
Engineering surfaces: structure and properties. Tribology: surface contacts, friction and wear. Surface heat treatment. Solid, liquid and vapor phase deposition processes for tribological coatings. Emerging processes: nano-engineered and diamond-based coatings. Evaluation and characterization of tribiological coatings. Prereq: Graduate standing in engineering or science. F (odd years).

IME 740. Advanced Engineering Economy. 3 Credits.
Advanced topics in engineering economy including replacement analysis, capital budgeting, income tax effects on equipment selection, probabilistic models, and manufacturing costing. Prereq: IME 640. F/2 (odd years).

IME 761. Quality Engineering. 3 Credits.
Study and application of advanced statistical tools and techniques for defining, monitoring and improving quality of products, processes and services: statistical control charts, process capability analysis, acceptance sampling of variables and attributes, application of design-of-experiments for product and process optimization, response surface methodology, Taguchi methods. Prereq: IME 661. F/2 (odd years).

IME 765. Data Analysis. 3 Credits.
Applications oriented. Topics include: statistical estimation, hypothesis testing, non-parametric methods, design of experiments, factorial experiments, response surface methodology, regression analysis, time series analysis and forecasting, multivariate methods, statistical control charts. Prereq: IME 660.

IME 766. Robust Design Methods. 3 Credits.
Robust design, principles of quality engineering, experimental methods, probabilistic and statistical analysis, product development process, identification of critical design parameters, and optimization methods for product/process design in manufacturing and service industries. Prereq: IME 765.

IME 770. Quantitative Modeling. 3 Credits.
Applications modeling and optimization methods. Domains: transportation, logistics, manufacturing, service systems scheduling, and supply-chain management. Decision models: linear programming and sensitivity analysis, transportation and assignment, network models and algorithms, and integer, dynamic and nonlinear programming. Cross-listed with ENGR 770.

IME 771. Probabilistic and Deterministic Methods. 3 Credits.
Applications modeling. Domains include transportation, logistics, manufacturing, service systems scheduling, and supply-chain management. Quantitative models and tools include Markov chains, stochastic processes, queuing, deterministic and stochastic decision analysis, time series, forecasting, and regression modeling. Prereq: IME 660. Cross-listed with ENGR 771.

IME 772. Advanced Simulation. 3 Credits.
In-depth study of special purpose simulation languages to model, analyze, and design industrial and engineering systems. Stochastic and deterministic methods are included. Prereq: IME 672. S (even years).

IME 773. Advanced Operations Research Topics. 3 Credits.
Study of the theory and applications of linear programming, network flows, and nonlinear programming. Prereq: IME 670. F/2 (odd years).

IME 774. Neural Networks. 3 Credits.
Introduction to the parallel processing paradigms that have been developed recently including neuronetworks and genetic algorithms. Students will work on projects using these tools. Prereq: CSCI 724. Cross-listed with PSYC 774 and CSCI 735.

IME 780. Advanced Production and Inventory Control. 3 Credits.
Study of the theory and applications of production scheduling, inventory management, production planning, just-in-time production, and materials requirement planning. Prereq: IME 680. F (even years).

IME 782. Robotics/CAD/CAM/Control Systems. 3 Credits.
Study of automation, integration of fabrication, and assembly systems. Includes automated material handling and intelligent control systems. Prereq: IME 682. S/2 (odd years).

IME 784. Computer Integrated Manufacturing. 3 Credits.
Study of the continuum of integrated manufacturing processes where computer technology is incorporated in the conception, design, planning, and fabrication of a good or service. The study of philosophy and methods of systematically building flexible and efficient production systems. Prereq: IME 682. S/2 (even years).

IME 785. Facilities Location. 3 Credits.
Theory and methods of locating facilities. Domains include plant and warehouse siting, emergency service sites, vehicle and hazardous material routing, distribution systems design. Topics include planar single and multi-facility models, network location problems, cyclical networks. Prereq: IME 670 or ENGR 770.

IME 786. Manufacturing Systems Analysis. 3 Credits.
Comprehensive analysis of complex issues in the technology and management of modern manufacturing systems and enterprises. Technological issues will impinge on product realization, production of goods, and manufacturing equipment and facilities; management issues addressed will be those drawn from operation of global production enterprises. Seminar format. Prereq: IME 630 or IME 631 (both preferred). S.

IME 790. Graduate Seminar. 1-3 Credits.

IME 791. Temporary/Trial Topics. 1-5 Credits.

IME 793. Individual Study/Tutorial. 1-5 Credits.

IME 795. Field Experience. 1-15 Credits.

IME 796. Special Topics. 1-5 Credits.

IME 797. Master's Paper. 1-3 Credits.

IME 798. Master's Thesis. 1-10 Credits.

IME 899. Doctoral Dissertation. 1-15 Credits.

International Studies (INTL)

INTL 110. Introduction to International Studies. 3 Credits.
An interdisciplinary course which introduces students to a variety of global topics, concepts, and perspectives.

INTL 379. Study Tour Abroad. 1-6 Credits.

INTL 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. Study Abroad. 1-15 Credits.

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. Landscape Architecture Graphics. 3 Credits.
This course will give some insight into the design approach used by landscape architects. It will explore the theories that influence landscape architecture and the manner in which these theories are transformed into physical environments via drawing and other graphic techniques. Prereq: LA or ARCH major.

LA 232. Design Technology. 3 Credits.
Introductory exploration of digital design media and environmental technology in landscape architecture. Prereq or Co-req: ARCH 271 or LA 271.

LA 271. Introduction to Landscape Architecture Studio. 6 Credits.
Entry-level design generation methods involving concept formation, site inventory and analysis, programming, and simple site organization and planning. Problem solving through graphic, computer-generated, and model development; oral and written communication skills. Prereq: LA major or minor.

LA 272. Parks & Open Spaces Studio. 6 Credits.
Continued design development in site organization and planning. Design issues in natural resources, land reclamation, construction technology, and rural development. Intermediate problem solving through two- and three-dimensional graphic techniques; continued oral and written communication skills. Prereq: LA major, LA 271.

LA 291. Seminar. 1-3 Credits.

LA 292. Study Abroad. 1-15 Credits.

LA 294. Individual Study. 1-5 Credits.

LA 299. Special Topics. 1-5 Credits.

LA 322. History of Landscape Architecture. 4 Credits.
Global overview of the landscape developments from prehistoric civilizations through the 20th century using styles and trends. Emphasis on analyzing historic places and locations as a problem-solving method.

LA 331. Graphics III: Design Communication. 3 Credits.
Advanced exploration into computer applications, technologies, and design techniques as related to landscape architecture. Course emphasis towards proficient digital drafting, graphical representation and presentation strategies. Prereq: LA 232 and Landscape Architecture or Architecture majors only.

LA 341. Site Development and Detailing I. 4 Credits.
Intermediate investigations into site planning and design development with a primary focus on site design integration with the technically-related concepts. Prereq for LA majors: Second-year standing. Prereq for ARCH majors: ARCH 272.

LA 342. Site Development and Detailing II. 4 Credits.
Intermediate-level focus on fundamental site landscape and engineering issues within the construction process. Emphasis on site grading and storm water management. Lecture. Prereq: LA major or minor.

LA 371. Site Planning & Design Studio. 6 Credits.
Visual problem solving and large-scale site planning issues. Two-part focus involving the comprehensive visual inventory and analysis along with the immediate application of site planning and design skills. Studio. Prereq: LA major, LA 272.

LA 372. Community Planning & Design Studio. 6 Credits.
Cultural and environmental design issues as they relate to large-scale land planning and site design involved with residential communities. Emphasis within the studio involves site engineering and design detailing. Course includes a field trip. Prereq: LA major, LA 371.

LA 379. Study Tour Abroad. 1-6 Credits.

LA 391. Seminar. 1-3 Credits.

LA 392. Study Abroad. 1-15 Credits.

LA 394. Individual Study. 1-5 Credits.

LA 396. Field Experience. 1-15 Credits.

LA 399. Special Topics. 1-5 Credits.

LA 422. Planting Theory and Practice. 3 Credits.
Acquired methods advancing plant design with ecological and cultural applications in rural/urban environments. Design principles, visual properties, plant communities, structural and ornamental planting. Current garden themes, styles and construction methods.

LA 441. Site Development and Detailing III. 4 Credits.
Advanced exploration into the use of computers and computer-aided design as part of the landscape architecture construction documentation process. Seminar/laboratory. Prereq: LA 372. Coreq: LA 471.

LA 471. Urban Design Studio. 6 Credits.
Regional systems inventory, visual survey, analysis techniques, and methodologies for design problem solving through graphic, computer, and modeling development. Focus on urban studies and site planning. Studio. Prereq: LA major, LA 372.

LA 472. Remediation & Planting Design Studio. 6 Credits.
Natural resource and land reclamation management techniques as part of contemporary design in landscape architecture. Emphasis on presentation and communication. Capstone course. Course includes a field trip. Prereq: LA major, LA 471.

LA 491. Seminar. 1-5 Credits.

LA 492. Study Abroad. 1-15 Credits.

LA 494. Individual Study. 1-5 Credits.

LA 496. Field Experience. 1-15 Credits.

LA 552. Advanced Landscape Planning. 3 Credits.
Theories and practices facing landscape architects and planners in the design of urban, suburban, and rural landscapes. Seminar/field trip. Prereq: LA major or minor.

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 771. Performance Based Design Studio. 6 Credits.
Design of sustainable sites and quality communities with themes that promote the approach of parametric and data driven design in landscape architecture. Strategies, technologies, metrics tools, and practices regarding evaluating site performances will be introduced. Prereq: LA 472, LA 441.

LA 772. Landscape Architecture Graduate Thesis. 6 Credits.
Student generated design solution assimilating the theoretical, social, environmental, technical and ethical practices of Landscape Architecture. Advanced exploration into research/analysis, design development and presentation methods as a culmination of graduate education. Prereq: LA 771.

LA 781. Professional Practice. 3 Credits.
Study of contemporary landscape architectural practice covering professional development, firm organization, project management, SITES 2.0 within the context of the ethical, legal, sustainable, and regulatory environment. Prereq: LA 472.

LA 789. Professional Topics in Landscape Architecture. 3 Credits.
Various topics related to theoretical or methodological aspects of landscape architecture as a professional discipline. May be repeated. Prereq: Students must be Architecture or Landscape Architecture majors only.

Leadership (LEAD)

LEAD 205. Peer Leader Development. 2 Credits.
This course prepares second semester freshmen to act as peer leaders in BUSN 189. It develops the peer leadership skills these students will need to assist the freshmen to navigate the new terrain of college. College of Business consent required.

LEAD 206. Peer Leader Practicum. 1 Credit.
This course is the application course that follows LEAD 205. During the fall semester, each peer leader is accountable for providing leadership for approximately 15 freshmen during the semester. Prereq: LEAD 205.

LEAD 225. Level II Leadership. 3 Credits.
This sophomore level course develops the individual's ability to be simultaneously a good team player and a team leader. It prepares the individual for working on team projects using a service-learning approach.

LEAD 394. Individual Study. 1-5 Credits.

LEAD 494. Individual Study. 1-5 Credits.

LEAD 790. Graduate Seminar. 1-5 Credits.

LEAD 793. Individual Study/Tutorial. 1-5 Credits.

LEAD 890. Seminar. 1-5 Credits.

LEAD 893. Individual Study/Tutorial. 1-5 Credits.

Library Science (LIB)

LIB 194. Individual Study. 1-5 Credits.

LIB 196. Field Experience. 1-15 Credits.

LIB 199. Special Topics. 1-5 Credits.

LIB 291. Seminar. 1-3 Credits.

LIB 292. Study Abroad. 1-15 Credits.

LIB 294. Individual Study. 1-5 Credits.

LIB 299. Special Topics. 1-5 Credits.

LIB 379. Study Tour Abroad. 1-6 Credits.

LIB 391. Seminar. 1-3 Credits.

LIB 392. Study Abroad. 1-15 Credits.

LIB 394. Individual Study. 1-5 Credits.

LIB 399. Special Topics. 1-5 Credits.

LIB 491. Seminar. 1-5 Credits.

LIB 492. Study Abroad. 1-15 Credits.

LIB 494. Individual Study. 1-5 Credits.

LIB 496. Field Experience. 1-15 Credits.

LIB 499. Special Topics. 1-5 Credits.

Management (MGMT)

MGMT 320. Foundations of Management. 3 Credits.
Study of the major functional areas of management including an international perspective of management. Restricted to College of Business professional major or minor, and a 2.50 minimum NDSU grade point average.

MGMT 330. Foundations of Organizational Behavior. 3 Credits.
A behavioral approach to management with emphasis on the understanding of individual behavior in groups in organizations. Topics include motivation, communication, perception, and cultural diversity. Prereq: MGMT 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MGMT 360. Operations Management. 3 Credits.
Study and application of concepts and managerial techniques for manufacturing and service operations. Includes production technology, facility location/layout, inventory management, MRP, just-in-time manufacturing, and total quality management. Prereq: MGMT 320, STAT 330 and MATH 144 or MATH 146. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MGMT 394. Individual Study. 1-5 Credits.

MGMT 430. Leadership in Organizations. 3 Credits.
A comprehensive study of the principles, practices, and challenges of contemporary leadership and followership. Prereq: MGMT 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 630.}.

MGMT 440. International Management. 3 Credits.
Focused on management challenges associated with business activity across national boundaries. Development of management skills for global contexts. Prereq: MGMT 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.{Also offered for graduate credit - see MGMT 640.}.

MGMT 450. Human Resource Management. 3 Credits.
Survey of human resource management, including job analysis, recruitment, selection, performance appraisal, compensation, training, and labor relations. The impact of environmental influences such as legislation, court decisions, and unions on human resource activities are addressed. Prereq: MGMT 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 650 .}.

MGMT 451. Negotiation and Alternative Dispute Resolution. 3 Credits.
An exploration of negotiation and conflict settlement in interpersonal, business, and international settings. Topics include techniques used in negotiations, and alternative dispute resolution procedures such as mediation and arbitration. May be repeated. Prereq: MGMT 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 651.}.

MGMT 452. Compensation Management. 3 Credits.
Study of the human resource management function of compensation. Topics include the job analysis, job evaluation, wage determination, pay-for-performance, and employee benefits. The impact of compensation on recruitment, satisfaction, and performance is examined. Prereq: MGMT 450. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 652.}.

MGMT 453. Understanding and Managing Diversity in Organizations. 3 Credits.
Use of case analysis and experiential learning to consider the theoretical perspectives and practical implications of different forms of diversity at three management levels: personal values and actions; group dynamics; institutional policies and practices. Prereq: MGMT 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MGMT 454. Labor-Management Relations. 3 Credits.
Analysis of human resource management in the presence of labor unions. Topics include: labor history, labor law, organizing unions, contract negotiation and administration, contract dispute resolution, labor-management cooperation, and strikes. Prereq: MGMT 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 654.}.

MGMT 461. Supply Chain Management. 3 Credits.
Identification of the key elements in a firm's management of their supply chain. Theory and practical applications for analyzing and developing strategies to assist firms in obtaining and maintaining a competitive advantage. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 661.}.

MGMT 462. Modeling the Supply Chain. 3 Credits.
Development of spreadsheet models representing different positions in the supply chain. The models can be used to enhance decision making and achieve a better understanding of how the different stages in a supply chain interact. Prereq: MGMT 320, STAT 330, junior standing and at least a cumulative GPA of 2.50.

MGMT 470. Entrepreneurship/Small Business Management. 3 Credits.
A comprehensive entrepreneurship/small business course that examines entrepreneurial ideas, processes, individuals; new venture creation and growth (including franchises and family business); and application of management, marketing, and finance tools to the small business context. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MGMT 471. Leading the Nonprofit Organization. 3 Credits.
This course covers theories, tools, and perspectives for leading and managing nonprofit organizations; exploration of similarities and differences between nonprofits and business firms; discussion of current and controversial issues in the nonprofit sector - all emphasizing practical applications for nonprofit leadership in managerial, staff, and volunteer roles. {Also offered for graduate credit - see MGMT 671.}.

MGMT 494. Individual Study. 1-5 Credits.

MGMT 496. Field Experience. 1-15 Credits.

MGMT 499. Special Topics. 1-5 Credits.

MGMT 630. Leadership in Organization. 3 Credits.
This course will give students a comprehensive view of the principles, practices, and challenges of contemporary leadership and followership. {Also offered for undergraduate credit - see MGMT 430.}.

MGMT 640. International Management. 3 Credits.
Focused on management challenges associated with business activity across national boundaries. Development of management skills for global contexts. {Also offered for undergraduate credit - see MGMT 440.}.

MGMT 650. Human Resource Management. 3 Credits.
Survey of human resource management, including job analysis, recruitment, selection, performance appraisal, compensation, training, and labor relations. The impact of environmental influences such as legislation, court decisions, and unions on human resource activities are addressed. {Also offered for undergraduate credit - see MGMT 450.}.

MGMT 651. Negotiation and Alternative Dispute Resolution. 3 Credits.
An exploration of negotiation and conflict settlement in interpersonal, business, and international settings. Topics include techniques used in negotiations, and alternative dispute resolution procedures such as mediation and arbitration. {Also offered for undergraduate credit - see MGMT 451.}.

MGMT 652. Compensation Management. 3 Credits.
Study of the human resource management function of compensation. Topics include the job analysis, job evaluation, wage determination, pay-for-performance, and employee benefits. The impact of compensation on recruitment, satisfaction, and performance is examined. Prereq: MGMT 650. {Also offered for undergraduate credit - see MGMT452.}.

MGMT 654. Labor-Management Relations. 3 Credits.
Analysis of human resource management in the presence of labor unions. Topics include: labor history, labor law, organizing unions, contract negotiation and administration, contract dispute resolution, labor-management cooperation, and strikes. {Also offered for undergraduate credit - see MGMT 454.}.

MGMT 661. Supply Chain Management. 3 Credits.
Identification of the key elements in a firm's management of their supply chain. Theory and practical applications for analyzing and developing strategies to assist firms in obtaining and maintaining a competitive advantage. {Also offered for undergraduate credit - see MGMT 461.}.

MGMT 671. Leading the Nonprofit Organization. 3 Credits.
This course covers theories, tools, and perspectives for leading and managing nonprofit organizations; exploration of similarities and differences between nonprofits and business firms; discussion of current and controversial issues in the nonprofit sector - all emphasizing practical applications for nonprofit leadership in managerial, staff, and volunteer roles. {Also offered for undergraduate credit - see MGMT 471.}.

MGMT 696. Special Topics. 1-5 Credits.

MGMT 750. Advanced Organizational Behavior. 3 Credits.
Study of theory and current management research to facilitate leadership of individual and small-group behavior in organizations. Topics include motivation, reward, job satisfaction, stress, communication, and conflict resolution.

MGMT 751. Advanced Operations Management. 3 Credits.
Advanced study of decision-making directed at creating, producing, and bringing goods and services to market under uncertain business conditions. Includes techniques from project/supply chain/quality/inventory management, forecasting, and aggregate planning.

MGMT 793. Individual Study. 1-5 Credits.

MGMT 893. Individual Study/Tutorial. 1-5 Credits.

Management Information Systems (MIS)

MIS 116. Business Use of Computers. 3 Credits.
Exploration of how microcomputers are used in business with an emphasis in developing proficiency in Microsoft Excel and introduction to Microsoft Access. Credit will be awarded only for MIS 116, CSCI 114, or CSCI 116 but not more than one.

MIS 194. Individual Study. 1-5 Credits.

MIS 196. Field Experience. 1-15 Credits.

MIS 199. Special Topics. 1-5 Credits.

MIS 277. Introduction to UNIX. 3 Credits.
This course introduces students to the UNIX operating system environment. Topics include basic UNIX commands, operating system installation and administration, application installation, use of alternative shells, web servers, and system security. Cross-listed with CSCI 277.

MIS 291. Seminar. 1-3 Credits.

MIS 292. Study Abroad. 1-15 Credits.

MIS 294. Individual Study. 1-5 Credits.

MIS 299. Special Topics. 1-5 Credits.

MIS 315. System Analysis and Design. 3 Credits.
Introduction to the front end of the software development life cycle. Includes various modern concepts, techniques, and tools for analyzing and designing well-structured software systems. Prereq: CSCI 161 or CSCI 228.

MIS 320. Management Information Systems. 3 Credits.
Introduction to basic concepts and developments in information technology. Overview of the opportunities and challenges in the development and management of organizational information systems from a socio-technical perspective. Prereq: CSCI 116 or MIS 116. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MIS 340. Applied Business Intelligence. 3 Credits.
A hands-on look at Business Intelligence as applied to managerial decision making by exploring techniques for information creation including business analytics, data visualization, scorecards, dashboards and data mining. Prereq: MIS 320.

MIS 350. Enterprise Systems. 3 Credits.
Introduction to the theoretical and practical issues related to the application of enterprise systems within organizations. Prereq: MIS 320 and CSCI 161 or CSCI 228 and students must be College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MIS 371. Web Scripting Languages. 3 Credits.
This course examines Scripting Languages and their applications. Emphasis will be placed on web scripting. A representative set of scripting languages will be covered. Prereq: CSCI 122 or CSCI 160 or CSCI 227 or ECE 173. Cross-listed with CSCI 371. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 375. Database Design for Business Application. 3 Credits.
Fundamentals of conceptualizing and implementing databases. Emphasis is on using query languages to obtain information for decision-making. Includes managerial topics related to database administration, security, integrity, optimization, and distributed databases. Prereq: MIS 320, CSCI 228. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 376. Data and Telecommunications Administration. 3 Credits.
Introduction to a wide variety of topics in the voice and data communications field. Prereq: MIS 320, CSCI 228. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 391. Seminar. 1-3 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 392. Study Abroad. 1-15 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 394. Individual Study. 1-5 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 397. Fe/Coop Ed/Internship. 1-4 Credits.

MIS 399. Special Topics. 1-5 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 412. Computer Crime, Forensics, and Investigation. 3 Credits.
Introduction to the technical and legal aspects of obtaining and analyzing digital information for use as evidence in civil, criminal, or administrative cases. Prereq: MIS 320 and ACCT 410 or MIS 376 or CSCI 372 and students must be College of Business students who have been admitted to the professional program and have a cumulative GPA of 2.5 or higher. Cross-listed with ACCT.

MIS 413. MIS Service Internship. 3 Credits.
Supervised professional information technology experience in a non-paid position. Offered on a Pass/Fail basis only.

MIS 415. Managing Information Technology Security. 3 Credits.
Introduction to information security, impact of cyber-attacks on everyday Information Technology operations, the regulatory environment surrounding today's enterprise, and mitigation techniques. Prereq: MIS 320 or CSCI 161. Students must have a minimum cumulative 2.50 GPA and be at least junior standing.

MIS 460. Enterprise Infrastructure I. 3 Credits.
This course provides an intensive hands-on coverage of the design, implementation and maintenance of a basic enterprise information technology infrastructure. The role of network administrator and security will be emphasized. Prereq: MIS 375 or CSCI 366 and MIS 376 or CSCI 459.

MIS 470. Information Systems. 3 Credits.
Exploration of managerial issues pertaining to administration of the information systems function in organizations. Issues include planning, operations, control, electronic commerce, and other current topics. Prereq: MIS 375, CSCI 315. Coreq: MIS 376. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 479. Decision Support and Intelligent Systems. 3 Credits.
Information system support and modeling of the decision-making process via expert systems, neural networks, and hybrid intelligent systems are the primary focus of this course. The state-of-the-art in knowledge management will be explored. Prereq: CSCI 228 and MIS 320.

MIS 491. Seminar. 1-5 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 492. Study Abroad. 1-15 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 494. Individual Study. 1-5 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 496. Field Experience. 1-15 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 499. Special Topics. 1-5 Credits.
Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 770. Information Resources Management. 3 Credits.
Role of information resources in supporting organizational functions by providing a managerial perspective on use, design, and evaluation of information systems; use of information technologies for making and communicating decisions, and interacting with business functions. Prereq: Departmental approval.

MIS 796. Special Topics. 1-5 Credits.

Marketing (MRKT)

MRKT 301. Marketing for Non-Business Majors. 3 Credits.
This course introduces non-business majors and non-degree seeking students to the four basic areas of marketing: product, price, place and promotion. This course will also cover consumer behavior and strategic marketing. Credit awarded only for MRKT 301 or MRKT 320 (formerly BUSN 360), not both.

MRKT 320. Foundations of Marketing. 3 Credits.
Survey of the four basic areas of marketing: product, price, place, and promotion. Exposure to consumer behavior and strategic marketing from an international perspective. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. Credit awarded only for MRKT 301 or MRKT 320 (formerly BUSN 360), not both.

MRKT 362. Foundations of Retailing. 3 Credits.
Analysis of the global retail environment and exposure to issues such as the development of retailing image, location theory, inventory management, and integrated marketing communication. Prereq: MRKT 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MRKT 372. Global Retailing. 3 Credits.
Theoretical approach to management practices and marketing policies for retail soft goods in a complex and changing world market. Prereq: 2.5 cumulative GPA, junior standing and MRKT 320 or ADHM 171. Cross-listed with ADHM 372.

MRKT 410. Consumer Behavior. 3 Credits.
Examination of dimensions of consumer buying theories. Aimed at understanding the buying behavior of customers. Prereq: MRKT 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MRKT 610.}.

MRKT 420. Advertising and Integrated Marketing Communication. 3 Credits.
Examination of the use of advertising as part of the worldwide marketing function; prepares the student to analyze and plan integrated marketing communication campaigns. Prereq: MRKT 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MRKT 620.}.

MRKT 430. Sales and Personal Selling. 3 Credits.
Examination of the theoretical frameworks, principles, and the methods related to sales and the personal selling process. Co-req: MRKT 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - See MRKT 630.}.

MRKT 434. Sales Management. 3 Credits.
This course provides students with a basic understanding of functions, tasks, and decisions involved in sales management. Specific topics include planning, organizing, implementing, and monitoring and controlling the sales effort. Prereq: MRKT 320, 430 and College of Business professional major or minor with a junior or senior classification and a 2.50 minimum NDSU grade point average. {Also offered as a graduate course: MRKT 634.}.

MRKT 436. Advanced Professional Selling. 1 Credit.
This course focuses on advanced professional selling frameworks and decisions involved in the sales process. Specific topics include advanced needs inquiry and solution development. Prereq: MRKT 320 and MRKT 430 and at least junior standing with a cumulative 2.50 NDSU GPA. Co-req: MRKT 434.

MRKT 438. Customer Relationship Management & Sales Technology. 3 Credits.
Introduction to principles of customer relationship management, sales automation, and use of different technologies in professional sales. Prereq: MRKT 320 and at least junior standing with a cumulative NDSU GPA of 2.50 or higher.

MRKT 440. International Marketing. 3 Credits.
Focused on identifying and satisfying global customer needs better than the competition, both domestic and international, and coordinating marketing activities within the context of the global environment. Prereq: MRKT 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MRKT 640 .}.

MRKT 450. Marketing Research. 3 Credits.
Study of marketing research methods with focus on research design, data collection, and analysis techniques. Prereq: MRKT 320, STAT 331 and MATH 144 or MATH 146. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MRKT 650.}.

MRKT 460. Marketing Strategy. 3 Credits.
The analysis, planning, implementation, and control of worldwide marketing programs to achieve an organization's objectives including an examination of the progress of the Internet for the marketing of goods and services. Prereq: MRKT 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MRKT 465. Digital Marketing. 3 Credits.
This course focuses on understanding, managing and analyzing an organization's digital marketing strategy. Topics related to online business models, search engine optimization, paid search and display advertising, web analytics, email marketing, social media and mobile marketing, reputation management and online retailing will be considered. Prereq: MRKT 320 and College of Business professional major or minor with a junior or senior classification and a 2.50 minimum NDSU grade point average.

MRKT 470. Services Marketing. 3 Credits.
This course focuses on management and strategic issues as they relate to the marketing of services. Prereq: MRKT 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MRKT 670.}.

MRKT 494. Individual Study. 1-5 Credits.

MRKT 499. Special Topics. 1-5 Credits.

MRKT 610. Consumer Behavior. 3 Credits.
Examination of dimensions of consumer buying theories. Aimed at understanding the buying behavior of customers. {Also offered for undergraduate credit - see MRKT 410.}.

MRKT 620. Advertising and Integrated Marketing Communication. 3 Credits.
Examination of the use of advertising as part of the worldwide marketing function; prepares the student to analyze and plan integrated marketing communication campaigns. {Also offered for undergraduate credit - see MRKT 420.}.

MRKT 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 760. Strategic Marketing Management. 3 Credits.
Focus on the conceptual framework, managerial approach and analysis of understanding customer value and deploying marketing resources to communicate and deliver value in uncertain and dynamic marketplace environments.

MRKT 793. Individual Study. 1-5 Credits.

Materials & Nanotechnology (MNT)

MNT 729. Materials Characterization. 3 Credits.
This course will cover basic techniques and methods for characterization of materials, x-ray diffraction and electron microscopy will be discussed in detail. Also covered will be spectroscopies, NMR, FTIR and RAMAN.

MNT 730. Nanotechnology and Nanomaterials. 3 Credits.
This course reviews principles of nanotechnology, nanomaterials and develops a framework for their understanding. The basic tools of nanotechnology; nanoscale characterization, physics and materials design will be discussed in the context of current engineering applications.

MNT 732. Physical Properties of Materials. 3 Credits.
Describes the fundamental science and engineering concepts that form the foundation of Materials and Nanotechnology, including statistical mechanics, quantum mechanics, condensed matter physics and chemical engineering.

MNT 735. Optoelectronics Materials and Processing. 3 Credits.
This course covers the basic principles of semiconductor optoelectronic devices and their processing techniques. Students will learn the methods used for their fabrication and also current applications and limits of such technologies in nanotechnology.

MNT 745. Preparing Future Researchers. 1 Credit.
This course will involve presentations given by invited faculty from various academic institutions ranging from research oriented to teaching oriented and also R&D project leaders in companies.

MNT 756. Molecular Modeling. 3 Credits.
This course will cover basic fundamentals of molecular statics, molecular dynamics, Monte Carlo modeling techniques and allow students to be able to model complex lattice structures, structures of lattice defects, crystal surfaces, and interfaces.

MNT 760. Materials Synthesis Processing. 3 Credits.
This course deals with synthesis and processing issues in materials design.

MNT 783. Nanomechanics. 3 Credits.
Covers essential tools (quantum mechanics, molecular dynamics, statistical physics, continuum mechanics) used at the nanoscale. The course will present methods that bridge atomistic and continuum models and discuss these techniques in the context of material design.

MNT 790. Graduate Seminar. 1-5 Credits.

MNT 793. Individual Study. 1-5 Credits.

MNT 794. Practicum/Internship. 1-8 Credits.

MNT 798. Master's Thesis. 1-10 Credits.
Original investigation under the supervision of a major adviser and a supervisory committee. Graded S or U.

MNT 899. Doctoral Dissertation. 1-15 Credits.
Original investigation under the supervision of a major adviser and a supervisory committee. Graded S or U.

Mathematics (MATH)

MATH 098. Intermediate Algebra. 3 Credits.
Properties of the real number system, factoring, linear and quadratic equations, functions, polynomial and rational expressions, inequalities, systems of equations, exponents, and radicals. Offered through Continuing Education. Special fee required. Does not satisfy any requirements for graduation. A grade of C or higher is required in this course to be eligible to take MATH 103 or MATH 104.

MATH 103. College Algebra. 3 Credits.
Relations and functions, equations and inequalities, complex numbers; polynomial, rational, exponential and logarithmic functions; systems of equations, and matrices. Prereq: MATH 98 with a grade of C or higher or placement.

MATH 104. Finite Mathematics. 3 Credits.
Systems of linear equations and inequalities, matrices, linear programming, mathematics of finance, elementary probability and descriptive statistics. Prereq: MATH 98 with a grade of C or higher or placement.

MATH 105. Trigonometry. 3 Credits.
Angle measure, trigonometric and inverse trigonometric functions, trigonometric identities and equations, polar coordinates and applications. Prereq: MATH 103 or placement. Credit awarded only for MATH 105 or MATH 107, not both.

MATH 107. Precalculus. 4 Credits.
Equations and inequalities; polynomial, rational, exponential, logarithmic and trigonometric functions; inverse trigonometric functions; algebraic and trigonometric methods commonly needed in calculus. An expedited, combined offering of MATH 103 and MATH 105. Prereq: Placement. 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. Prereq: MATH 105 or MATH 107.

MATH 144. Mathematics for Business. 4 Credits.
Mathematics of finance, linear programming and its applications in business, limits, continuity, derivatives, implicit and logarithmic differentiation, higher order derivatives, optimization and extrema, partial differentiation, extreme values of functions of two variables. Prereq: MATH 103, MATH 107 or placement exam. Credit awarded only for MATH 144 or MATH 146, not both.

MATH 146. Applied Calculus I. 4 Credits.
Limits, derivatives, integrals, exponential and logarithmic functions and applications. Prereq: MATH 103, MATH 107, or placement. Credit awarded only for MATH 144 or MATH 146, not both.

MATH 147. Applied Calculus II. 4 Credits.
Definite integrals, trigonometry, introduction to differential equations, infinite sequences and series, probability and applications. Prereq: MATH 146.

MATH 165. Calculus I. 4 Credits.
Limits, continuity, differentiation, Mean Value Theorem, integration, Fundamental Theorem of Calculus and applications. Prereq: MATH 105, MATH 107, or placement.

MATH 166. Calculus II. 4 Credits.
Applications and techniques of integration; polar equations; parametric equation; sequences and series, power series. Prereq: MATH 165.

MATH 194. Individual Study. 1-5 Credits.

MATH 196. Field Experience. 1-15 Credits.

MATH 199. Special Topics. 1-5 Credits.

MATH 259. Multivariate Calculus. 3 Credits.
Functions of several variables, vectors in two and three variables, partial derivatives, surfaces and gradients, tangent planes, differentials, chain rule, optimization, space curves, and multiple integrals. Prereq: MATH 166. Credit awarded only for MATH 259 or MATH 265, not both.

MATH 265. Calculus III. 4 Credits.
Multivariate and vector calculus including partial derivatives, multiple integration, applications, line and surface integrals, Green's Theorem, Stoke's Theorem, and Divergence Theorem. Prereq: MATH 166. Credit awarded only for MATH 259 or MATH 265, not both.

MATH 266. Introduction to Differential Equations. 3 Credits.
Solution of elementary differential equations by elementary techniques. Laplace transforms, systems of equations, matrix methods, numerical techniques, and applications. Prereq: MATH 259 or MATH 265. Coreq: MATH 128, MATH 129, or MATH 329.

MATH 270. Introduction to Abstract Mathematics. 3 Credits.
Sets, symbolic logic, propositions, quantifiers, methods of proof, relations and functions, equivalence relations, math induction and its equivalents, infinite sets, cardinal numbers, number systems. Prereq: MATH 166.

MATH 291. Seminar. 1-3 Credits.

MATH 294. Individual Study. 1-5 Credits.

MATH 299. Special Topics. 1-5 Credits.

MATH 329. Intermediate Linear Algebra. 3 Credits.
Vector spaces over real and complex numbers, matrices, determinants, linear transformations, eigenvalues and eigenvectors, Cayley-Hamilton Theorem, inner product spaces, selected topics and applications. Prereq: MATH 129 and MATH 165.

MATH 346. Metric Space Topology. 3 Credits.
Various metrics on Euclidean spaces, metric spaces, open and closed sets, limit points and convergence, Bolzano Weierstrass Theorem, (uniformly) continuous functions, connected spaces, compact spaces and the Heine Borel Theorem, sequence of functions. Prereq: MATH 270.

MATH 374. Special Problems In Mathematics. 1 Credit.
Diverse and challenging mathematical problems are considered with the intent of preparing the student for the Putnam Mathematics competition. May be repeated for credit. Pass/Fail only. Prereq: MATH 270.

MATH 376. Actuarial Exam Study. 1 Credit.
Selected material from calculus, linear algebra, numerical analysis, and other areas that appear on national actuarial exams. May be repeated for credit. Pass/Fail only. Prereq: MATH 266 and MATH 429.

MATH 379. Study Tour Abroad. 1-6 Credits.

MATH 391. Seminar. 1-3 Credits.

MATH 392. Study Abroad. 1-15 Credits.

MATH 394. Individual Study. 1-5 Credits.

MATH 399. Special Topics. 1-5 Credits.

MATH 420. Abstract Algebra I. 3 Credits.
Groups, permutations, quotient groups, homomorphisms, rings, ideals, integers. Prereq: MATH 270 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. Linear Algebra. 3 Credits.
Vector spaces, linear transformations, eigenvalues and eigenvectors, canonical forms, inner product spaces, and selected applications. Prereq: MATH 270. {Also offered for graduate credit - see MATH 629.}.

MATH 430. Graph Theory. 3 Credits.
Graphs and directed graphs, graph models, subgraphs, isomorphisms, paths, connectivity, trees, networks, cycles, circuits, planarity, Euler's formula, matchings, bipartite graphs, colorings, and selected advanced topics. Prereq: MATH 270.

MATH 436. Combinatorics. 3 Credits.
Recurrence relations, formal power series, generating functions, exponential generating functions, enumeration, binomial coefficients and identities, hypergeometric functions, Ramsey theory, Sterling and Eulerian numbers. Prereq: MATH 270. {Also offered for graduate credit - see MATH 636.}.

MATH 439. Topics in Algebra and Discrete Mathematics. 3 Credits.
Advanced topics in algebra and discrete mathematics. Topics may vary but may include: algebraic geometry, factorization, partially ordered sets, and/or coding theory. Prereq: MATH 420 or MATH 430 or MATH 436. {Also offered for graduate credit - See MATH 639}.

MATH 440. Axiomatic Geometry. 3 Credits.
Hilbert's axioms for Euclidean geometry, projective geometry, history of parallel axiom, hyperbolic geometry, elliptic geometry. Prereq: MATH 270. {Also offered for graduate credit - see MATH 640.}.

MATH 442. Introduction to Topology. 3 Credits.
Basic Point-Set Topology: Topological Spaces, Open/Closed Sets, Continuity, Connectedness, Compactness; Surfaces: Classification, Basic Invariants; Introduction to Homology; Applications: Brouwer's Fix-Point Theorem, Ham and Sandwich Theorem. Prereq: MATH 346. {Also offered for graduate credit - see MATH 642.}.

MATH 443. Differential Geometry. 3 Credits.
Local and global geometry of plane curves, local geometry of hypersurfaces, global geometry of hypersurfaces, geometry of lengths and distances. Prereq: MATH 265 and MATH 346. {Also offered for graduate credit - see MATH 643.}.

MATH 449. Topics in Topology and Geometry. 3 Credits.
Topics will vary and may include: Riemannian Geometry, Symplectic Topology, Dynamical Systems on Manifolds, Hamiltonian Systems, Geometric Group Theory, Descriptive Set Theory. Prereq: MATH 442 or MATH 443. {Also offered for graduate credit - See MATH 649}.

MATH 450. Real Analysis I. 3 Credits.
Differentiation and Riemann integration in the real numbers. Sequences and series of functions; uniform convergence and power series. Prereq: MATH 346. {Also offered for graduate credit - see.MATH 650.}.

MATH 452. Complex Analysis. 3 Credits.
Complex number systems, analytic and harmonic functions, elementary conformal mapping, integral theorems, power series, Laurent series, residue theorem, and contour integral. Prereq: MATH 265 and MATH 270. {Also offered for graduate credit - see MATH 652.}.

MATH 453. Introduction to Lebesgue Measure. 3 Credits.
Definition of Lebesgue measure. Measurable and Lebesgue integrable functions. Introduction to Lp spaces. Prereq: MATH 450. {Also offered for graduate credit - see MATH 653}.

MATH 454. Introduction to Functional Analysis. 3 Credits.
Functional analysis in sequence spaces. Standard sequence spaces and dual spaces. Hahn-Banach Theorem. Operators on sequences spaces. Prereq: MATH 346. {Also offered for graduate credit - See MATH 654}.

MATH 459. Topics in Analysis. 3 Credits.
Topics will vary and may include: Harmonic Analysis, Dynamical Systems, Fractals, Distribution Theory, and Approximation Theory. Prereq: MATH 450. {Also offered for graduate credit - See MATH 659.}.

MATH 460. Intensive Mathematica. 1 Credit.
Thorough overview of the general purpose mathematical software MATHEMATICA: numerical and symbolic calculations for algebra and linear algebra, single and multivariable calculus, ordinary and partial differential equations, 2D- and 3D-graphics, animation, word processing. Prereq: MATH 259 or MATH 265. {Also offered for graduate credit - see MATH 660.}.

MATH 472. Number Theory. 3 Credits.
Properties of integers, number theoretic functions, quadratic residues, continued fractions, prime numbers and their distribution, primitive roots. Prereq: MATH 270. {Also offered for graduate credit - see MATH 672.}.

MATH 473. Cryptology. 3 Credits.
Cryptography and cryptanalysis of ciphers. Discrete logarithms, Diffie-Hellman key exchange, the RSA cryptosystem, elliptic curve cryptography, and selected topics. Prereq: MATH 420 or MATH 472. {Also offered for graduate credit - see MATH 673.}.

MATH 478. History of Mathematics. 3 Credits.
Historical considerations emphasizing the source of mathematical ideas, growth of mathematical knowledge, and contributions of some outstanding mathematicians. Prereq: MATH 270. {Also offered for graduate credit - see MATH 678.}.

MATH 480. Applied Differential Equations. 3 Credits.
Method of power series and method of Frobenius, oscillation theorems, special functions (Bessel functions and Legendre functions), linear systems including the exponential matrix. Sturm-Liouville and phase plane analysis as time permits. Prereq: MATH 266. {Also offered for graduate credit - see MATH 680.}.

MATH 481. Fourier Analysis. 3 Credits.
Discrete and continuous Fourier transforms, Fourier series, convergence and inversion theorems, mean square approximation and completeness, Poisson summation, Fast-Fourier transform. Prereq: MATH 265. {Also offered for graduate credit - see MATH 681.}.

MATH 483. Partial Differential Equations. 3 Credits.
First and second order partial differential equations, classification, examples, solution methods for the wave, diffusion, and Laplace equations, causality and energy, boundary value problems, separation of variables, Green's identities, Green's functions. Prereq: MATH 266 and either MATH 270 or Math 329. {Also offered for graduate credit - see MATH 683.}.

MATH 484. Mathematical Methodsof Biological Processes. 3 Credits.
This course provides an introduction to mathematical methods in biology. Prereq: MATH 266. {Also offered for graduate credit - see MATH 684.}.

MATH 485. Topics in Applied Mathematics. 3 Credits.
Topics will vary and may include: Models in Biology and Finance, Network Theory, Calculus of Variation, Stochastic Calculus, Integral Transforms, Control Theory, and Parameter Estimation. Prereq: MATH 483. {Also offered for graduate credit - See MATH 685.}.

MATH 488. Numerical Analysis I. 3 Credits.
Numerical solution of nonlinear equations, interpolation, numerical integration and differentiation, numerical solution of initial value problems for ordinary differential equations. Prereq: MATH 266. {Also offered for graduate credit - see MATH 688.}.

MATH 491. Seminar. 1-5 Credits.

MATH 492. Study Abroad. 1-15 Credits.

MATH 493. Undergraduate Research. 1-5 Credits.

MATH 494. Individual Study. 1-5 Credits.

MATH 496. Field Experience. 1-15 Credits.

MATH 499. Special Topics. 1-5 Credits.

MATH 620. Abstract Algebra I. 3 Credits.
Groups, permutations, quotient groups, homomorphisms, rings, ideals, integers. {Also offered for undergraduate credit - see MATH 420.}.

MATH 621. Abstract Algebra II. 3 Credits.
Division rings, integral domains, fields, field extensions, Galois Theory. Prereq: MATH 620. {Also offered for undergraduate credit - see MATH 421.}.

MATH 629. Linear Algebra. 3 Credits.
Vector spaces, linear transformations, eigenvalues and eigenvectors, canonical forms, inner product spaces, and selected applications. {Also offered for undergraduate credit - see MATH 429.}.

MATH 636. Combinatorics. 3 Credits.
Recurrence relations, formal power series, generating functions, exponential generating functions, enumeration, binomial coefficients and identities, hypergeometric functions, Ramsey theory, Sterling and Eulerian numbers. {Also offered for undergraduate credit - see MATH 436.}.

MATH 639. Topics in Algebra and Discrete Mathematics. 3 Credits.
Advanced topics in algebra and discrete mathematics. Topics may vary but may include: algebraic geometry, factorization, partially ordered sets, and/or coding theory. {Also offered for undergraduate credit. See MATH 439.}.

MATH 640. Axiomatic Geometry. 3 Credits.
Hilbert's axioms for Euclidean geometry, projective geometry, history of parallel axiom, hyperbolic geometry, elliptic geometry. {Also offered for undergraduate credit - see MATH 440.}.

MATH 642. Introduction to Topology. 3 Credits.
Basic Point-Set Topology: Topological Spaces, Open/Closed Sets, Continuity, Connectedness, Compactness; Surfaces: Classification, Basic Invariants; Introduction to Homology; Applications: Brouwer's Fix-Point Theorem, Ham and Sandwich Theorem. {Also offered for undergraduate credit - see MATH 442.}.

MATH 643. Differential Geometry. 3 Credits.
Local and global geometry of plane curves, local geometry of hypersurfaces, global geometry of hypersurfaces, geometry of lengths and distances. {Also offered for undergraduate credit - see MATH 443.}.

MATH 649. Topics in Topology and Geometry. 3 Credits.
Topics will vary and may include: Riemannian Geometry, Symplectic Topology, Dynamical Systems on Manifolds, Hamiltonian Systems, Geometric Group Theory, Descriptive Set Theory. {Also offered for undergraduate credit - See MATH 449}.

MATH 650. Real Analysis I. 3 Credits.
Differentiation and Riemann integration in the real numbers. Sequences and series of functions; uniform convergence and power series. {Also offered for undergraduate credit - see MATH 450.}.

MATH 652. Complex Analysis. 3 Credits.
Complex number systems, analytic and harmonic functions, elementary conformal mapping, integral theorems, power series, Laurent series, residue theorem, and contour integral. {Also offered for undergraduate credit - see MATH 452.}.

MATH 653. Introduction to Lebesgue Measure. 3 Credits.
Definition of Lebesgue measure. Measurable and Lebesgue integrable functions. Introduction to Lp spaces. {Also offered for undergraduate credit - see MATH 453}.

MATH 654. Introduction to Functional Analysis. 3 Credits.
Functional analysis in sequence spaces. Standard sequence spaces and dual spaces. Hahn-Banach Theorem. Operators on sequences spaces. {Also offered for undergraduate credit - See MATH 454}.

MATH 659. Topics in Analysis. 3 Credits.
Topics will vary and may include: Harmonic Analysis, Dynamical Systems, Fractals, Distribution Theory, and Approximation Theory. {Also offered for undergraduate credit - See MATH 459.}.

MATH 660. Intensive Mathematica. 1 Credit.
Thorough overview of the general purpose mathematical software MATHEMATICA: numerical and symbolic calculations for algebra and linear algebra, single and multivariable calculus, ordinary and partial differential equations, 2D- and 3D-graphics, animation, word processing. {Also offered for undergraduate credit - see MATH 460.}.

MATH 672. Number Theory. 3 Credits.
Properties of integers, number theoretic functions, quadratic residues, continued fractions, prime numbers and their distribution, primitive roots. {Also offered for undergraduate credit - see MATH 472.}.

MATH 673. Cryptology. 3 Credits.
Cryptography and cryptanalysis of ciphers. Discrete logarithms, Diffie-Hellman key exchange, the RSA cryptosystem, elliptic curve cryptography, and selected topics. {Also offered for undergraduate credit - see MATH 473.}.

MATH 678. History of Mathematics. 3 Credits.
Historical considerations emphasizing the source of mathematical ideas, growth of mathematical knowledge, and contributions of some outstanding mathematicians. {Also offered for undergraduate credit - see MATH 478.}.

MATH 680. Applied Differential Equations. 3 Credits.
Method of power series and method of Frobenius, oscillation theorems, special functions (Bessel functions and Legendre functions), linear systems including the exponential matrix. Sturm-Liouville and phase plane analysis as time permits. {Also offered for undergraduate credit - see MATH 480.}.

MATH 681. Fourier Analysis. 3 Credits.
Discrete and continuous Fourier transforms, Fourier series, convergence and inversion theorems, mean square approximation and completeness, Poisson summation, Fast-Fourier transform. {Also offered for undergraduate credit - see MATH 481.}.

MATH 683. Partial Differential Equations. 3 Credits.
First and second order partial differential equations, classification, examples, solution methods for the wave, diffusion, and Laplace equations, causality and energy, boundary value problems, separation of variables, Green's identities, Green's functions. {Also offered for undergraduate credit - see MATH 483.}.

MATH 684. Mathematical Methods of Biological Processes. 3 Credits.
This course provides an introduction to mathematical methods in biology. {Also offered for undergraduate credit - see MATH 484.}.

MATH 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 I. 3 Credits.
Numerical solution of nonlinear equations, interpolation, numerical integration and differentiation, numerical solution of initial value problems for ordinary differential equations. {Also offered for undergraduate credit - see MATH 488.}.

MATH 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 or Co-req: 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 746. Topology I. 3 Credits.
Topological spaces, convergence and continuity, separation axioms, compactness, connectedness, metrizability, fundamental group and homotopy theory. Advanced topics may include homology theory, differential topology, three-manifold theory and knot theory. Prereq: MATH 642.

MATH 747. Topology II. 3 Credits.
Topological spaces, convergence and continuity, separation axioms, compactness, connectedness, metrizability, fundamental group and homotopy theory. Advanced topics may include homology theory, differential topology, three-manifold theory and knot theory. Prereq: MATH 642.

MATH 750. Analysis. 3 Credits.
Lebesgue and general measure and integration theory, differentiation, product spaces, metric spaces, elements of classical Banach spaces, Hilbert spaces, and selected advanced topics. Prereq: MATH 650.

MATH 752. Complex Analysis. 3 Credits.
Analytic and harmonic functions, power series, conformal mapping, contour integration and the calculus of residues, analytic continuation, meromorphic and entire functions, and selected topics. Prereq: MATH 652.

MATH 754. Functional Analysis. 3 Credits.
Normed spaces, linear maps, Hahn-Banach Theorem and other fundamental theorems, conjugate spaces and weak topology, adjoint operators, Hilbert spaces, spectral theory, and selected topics. Prereq: MATH 750.

MATH 756. Harmonic Analysis. 3 Credits.
A survey of Harmonic analysis including: Lp spaces; Fourier Series; Fourier transform; Hilbert transform; and special selected topics. Prereq: MATH 750.

MATH 760. Ordinary Differential Equations I. 3 Credits.
Existence, uniqueness, and extensibility of solutions to initial value problems, linear systems, stability, oscillation, boundary value problems, and selected advanced topics. Prereq: MATH 650 or MATH 680.

MATH 782. Mathematical Methods in Physics I. 3 Credits.
Review of practical mathematical methods routinely used by physicists, including applications. Focus on differential equations, variational principles, and other selected topics. Cross-listed with PHYS 752.

MATH 783. Mathematical Methods in Physics II. 3 Credits.
Tensor analysis, matrices and group theory, special relativity, integral equations and transforms, and selected advanced topics. Prereq: MATH 629 and MATH 652. Cross-listed with PHYS 753.

MATH 784. Partial Differential Equations I. 3 Credits.
Classification in elliptic, parabolic, hyperbolic type; existence and uniqueness for second order equations; Green's functions, and integral representations; characteristics, nonlinear phenomena. Prereq: MATH 650 or MATH 683.

MATH 790. Graduate Seminar. 1-3 Credits.

MATH 791. Temporary/Trial Topics. 1-5 Credits.

MATH 793. Individual Study/Tutorial. 1-5 Credits.

MATH 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 836. Discrete Mathematics. 3 Credits.
Combinatorial reasoning, generating functions, inversion formulae. Topics may include design theory, finite geometry, Ramsey theory, and coding theory. Advanced topics may include cryptography, combinatorial group theory, combinatorial number theory, algebraic combinatorics, (0,1)-matrices, and finite geometry. Prereq: MATH 636.

MATH 849. Topics in Geometry & Topology. 3 Credits.
Advanced topics in Geometry and/or Topology. Topics vary but may include: differential geometry, K-theory, knot theory, or noncommutative geometry. May be repeated for credit with change in subtopic. Prereq: MATH 642, MATH 643.

MATH 856. Dynamical Systems. 3 Credits.
A study of basic notions of topological and symbolic dynamics. Introduction to measurable dynamics and ergodic theory. Ergodicity, mixing and entropy of dynamical systems. Prereq: MATH 750.

MATH 857. Topics in Functional Analysis. 3 Credits.
Maximal monotone operators and the Hille-Yosida theorem, Sobolev spaces in dimension one and applications, Sobolev spaces in higher dimensions, extension operators, Sobolev embedding theorems, Poincare inequality, duality. May be repeated for credit with change in subtopic. Prereq: MATH 750. Co-req: MATH 751.

MATH 861. Ordinary Differential Equations II. 3 Credits.
Existence, uniqueness, and extendibility of solutions to initial value problems, linear systems, stability, oscillation, boundary value problems, difference equations, and selected advanced topics. Prereq: MATH 760.

MATH 862. Integral Equations. 3 Credits.
Existence and uniqueness of solutions of Fredholm and Volterra integral equations, Fredholm Theory, singular integral equations, and selected advanced topics. Prereq: MATH 650.

MATH 864. Calculus Of Variations. 3 Credits.
Variational techniques of optimization of functionals, conditions of Euler, Weierstrass, Legendre, Jacobi, Erdmann, Pontryagin Maximal Principle, applications, and selected advanced topics. Prereq: MATH 650.

MATH 867. Topics in Applied Mathematics. 3 Credits.
Topics will vary and may include: Optimal Control, Robust Control, Stability Analysis, Mathematics of Networks, Models in Biology, Levy Processes, Asymptotic Expansions. May be repeated for credit with change in subtopic. Prereq: MATH 650 or MATH 680.

MATH 878. Modern Probability Theory. 3 Credits.
Probability theory presented from the measure theoretic perspective. Emphasis on various types of convergence and limit theorems. Discussion of random walks, conditional expectations, and martingales. Prereq: STAT 768 or MATH 750. Cross-listed with STAT 778.

MATH 880. Methods of Optimization. 3 Credits.
Elements of convex analysis, constrained and unconstrained multi-dimensional linear and nonlinear optimization theory and algorithms, convergence properties and computational complexity. Prereq: CSCI 653. Cross-listed with CSCI 880.

MATH 881. Mathematical Control Theory. 3 Credits.
Standard optimal control and optimal estimation problems; duality; optimization in Hardy space; robust control design. Prereq: MATH 650.

MATH 885. Partial Differential Equations II. 3 Credits.
Nonlinear partial differential equations, Non-variational techniques, Hamilton-Jacobi equations, Riemann invariants, Entropy/entropy-flux pairs, selected advanced topics. Prereq: MATH 784.

MATH 888. Numerical Analysis. 3 Credits.
Numerical solutions to partial differential and integral equations, error analysis, stability, acceleration of convergence, numerical approximation, and selected advanced topics. Prereq: MATH 688.

MATH 893. Individual Study/Tutorial. 1-5 Credits.

MATH 899. Doctoral Dissertation. 1-15 Credits.

Mechanical Engineering (ME)

ME 189. Skills for Academic Success. 1 Credit.
This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation. Cross-listed with ABEN 189, AGRI 189, BUSN 189, HD&E 189 and UNIV 189. F, S.

ME 194. Individual Study. 1-5 Credits.

ME 196. Field Experience. 1-15 Credits.

ME 199. Special Topics. 1-5 Credits.

ME 212. Fundamentals of Visual Communication for Engineers. 3 Credits.
Visual communications for design and manufacturing, computer-aided drawing and design, three-dimensional modeling and orthographic projections, geometric dimensioning and tolerancing, ASME Y14.5 1994 standard, sketching, parametric modeling, drawings and assemblies. F, S.

ME 213. Modeling of Engineering Systems. 3 Credits.
Introduction to numerical methods used in the solution of engineering problems; computer methods, programming, and graphics; engineering system modeling and simulation; case studies. Prereq: MATH 129, ME 222. Coreq: MATH 266.

ME 221. Engineering Mechanics I. 3 Credits.
Scaler and vector approaches to trusses, frames and machines, internal forces, friction forces, center of gravity, centroid, and moment inertia. Prereq: MATH 165.

ME 222. Engineering Mechanics II. 3 Credits.
Dynamics of particles and rigid bodies, work energy, impulse-momentum, principles of conservation of energy and momentum. Prereq: ME 221, MATH 166.

ME 223. Mechanics of Materials. 3 Credits.
Introduction to stress, strain, and their relationships; torsion of circular shafts, bending stresses, deflection of beams, stress transformations. Prereq: ME 221.

ME 291. Seminar. 1-3 Credits.

ME 292. Study Abroad. 1-15 Credits.

ME 294. Individual Study. 1-5 Credits.

ME 299. Special Topics. 1-5 Credits.

ME 311. Introduction To Aviation. 3 Credits.
General introduction to aviation and preparation for FAA examination for Private Pilot License, study of FAA regulations, weather conditions, visual and radio navigation. F, S.

ME 312. Introduction to Flight. 2 Credits.
Instruction in flight procedures, operation of aircraft, and introduction to solo flight. Completion of 15 hours of dual flight instruction required. Coreq: ME 311. F, S.

ME 313. Commercial Instrument Ground School. 3 Credits.
Preparation of student for FAA written examination for Commercial Certificate and Instrument Rating License; study of commercial flight maneuvers and instrument flying and procedures. Prereq: ME 311 or holder of private pilot license. On demand.

ME 331. Materials Science and Engineering. 4 Credits.
Characterization of microscopic structures and associated macroscopic properties and performance of mechanical engineering design materials (metals, ceramics, plastics) and processing effects. Includes laboratory. Includes laboratory. Prereq: CHEM 122, ME 223 and admission to professional program.

ME 332. Engineering Materials II. 3 Credits.
Characterization of properties and processes in metals; diffusion, phase diagrams, phase transformation, creep, wear, corrosion, fracture, and fatigue. Prereq: ME 331 and admission to professional program. S.

ME 350. Thermodynamics and Heat Transfer. 3 Credits.
Basic concepts, first and second laws of thermodynamics; introduction to heat transfer principles. Prereq: ME 222 or equivalent. For non-mechanical engineering majors.

ME 351. Thermodynamics I. 3 Credits.
Basic concepts, properties of pure substances and ideal gases. First and second law, entropy. Prereq: ME 222, MATH 259.

ME 352. Fluid Dynamics. 3 Credits.
Foundations of the science of fluid dynamics. Basic concepts including thermodynamic principles applied to fluids. Development of conservation principles and applications. Prereq: ME 351 and admission to professional program.

ME 353. Thermodynamics II. 3 Credits.
Continuation of Thermodynamics I. Cycle analysis, thermodynamic relations, mixtures, chemical reactions, and related topics. Prereq: ME 351 and admission to professional program.

ME 361. Introduction to Mechanical Engineering Profession. 1 Credit.
A study of the effect of corporate structure and the application of economic analysis, scheduling procedures and available corporate resources to complete an engineering design program on time and within budget. Prereq: Admission to the professional program.

ME 379. Study Tour Abroad. 1-6 Credits.

ME 391. Seminar. 1-3 Credits.

ME 392. Study Abroad. 1-15 Credits.

ME 394. Individual Study. 1-5 Credits.

ME 397. Fe/Coop Ed/Internship. 1-4 Credits.

ME 399. Special Topics. 1-5 Credits.

ME 412. Engineering Measurements. 3 Credits.
Principles and characteristics of instruments used for engineering measurements, statistical analysis of data, signal conditioning, data acquisition systems. Includes laboratory. Prereq: ECE 303, ME 223 and admission to professional program. F, S {Also offered for graduate credit - see ME 612.}.

ME 421. Theory of Vibrations. 3 Credits.
Fundamentals of vibrations; free, forced, and damped vibration of single and multiple degrees of freedom systems. Prereq: ME 213, MATH 266 and admission to professional program. {Also offered for graduate credit - see ME 621.}.

ME 435. Plastics and Injection Molding Manufacturing. 3 Credits.
See Industrial and Manufacturing Engineering for description. {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 and CPM. {Also offered for graduate credit - See ME 636.}.

ME 437. Engineering Ceramics. 3 Credits.
Study the crystal and defect structures to determine the electrical and mass transport behaviors in ceramic materials. Investigation on microstructure of ceramic materials and its effect on optical, magnetic, dielectic, and thermo-mechanical properties. Prereq: ME 223, ME 331 and admission to the ME professional program.

ME 442. Machine Design I. 3 Credits.
Application of engineering mechanics, material properties, and failure theories to the design of reliable machine components. Prereq: Admission to professional program. Co-req: ME 331. {Also offered for graduate credit - see ME 642.}.

ME 443. Machine Design II. 3 Credits.
Application of methods, procedures, and standards used in the design and selection of mechanical components and elements, including springs, roller and journal bearings, gears, brakes, belts and flexible elements. Prereq: ME 442 and admission to the professional ME program. {Also offered for graduate credit - see ME 643.}.

ME 454. Heat and Mass Transfer. 3 Credits.
Principles of heat transfer by conduction, convection, and radiation. Introduction to mass transfer principles. Prereq: ME 213, ME 352, MATH 266 and admission to professional program. {Also offered for graduate credit - see ME 654.}.

ME 457. Thermal Systems Laboratory. 3 Credits.
Investigation of thermal, fluid and mechanical systems and instrumentations. Statistical methods are used in data collection and analysis. Prereq: Admission to professional program. Co-req: ME 454.

ME 461. Design Project I. 3 Credits.
Capstone student project in design, analysis, and experimental investigation in mechanical engineering. Prereq: ME 361. Coreq: ME 443, ME 454, Senior standing in ME. Prereq: admission to professional program.

ME 462. Design Project II. 3 Credits.
Capstone student project in design, analysis, and experimental investigation in mechanical engineering. Prereq: ME 461 and admission to professional program.

ME 468. Introduction to Biomechanics. 3 Credits.
Introduction to the fundamentals of biomechanics including force analysis, mechanics of deformable bodies; stress and strain, transport phenomena, and viscoelasticity, as well as their applications on the biomechanics of soft and hard tissues. Prereq: ME 223 and ME 352 and admission to the professional ME program. {Also offered for graduate credit - see ME 668.}.

ME 470. Renewable Energy Technology. 3 Credits.
Introduction to energy renewable technology, solar thermal energy systems, solar photovoltaic systems, wind to electric energy conversion systems, biomass energy resources and conversion processes, urban waste to energy from pyrolosis plants, hydrogen energy and fuel cells. Prereq: ME 350 or ME 351. {Also offered for graduate credit - see ME 670.}.

ME 471. Experimental Stress Analysis. 3 Credits.
Introduction to experimental techniques for the measurement of stresses and strains, including strain gages, optical methods, photoelasticity, and brittle coatings. Prereq: ME 442 and admission to professional program. {Also offered for graduate credit - see ME 671.}.

ME 472. Fatigue and Fracture of Metals. 3 Credits.
Causes and effects of fatigue failure and fracture of metals, analytical methods for fatigue design and fatigue life prediction, fatigue crack initiation and propagation, fatigue testing and validation. Prereq: ME 442 and admission to professional program. {Also offered for graduate credit - see ME 672.}.

ME 473. Engineering with Polymeric Materials. 3 Credits.
This course will introduce basic polymer materials including plastics, rubbers, adhesives; structures, properties, and relationships of polymers; additives; processing technologies, applications and development. Prereq: ME 331 and admission to professional program. {Also offered for graduate credit - see ME 673}.

ME 474. Mechanics of Composite Materials. 3 Credits.
Materials, properties, stress, and strength analyses; engineering design and manufacturing aspects of short and continuous fiber-reinforced materials. Prereq: ME 331 and admission to professional program. {Also offered for graduate credit - see ME 674.}.

ME 475. Automatic Controls. 3 Credits.
Introduction to industrial automatic controls. Theory and applications of pneumatic control, continuous process control, and programmable logic control. Demonstrations and discussion of the current industrial practice. Prereq: MATH 266 and admission to professional program. {Also offered for graduate credit - see ME 675.}.

ME 476. Mechatronics. 3 Credits.
Design and development of mechatronic systems that require an integrated knowledge of mechanical engineering, electronics, computer science and control theory. Prereq: ME 412 or ME 475 and admission to professional program. {Also offered for graduate credit - see ME 676.}.

ME 477. ME Finite Element Analysis. 3 Credits.
Introduction to the finite element method and its application to problems in mechanical engineering, including stress analysis. Prereq: ME 442 and ME 213 or ABEN 255 and admission to professional program. {Also offered for graduate credit - see ME 677.}.

ME 478. Advanced Flow Diagnostics. 3 Credits.
Introduction and review of fundamentals of advanced thermal and fluid measurement techniques for engineering applications including advanced laser and optical diagnostics, high speed imaging, infrared thermography, fiber optics, fluorescence, etc. Prereq: ME 352 and admission to the professional program in Mechanical Engineering. {Also offered for graduate credit - See ME 678}.

ME 479. Fluid Power Systems Design. 3 Credits.
Fluid dynamics principles and fluid properties are applied to the study of function, performance, and design of system components and systems for power transmission and control purposes. Prereq: ME 352 and admission to professional program. Cross-listed with ABEN 479. {Also offered for graduate credit - see ME 679.}.

ME 480. Biofluid Mechanics. 3 Credits.
Overview of fluid dynamical phenomena in biological systems; flow behavior of fluids in living organisms; application of fluid mechanics to the cardiovascular system and blood circulation. Prereq: ME 352 and admission to professional program. {Also offered for graduate credit - see ME 680.}.

ME 481. Fundmentals of Energy Conversion. 3 Credits.
Introduction to electric power generating systems and their major components such as turbines, boilers, condensers, and cooling towers. Prereq: ME 351 and admission to professional program. {Also offered for graduate credit - see ME 681.}.

ME 483. Introduction to Computational Fluid Dynamics. 3 Credits.
Introduction to the methods and analysis techniques used in numerical solutions of fluid flow, heat and mass transfer problems of practical engineering interest. Prereq: ME 352 and admission to professional program. {Also offered for graduate credit - see ME 683.}.

ME 484. Gas Turbines. 3 Credits.
Theory and design of gas turbines and components. Prereq: ME 454 and admission to professional program. {Also offered for graduate credit - see ME 684.}.

ME 485. Heating, Ventilation and Air Conditioning. 3 Credits.
Application of the basic fundamentals of thermodynamics, heat transfer, and fluid flow to heating, ventilating, and air conditioning. Prereq: ME 352 and admission to professional program. {Also offered for graduate credit - see ME 685.}.

ME 486. Nanotechnology and Nanomaterials. 3 Credits.
This course covers principles of nanotechnology, nanomaterials and develops a framework for their understanding. The basic tools of nanotechnology: nanoscale characterization, physics and materials design will be discussed in the context of current technological advances. Prereq: Senior standing in Engineering or Sciences. Cross-listed with CE 486. {Also offered for graduate credit - see ME 686.}.

ME 487. Internal Combustion Engines. 3 Credits.
Theory and practice of power and propulsion engines utilizing gas as a working substance. Study of gas turbines, spark, and compression ignition engines are included along with hybrid systems. Prereq: ME 351 and admission to professional program. {Also offered for graduate credit - see ME 687.}.

ME 488. Introduction to Aerodynamics. 3 Credits.
Introductory aerodynamics, aerodynamic characteristics of airfoils, and other components subjected to inviscid-incompressible flows; dynamics of compressible fluids; shock waves, one-dimensional flow, expansion waves in two-dimensional flow, and compressible flow over aerodynamic bodies. Prereq: ME 352 and admission to professional program or graduate standing. {Also offered for graduate credit - see ME 688.}.

ME 489. Vehicle Dynamics. 3 Credits.
Fundamental science and engineering underlying the design and operation of vehicles. Use of previous knowledge of statics, kinematics, dynamics, and machine design. Prereq: ME 222 and admission to professional program. {Also offered for graduate credit - see ME 689.}.

ME 491. Seminar. 1-5 Credits.

ME 492. Study Abroad. 1-15 Credits.

ME 494. Individual Study. 1-5 Credits.

ME 496. Field Experience. 1-15 Credits.

ME 499. Special Topics. 1-5 Credits.

ME 612. Engineering Measurements. 3 Credits.
Principles and characteristics of instruments used for engineering measurements, statistical analysis of data, signal conditioning, data acquisition systems. Includes laboratory. {Also offered for undergraduate credit - see ME 412.}.

ME 621. Theory of VIbrations. 3 Credits.
Fundamentals of vibrations; free, forced, and damped vibration of single and multiple degrees of freedom systems. {Also offered for undergraduate credit - see ME 421.}.

ME 635. Plastics and Injection Molding Manufacturing. 3 Credits.
Product and process engineering for manufacturers of plastic products; material evaluation and selection, mold design, process design, quality evalutaion of manufactured plastic parts. Cross-listed with IME 635. {Also offered for undergraduate credit - see ME 435.}.

ME 636. Biopolymers and Biocomposites. 3 Credits.
Structure/properties/synthesis of biopolymers, biomaterials and engineered biocomposites derived from plant based materials. An interdisciplinary course designed for graduate students. Introduction to science and engineering of converting biorenewable resources into novel biobased materials and products. Introduction to principles and concepts critical to successful design of polymeric biomaterials, coatings, and biocomposites. Understanding environmental impacts through life cycle analysis (LCA). Cross-listed with CHEM and CPM. {Also offered for undergraduate credit - See ME 436}.

ME 637. Engineering Ceramics. 3 Credits.
Study the crystal and defect structures to determine the electrical and mass transport behaviors in ceramic materials. Investigation on microstructure of ceramic materials and its effect on optical, magnetic, dielectic, and thermo-mechanical properties. {Also offered for undergraduate credit - see ME 437.}.

ME 642. Machine Design I. 3 Credits.
Application of engineering mechanics, material properties, and failure theories to the design of reliable machine components. {Also offered for undergraduate credit - see ME 442.}.

ME 643. Machine Design II. 3 Credits.
Application of methods, procedures, and standards used in the design and selection of mechanical components and elements, including springs, roller and journal bearings, gears, brakes, belts and flexible elements. {Also offered for undergraduate credit - see ME 443.}.

ME 654. Heat and Mass Transfer. 3 Credits.
Principles of heat transfer by conduction, convection, and radiation. Introduction to mass transfer principles. {Also offered for undergraduate credit - see ME 454.}.

ME 668. Introduction to Biomechanics. 3 Credits.
Introduction to the fundamentals of biomechanics including force analysis, mechanics of deformable bodies; stress and strain, transport phenomena, and viscoelasticity, as well as their applications on the biomechanics of soft and hard tissues. {Also offered for undergraduate credit - see ME 468.}.

ME 670. Renewable Energy Technology. 3 Credits.
Introduction to energy renewable technology, solar thermal energy systems, solar photovoltaic systems, wind to electric energy conversion systems, biomass energy resources and conversion processes, urban waste to energy from pyrolosis plants, hydrogen energy and fuel cells. {Also offered for undergraduate credit - see ME 470.}.

ME 671. Experimental Stress Analysis. 3 Credits.
Introduction to experimental techniques for the measurement of stresses and strains, including strain gages, optical methods, photoelasticity, and brittle coatings. {Also offered for undergraduate credit - see ME 471.}.

ME 672. Fatigue and Fracture of Metals. 3 Credits.
Causes and effects of fatigue failure and fracture of metals, analytical methods for fatigue design and fatigue life prediction, fatigue crack initiation and propagation, fatigue testing and validation. {Also offered for undergraduate credit - see ME 472.}.

ME 673. Polymer Engineering. 3 Credits.
This course will introduce basic polymer materials including plastics, rubbers, adhesives; structures, properties, and relationships of polymers; additives; processing technologies, applications and development. {Also offered for undergraduate credit - see ME 473.}.

ME 674. Mechanics of Composite Materials. 3 Credits.
Materials, properties, stress, and strength analyses; engineering design and manufacturing aspects of short and continuous fiber-reinforced materials. {Also offered for undergraduate credit - see ME 474.}.

ME 675. Automatic Controls. 3 Credits.
Introduction to industrial automatic controls. Theory and applications of pneumatic control, continuous process control, and programmable logic control. Demonstrations and discussion of the current industrial practice. {Also offered for undergraduate credit - see ME 475.}.

ME 676. Mechatronics. 3 Credits.
Design and development of mechatronic systems that require an integrated knowledge of mechanical engineering, electronics, computer science and control theory. {Also offered for undergraduate credit - see ME 476.}.

ME 677. ME Finite Element Analysis. 3 Credits.
Introduction to the finite element method and its application to problems in mechanical engineering, including stress analysis. {Also offered for undergraduate credit - see ME 477.}.

ME 678. Advanced Flow Diagnostics. 3 Credits.
Introduction and review of fundamentals of advanced thermal and fluid measurement techniques for engineering applications including advanced laser and optical diagnostics, high speed imaging, infrared thermography, fiber optics, fluorescence, etc. {Also offered for undergraduate credit - See ME 478}.

ME 679. Fluid Power Systems Design. 3 Credits.
Fluid dynamics principles and fluid properties are applied to the study of function, performance, and design of system components and systems for power transmission and control purposes. {Also offered for undergraduate credit - see ME 479.}.

ME 680. Biofluid Mechanics. 3 Credits.
Overview of fluid dynamical phenomena in biological systems; flow behavior of fluids in living organisms; application of fluid mechanics to the cardiovascular system and blood circulation. {Also offered for undergraduate credit - see ME 480.}.

ME 681. Fundamentals of Energy Conversion. 3 Credits.
Introduction to electric power generating systems and their major components such as turbines, boilers, condensers, and cooling towers. {Also offered for undergraduate credit - see ME 481.}.

ME 683. Introduction to Computational Fluid Dynamics. 3 Credits.
Introduction to the methods and analysis techniques used in numerical solutions of fluid flow, heat and mass transfer problems of practical engineering interest. {Also offered for undergraduate credit - see ME 483.}.

ME 684. Gas Turbines. 3 Credits.
Theory and design of gas turbines and components. Prereq: ME 654. {Also offered for undergraduate credit - see ME 484.}.

ME 685. Heating, Ventilation and Air Conditioning. 3 Credits.
Application of the basic fundamentals of thermodynamics, heat transfer, and fluid flow to heating, ventilating, and air conditioning. {Also offered for undergraduate credit - see ME 485.}.

ME 686. Nanotechnology and Nanomaterials. 3 Credits.
This course covers principles of nanotechnology, nanomaterials and develops a framework for their understanding. The basic tools of nanotechnology: nanoscale characterization, physics and materials design will be discussed in the context of current technological advances. {Also offered for undergraduate credit - see ME 486.}.

ME 687. Internal Combustion Engines. 3 Credits.
Theory and practice of power and propulsion engines utilizing gas as a working substance. Study of gas turbines, spark, and compression ignition engines. {Also offered for undergraduate credit - see ME 487.}.

ME 688. Introduction to Aerodynamics. 3 Credits.
Introductory aerodynamics, aerodynamic characteristics of airfoils, and other components subjected to inviscid-incompressible flows; dynamics of compressible fluids; shock waves, one-dimensional flow, expansion waves in two-dimensional flow, and compressible flow over aerodynamic bodies. {Also offered for undergraduate credit - see ME 488.}.

ME 689. Vehicle Dynamics. 3 Credits.
Fundamental science and engineering underlying the design and operation of vehicles. Use of previous knowledge of statics, kinematics, dynamics, and machine design. {Also offered for undergraduate credit - see ME 489.}.

ME 690. Graduate Seminar. 1-3 Credits.

ME 696. Special Topics. 1-5 Credits.

ME 711. Advanced Engineering Analysis. 3 Credits.
Mathematical analysis and numerical treatment of engineering problems, eigenvalue problems in lumped and distributed parameter systems, advanced mathematics applied to engineering design.

ME 712. Advanced Finite Element Analysis. 3 Credits.
Application of finite element methods to problems of plasticity, viscoplasticity, fracture, vibrations, fluids, material and geometric non-linearity, and heat transfer. Recommended: ME 677.

ME 717. Advanced Controls for Mechanical Systems. 3 Credits.
Analysis and design of multivariable control systems for robust stabilization and optimal performance of mechanical systems.

ME 720. Continuum Mechanics. 3 Credits.
Tensor analysis in affined and metric spaces, kinematics of motion, general principles of continuum mechanics and postulates on constitutive laws. Two 75-minute lectures. Cross-listed with CE 720.

ME 721. Advanced Dynamics. 3 Credits.
Newtonian dynamics; dynamics of particles; dynamics of rigid bodies; multi-body dynamics; variational principles; principle of virtual work; d'Alembert's principle; Hamilton's principle; Lagrange's equation of motion; kinematics of rigid bodies; solutions of nonholonomic equations of motion.

ME 722. Advanced Mechanics of Materials. 3 Credits.
Stress, deformation, failure analysis of deformable bodies and structures under static and dynamic loadings, fundamental concepts and definitions in stress, strain, energy methods, plasticity, fracture, fatigue, creep, contact, impact and stability of solid bodies and plate bending problems.

ME 725. Advanced Mechanics and Failure of Composites. 3 Credits.
Concepts in static, dynamics, impact, and thermal analysis of anisotropic elastic materials are covered. Different failure theories, laminated theories, and micromechanics formulations of composites are reviewed in detail.

ME 726. Fracture Mechanics. 3 Credits.
Linear elastic fracture mechanics, energy release rate, stress intensity factor, J-integral, elasto-plastic fracture, crack tip plasticity, crack propagation, fracture fatigue crack growth, fracture tests, fracture in polymers, ceramics and composite materials.

ME 728. Stress Waves in Solids. 3 Credits.
Introduction to fundamental concepts and principles of stress waves propagating in solid materials and relevant applications and experimental techniques.

ME 729. Advanced Vibrations. 3 Credits.
Newton-Euler method; Lagrange's method; frequency response; modal analysis; eigenvalue problems; second-order stiffness systems (rod, shaft and string); Euler-Bernoulli beam theory; Rayleigh beam theory; Timoshenko beam theory; extended operator; membranes.

ME 731. Mechanical Behavior of Materials. 3 Credits.
Fundamental concepts of elastic, viscoelastic, and plastic deformation of materials; emphasizing atomic and microstructure-mechanical property relationships. Theory of static and dynamic dislocations; fracture, fatigue, and creep as well as strengthening mechanisms in materials.

ME 733. Polymer Nanocomposites. 3 Credits.
Fundamental concepts and principles of nanotechnology, nanostructured materials and nanocomposites; polymer nanocomposites processing, property characterization, and relevant modeling.

ME 734. Smart Materials and Structures. 3 Credits.
Physics, chemistry, engineering principles and applications of smart materials and structures. Recommended: Any basic materials science class, solid state physics class, or CPM 672 or CPM 674.

ME 736. Advanced Surface Analysis. 3 Credits.
Topics covered in this course include tribology, introduction to deposition technologies, surface protection mechanisms, surface preparation for deposition, hard coatings, materials science of deposition, analytical techniques for surface characterization, evaluation of mechanical performance of deposited layer, case studies.

ME 743. Biomechanics Of Impact. 3 Credits.
Fundamental sciences of engineering and human anatomy that form the basis of biomechanics of soft tissue and bone under dynamic conditions.

ME 751. Advanced Thermodynamics. 3 Credits.
Rigorous treatment of thermodynamic principles. Emphasis on the concept of availability methods as applied to various engineering systems.

ME 753. Gas Dynamics. 3 Credits.
Fundamental concepts of fluid dynamics and thermodynamics are used in the treatment of compressible flow, frictional flows, and flows with heat transfer or energy release.

ME 754. Boundary Layer Theory. 3 Credits.
Fundamental laws of motion of a viscous fluid are derived and used in the consideration of laminar boundary layers, transition phenomena, and turbulent boundary layer flows.

ME 755. Fluid Mechanics for Bio/Nanotechnologies. 3 Credits.
Fundamental principles of fluid dynamics in micro and nano scales, with applications to nanotechnology and biotechnology.

ME 761. Heat Transmission I. 3 Credits.
Advanced study of heat conduction in solids. Analytical, graphical, and numerical evaluations of the temperature field. Use of advanced mathematical methods in the solution of boundary value problems. Recommended: ME 654.

ME 790. Graduate Seminar. 1-3 Credits.

ME 791. Temporary/Trial Topics. 1-5 Credits.

ME 793. Individual Study/Tutorial. 1-5 Credits.

ME 795. Field Experience. 1-15 Credits.

ME 796. Special Topics. 1-5 Credits.

ME 797. Master's Paper. 1-3 Credits.

ME 798. Master's Thesis. 1-10 Credits.

ME 899. Doctoral Dissertation. 1-15 Credits.

Medical Laboratory Science (MLS)

MLS 194. Individual Study. 1-5 Credits.

MLS 196. Field Experience. 1-15 Credits.

MLS 199. Special Topics. 1-5 Credits.

MLS 200. Introduction to Medical Laboratory Science. 1 Credit.
Introduction to medical laboratory science. Lectures, discussions, and field trips focus on professional traits and communication, ethical behavior of the health care provider, major curriculum requirements, and scope of practice.

MLS 291. Seminar. 1-3 Credits.

MLS 292. Study Abroad. 1-15 Credits.

MLS 294. Individual Study. 1-3 Credits.

MLS 299. Special Topics. 1-5 Credits.

MLS 379. Study Tour Abroad. 1-6 Credits.

MLS 391. Seminar. 1-3 Credits.

MLS 392. Study Abroad. 1-15 Credits.

MLS 394. Individual Study. 1-3 Credits.

MLS 399. Special Topics. 1-5 Credits.

MLS 435. Hematology. 2 Credits.
An introduction to the origin, matruation, and function of the formed elements of human blood. Identification of normal cells will be emphasized. Prereq: MICR 202L or MICR 350L.

MLS 491. Seminar. 1-5 Credits.

MLS 492. Study Abroad. 1-15 Credits.

MLS 494. Individual Study. 1-5 Credits.

MLS 496. Field Exp/Internship. 1-15 Credits.
Restricted to Medical Laboratory Science professional majors.

MLS 499. Special Topics. 1-5 Credits.

Microbiology (MICR)

MICR 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. Study Abroad. 1-15 Credits.

MICR 294. Individual Study. 1-5 Credits.

MICR 299. Special Topics. 1-5 Credits.

MICR 350. General Microbiology. 3 Credits.
Principles of microbiology for students requiring a rigorous professionally oriented course. This course is a prerequisite to most microbiology courses. Prereq: BIOL 150 and CHEM 122.

MICR 350L. General Microbiology Lab. 2 Credits.
Principles of microbiology for students requiring a rigorous professionally-oriented course. Prereq: BIOL 150 and CHEM 122.

MICR 352. General Microbiology II. 3 Credits.
Further exploration of microbiological concepts introduced in MICR 350. Topics include molecular structure, physiology, metabolism, growth and microbial genetics. Prereq: MICR 350.

MICR 352L. General Microbiology Lab II. 2 Credits.
Application of principles of microbiology introduced in General Microbiology II using advanced microbiology techniques and tools. Prereq: MICR 350L. Coreq: MICR 352.

MICR 354. Scientific Writing. 3 Credits.
This course will emphasize the qualities of sound logic, good structure, and honesty in writing journal articles and science pieces for popular press. Prereq: ENGL 120, MICR 350, junior standing. Satisfies upper-division writing requirement.

MICR 373. Equine Health Management. 1 Credit.
This course introduces the student to learning through a case-based approach to equine disease. Case material highlights equine health problems seen in the Midwest. Case questions encourage students to think about disease prevention, management and eradication. Prereq: ANSC 114 and VETS 135.

MICR 379. Study Tour Abroad. 1-6 Credits.

MICR 391. Seminar. 1-3 Credits.

MICR 392. Study Abroad. 1-15 Credits.

MICR 394. Individual Study. 1-5 Credits.

MICR 397. Fe/Coop Ed/Internship. 1-4 Credits.

MICR 399. Special Topics. 1-5 Credits.

MICR 445. Animal Cell Culture Techniques. 2 Credits.
Methods of animal cell culture propagation and uses for cell culture systems. {Also offered for graduate credit - see MICR 645.}.

MICR 450. Infectious Disease Pathogenesis. 3 Credits.
Students will study mechanisms of bacterial, viral, fungal, and parasitic pathogenesis and the immune response to pathogens. Prereq: MICR 350 or 460/660 or 470/670. {Also offered for graduate credit - see MICR 650.}.

MICR 450L. Infectious Disease Pathogenesis Laboratory. 2 Credits.
This course will explore laboratory-based activities specifically designed for the microbiology major. {Also offered at the graduate level as MICR 650L.}.

MICR 452. Microbial Ecology. 3 Credits.
Study of the relationships between microbes and the physical, chemical, and biotic components of their environments. The role of microbes in nutrient cycling, bioremediation, biocontrol, biological waste treatment, fuel production, and energy recovery. Prereq: MICR 350, MICR 350L. {Also offered for graduate credit - see MICR 652.}.

MICR 453. Food Microbiology. 3 Credits.
Study of the nature, physiology, and interactions of microorganisms in foods. Introduction to foodborne diseases, effects of food processing on the microflora of foods, principles of food preservation, food spoilage, and foods produced by microorganisms. Prereq: MICR 350L. {Also offered for graduate credit - see MICR 653.}.

MICR 460. Pathogenic Microbiology. 3 Credits.
Study of the microorganisms that cause disease and of disease processes. Prereq: MICR 202 or 350. {Also offered for graduate credit - see MICR 660.}.

MICR 460L. Pathogenic Microbiology Laboratory. 2 Credits.
Isolation and identification of pathogenic microorganisms. Prereq: MICR 350L. {Also offered for graduate credit - see MICR 661.}.

MICR 463. Clinical Parasitology. 2 Credits.
A study of protozoan and helminthic parasites of humans, with an emphasis on clinical identification, life histories, and control. Prereq: BIOL 150, BIOL 150L. {Also offered for graduate credit - see MICR 663.}.

MICR 470. Basic Immunology. 3 Credits.
An overview of the role of the immune system including the functions of humoral and cell-mediated immunity in health and disease. Prereq: MICR 350. {Also offered for graduate credit - see MICR 670.}.

MICR 471. Immunology and Serology Laboratory. 2 Credits.
Basic immunological and serological procedures. Prereq or Co-req: MICR 350 and MICR 350L. {Also offered for graduate credit - see MICR 671.}.

MICR 472. Clinical Immunology. 3 Credits.
Concepts in immunology including special attention to clinical conditions that may appear as a result of immune system activity. Prereq: MICR 470. {Also offered for graduate credit - see MICR 672.}.

MICR 474. Epidemiology. 3 Credits.
Study of the distribution and dynamics of disease in populations. Prereq: STAT 330. {Also offered for graduate credit - see MICR 674.}.

MICR 475. Virology. 3 Credits.
The biology of viruses with emphasis on virus replication and pathogenesis. Co-req: MICR 470. {Also offered for graduate credit - see MICR 675.}.

MICR 480. Bacterial Physiology. 3 Credits.
Composition and function of eubacterial and archaeobacterial cell structure. Nutrition and nutrient transport in bacteria. Principles of energy-yielding carbohydrate metabolism, bacterial fermentation, and respiration. Prereq: MICR 350, MICR 350L. Co-req: BIOC 460. {Also offered for graduate credit - see MICR 680.}.

MICR 481. Microbial Genomics with Computational Laboratory. 3 Credits.
Microbial genome science with additional emphasis on microbial evolution and environmental science. Topics include: i) genomic diversity, ii) the consequences of horizontal gene transfer, iii) single cell and population genomics, and iv) environmental metagenomics. Prereq: BIOC 460. Recommended: STAT 330. {Also offered for graduate credit - see MICR 681.}.

MICR 482. Bacterial Genetics & Phage. 3 Credits.
Bacterial genetics as it pertains to antibiotic resistance, genetic testing and manipulation for biotechnological applications. Prereq: MICR 350. Coreq: BIOC 460. {Also offered for graduate credit - see MICR 682.}.

MICR 485. Capstone Experience in Microbiology - Experimental Design. 1 Credit.
The capstone experience is the culmination of earlier course work that will allow students to integrate their knowledge of microbiology. The experimental design course will focus on using the scientific method to design and propose a group research project. Prereq: MICR 352, MICR 352L and Microbiology majors only.

MICR 486. Capstone Experience in Microbiology. 3 Credits.
The capstone experience course Is a culmination of all required coursework in the major assisting students in broadening and integrating the total experience of the microbiology major. Prereq: MICR 350, MICR 350L, Microbiology majors only and senior standing, semester of graduation.

MICR 491. Seminar. 1-5 Credits.

MICR 492. Study Abroad. 1-15 Credits.

MICR 493. Undergraduate Research. 1-5 Credits.

MICR 494. Individual Study. 1-5 Credits.

MICR 496. Field Experience. 1-15 Credits.

MICR 499. Special Topics. 1-5 Credits.

MICR 645. Animal Cell Culture Techniques. 2 Credits.
Methods of animal cell culture propagation and uses for cell culture systems. {Also offered for undergraduate credit - see MICR 445.}.

MICR 650. Infectious Disease Pathogenesis. 3 Credits.
Students will study mechanisms of bacterial, viral, fungal, and parasitic pathogenesis and the immune response to pathogens. Prereq: MICR 660 or MICR 670. {Also offered for undergraduate credit - see MICR 450.}.

MICR 650L. Infectious Disease Pathogenesis Laboratory. 2 Credits.
This course will explore laboratory-based activities specifically designed for the microbiology major. {Also offered at the undergraduate level as MICR 450L.}.

MICR 652. Microbial Ecology. 3 Credits.
Study of the relationships between microbes and the physical, chemical, and biotic components of their environments. The role of microbes in nutrient cycling, bioremediation, biocontrol, biological waste treatment, fuel production, and energy recovery. {Also offered for undergraduate credit - see MICR 452.}.

MICR 653. Food Microbiology. 3 Credits.
Study of the nature, physiology, and interactions of microorganisms in foods. Introduction to foodborne diseases, effects of food processing on the microflora of foods, principles of food preservation, food spoilage, and foods produced by microorganisms. {Also offered for undergraduate credit - see MICR 453.}.

MICR 660. Pathogenic Microbiology. 3 Credits.
Study of the microorganisms that cause disease and of disease processes. {Also offered for undergraduate credit - see MICR 460.}.

MICR 661. Pathogenic Microbiology Lab. 2 Credits.
Isolation and identification of pathogenic microorganisms. {Also offered for undergraduate credit - see MICR 460L.}.

MICR 663. Clinical Parasitology. 2 Credits.
A study of protozoan and helminthic parasites of humans, with an emphasis on clinical identification, life histories, and control. {Also offered for undergraduate credit - see MICR 463.}.

MICR 670. Basic Immunology. 3 Credits.
An overview of the role of the immune system including the functions of humoral and cell-mediated immunity in health and disease. {Also offered for undergraduate credit - see MICR 470.}.

MICR 671. Immunology and Serology Laboratory. 2 Credits.
Basic immunological and serological procedures. {Also offered for undergraduate credit - see MICR 471.}.

MICR 672. Clinical Immunology. 3 Credits.
Concepts in immunology including special attention to clinical conditions that may appear as a result of immune system activity. {Also offered for undergraduate credit - see MICR 472.}.

MICR 674. Epidemiology. 3 Credits.
Study of the distribution and dynamics of disease in populations. {Also offered for undergraduate credit - see MICR 474.}.

MICR 675. Virology. 3 Credits.
The biology of viruses with emphasis on virus replication and pathogenesis. {Also offered for undergraduate credit - see MICR 475.}.

MICR 680. Bacterial Physiology. 3 Credits.
Composition and function of eubacterial and archaeobacterial cell structure. Nutrition and nutrient transport in bacteria. Principles of energy-yielding carbohydrate metabolism, bacterial fermentation, and respiration. {Also offered for undergraduate credit - see MICR 480.}.

MICR 681. Microbial Genomics with Computational Laboratory. 3 Credits.
Microbial genome science with additional emphasis on microbial evolution and environmental science. Topics include: i) genomic diversity, ii) the consequences of horizontal gene transfer, iii) single cell and population genomics, and iv) environmental metagenomics. {Also offered for undergraduate credit - see MICR 481.}.

MICR 682. Bacterial Genetics and Phage. 3 Credits.
Bacterial genetics as it pertains to antibiotic resistance, genetic testing and manipulation for biotechnological applications. {Also offered for undergraduate credit - see MICR 482.}.

MICR 690. Graduate Seminar. 1-3 Credits.

MICR 695. Field Experience. 1-15 Credits.

MICR 696. Special Topics. 1-5 Credits.

MICR 722. International Health Systems, Policy and Biosecurity. 2 Credits.
This course will provide students with the necessary information to understand international health regulations and the potential implications on animal health, human health, global trade and food safety.

MICR 723. International Animal Production, Disease Surveillance and Public Health. 3 Credits.
The course will enable students to appreciate tropical animal production, food safety & public health from a developing country's perspective, prepare them for global career opportunities, foster an international perspective and understanding of diverse systems.

MICR 724. Applied Epidemiology and Biostatistics. 3 Credits.
This course will enable the students to get an understanding of how to apply epidemiological tools in study designs data management and analysis. Students will create or use existing databases and learn data management and analysis using software such as EPIINFO.

MICR 752. Advanced Topics in Food Safety Microbiology. 3 Credits.
Overview of food systems and in-depth evaluation of microbiological food safety concerns with an emphasis on public health aspects of detecting, tracking, and controlling pathogens in the food supply.

MICR 756. Advanced Topics in Public Health Microbiology. 3 Credits.
Through the use of case-based learning, students explore several key areas of public health microbiology. Case questions encourage students to think about disease prevention, management and eradication. Students will be expected to read and research information on each case and answer discussion questions.

MICR 762. Advanced Pathogenic Bacteriology. 3 Credits.
Biophysical and biochemical mechanisms by which microorganisms cause infectious disease and hot reactions to the disease.

MICR 767. Critical Thinking for the Life Sciences. 3 Credits.
This course is designed to impart critical thinking skills to graduate students in the life sciences. Topics such as information retrieval, problem-solving, Socratic questioning and logical fallacies in sciences will be covered by in-class work shops and application-based assignments.

MICR 770. Immunology of Chronic Infections. 3 Credits.
A study of the host's response to chronic infections, which is illustrated using a framework of diseases of worldwide importance that present different pathologies and outcomes. Prereq: MICR 670.

MICR 775. Molecular Virology. 3 Credits.
An in-depth study of current areas of research on human and animal viruses. The replication, pathogenesis, diagnosis, prevention, and control of viruses using contemporary molecular and cellular biology approaches will be examined. Prereq: MICR 660, MICR 670, MICR 675.

MICR 781. Advanced Bacterial Physiology. 3 Credits.
In-depth consideration of various topics in bacterial physiology such as autotrophy, bacterial growth and growth yields, energy-yielding metabolism, and regulation of catabolic pathways. Prereq: MICR 680.

MICR 782. Molecular Microbiological Techniques. 3 Credits.
Familiarize students with current molecular and immunologic strategies and techniques commonly used to study infectious disease processes.

MICR 783. Advanced Bacterial Genetics and Phage. 3 Credits.
Mechanisms of genetic rearrangement and regulation in bacteria and phage. Recombinant DNA. Prereq: MICR 682.

MICR 785. Pathobiology. 3 Credits.
A comprehensive understanding of the molecular mechanisms that underlie disease pathogenesis and lesion development. Investigation and presentation on mechanisms underlying a specific disease entity of either human or animal origin. Prereq: MICR 660.

MICR 790. Graduate Seminar. 1-3 Credits.

MICR 791. Temporary/Trial Topics. 1-5 Credits.

MICR 792. Graduate Teaching Experience. 1-6 Credits.

MICR 793. Individual Study/Tutorial. 1-5 Credits.

MICR 794. Practicum/Internship. 1-8 Credits.

MICR 795. Field Experience. 1-15 Credits.

MICR 796. Special Topics. 1-5 Credits.

MICR 797. Master's Paper. 1-3 Credits.

MICR 798. Master's Thesis. 1-10 Credits.

MICR 801. Foundation in Microbiology Research I. 4 Credits.
A study of the scientific process and the principles and applications of microbiology in the areas of cell structure and function, pathways and transformations, and information flow.

MICR 802. Foundation in Microbiology Research II. 4 Credits.
A study of the principles and applications of microbiology in the areas of genomics, evolution, ecology, and infectious disease.

MICR 893. Individual Study/Tutorial. 1-5 Credits.

MICR 899. Doctoral Dissertation. 1-15 Credits.

Military Science (MS)

MS 101. Foundations of Officership. 1 Credit.
Introduce fundamental concepts consistent with the military culture; includes leadership, ethics, and Army values. Increase self-confidence through team study and activities involving military skills, leadership reaction course, and making presentations. Weekly lab required. Recommended Coreq: MS 310.

MS 102. Basic Leadership. 1 Credit.
Principles of effective leading; reinforce self-confidence; develop communication skills to improve performance and group interaction; relate organizational ethical values to leadership effectiveness. Weekly lab required. Recommended Coreq: MS 320. S.

MS 110. Army ROTC Physical Fitness. 2 Credits.
Instruction in planning and leading physical fitness programs. Development of physical fitness required of an Army officer. Emphasis on development of an individual fitness program and the role of exercise and fitness in ones life. May be repeated one time only. F, S.

MS 194. Individual Study. 1-5 Credits.

MS 196. Field Experience. 1-15 Credits.

MS 199. Special Topics. 1-5 Credits.

MS 201. Individual Leadership Studies. 2 Credits.
Apply ethics-based leadership skills in oral presentations, writing concisely, planning events, coordinating group efforts, first aid skills, land navigation, and basic military tactics. Focuses on personal development and includes ROTC leadership assessment program. Recommended Coreq: MS 310. F.

MS 202. Leadership and Teamwork. 2 Credits.
Continuation of individual and team building concepts for small unit operations: provides a conceptual framework for decision making, planning, and time management; making safety assessments; introduces movement techniques and pre-execution checks. Recommended Coreq: MS 310. S.

MS 210. Leadership Laboratory. 1 Credit.

MS 291. Seminar. 1-3 Credits.

MS 292. Study Abroad. 1-15 Credits.

MS 294. Individual Study. 1-5 Credits.

MS 299. Special Topics. 1-5 Credits.

MS 301. Leadership and Problem Solving. 3 Credits.
Continuation of individual and team building concepts for small unit operations; provides a conceptual framework for decision making, planning, and time management; making safety assessments; introduces movement techniques and pre-execution checks. Prereq: Departmental approval. Coreq: MS 310. S.

MS 302. Leadership and Ethics. 3 Credits.
Develop skills in planning and leading by conducting training for lower division students. Introduction to operational art and tactics; includes a series of practical opportunities to lead small groups, receive personal assessments and evaluations. Prereq: Departmental approval. Coreq: MS 310. F.

MS 310. Leadership Laboratory. 1 Credit.
Individual and collective drill, small unit leadership experience, and tactical training to lead small groups, receive personal assessments and encouragement, and defensive tactics. Develop skills in planning and leading by conducting training for lower-division students. Weekly lab, physical fitness program, and field exercises required. May be repeated. F.

MS 320. Leadership Laboratory. 1 Credit.
Small unit drill, as well as tactical application of leadership fundamentals at the squad/patrol leader level. May be repeated. S.

MS 379. Study Tour Abroad. 1-6 Credits.

MS 391. Seminar. 1-3 Credits.

MS 392. Study Abroad. 1-15 Credits.

MS 394. Individual Study. 1-5 Credits.

MS 399. Special Topics. 1-5 Credits.

MS 401. Leadership and Management. 3 Credits.
Plan, conduct, and evaluate activities of the ROTC cadet organization. Articulate goals, put plans into action. Introduce staff organization and processes. Assess organizational cohesion and develop improvement strategies. Apply Army policies. Prereq: Departmental approval. Coreq: MS 410.

MS 402. Officership. 3 Credits.
Continuation of planning, conducting, and evaluating activities of the ROTC cadet organization. Articulate goals, put plans into action. Introduce staff organization and processes. Assess organizational cohesion and develop improvement strategies. Apply Army policies. Prereq: Departmental approval. Coreq: MS 420.

MS 410. Leadership Laboratory. 1 Credit.
Assumption of command and staff positions within the cadet battalion. May be repeated. F.

MS 420. Leadership Laboratory. 1 Credit.
Assumption of command and staff positions within the cadet battalion. May be repeated. S.

MS 491. Seminar. 1-5 Credits.

MS 492. Study Abroad. 1-15 Credits.

MS 494. Individual Study. 1-5 Credits.

MS 496. Field Experience. 1-15 Credits.

MS 499. Special Topics. 1-5 Credits.

Modern Languages (LANG)

LANG 101. Basic ESL: Integrated Skills. 1-20 Credits.
Intensive integrated skills approach to basic English for novice non-native speakers; emphasis on reading, writing, listening and speaking skills needed for academic work. May be repeated. 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. 3-5 Credits.
Studies of American language and culture with a focus on content designed to equip international students to effectively adapt to the American university environment. May be repeated for credit. 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 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. Study Abroad. 1-15 Credits.

LANG 294. Individual Study. 1-5 Credits.

LANG 299. Special Topics. 1-5 Credits.

LANG 379. Study Tour Abroad. 1-6 Credits.

LANG 391. Seminar. 1-3 Credits.

LANG 392. Study Abroad. 1-15 Credits.

LANG 394. Individual Study. 1-5 Credits.

LANG 399. Special Topics. 1-5 Credits.

LANG 491H. Seminar. 1-3 Credits.

LANG 491. Seminar. 1-5 Credits.

LANG 492. Study Abroad. 1-15 Credits.

LANG 494. Individual Study. 1-5 Credits.

LANG 496. Field Experience. 1-15 Credits.

LANG 499. Special Topics. 1-5 Credits.

LANG 690. Graduate Seminar. 1-5 Credits.

LANG 696. Special Topics. 1-5 Credits.

LANG 701. English Language and Classroom Skills for International GTAs. 3 Credits.
This course is designed to help international graduate students become effective teachers by developing the language and teaching skills necessary to meet the expectations of undergraduate students at NDSU. Students gain practical experience in classroom leadership, lesson planning, and presenting lectures. It is taught in tandem with a co-requisite language tutorial that is tailored to individual language needs. Co-req: LANG 702.

LANG 702. English Language Tutorial for International GTAs. 1 Credit.
In conjunction with LANG 701, this course is designed to help international graduate students become effective teachers by developing the language necessary to meet the expectations of undergraduate students at NDSU. Assignments and one-on-one tutorials are designed to identify individual language deficiencies and to improve on assessed needs. Can be repeated for credit. Co-req: LANG 701.

LANG 790. Graduate Seminar. 1-5 Credits.

LANG 796. Special Topics. 1-5 Credits.

Music (MUSC)

MUSC 100. Music Appreciation. 3 Credits.
Understanding and appreciating musical styles and composers with some emphasis on the relationship of music to concurrent social and artistic trends. Designed for non-music majors.

MUSC 101. Fundamentals of Music. 3 Credits.
Introduction to fundamental elements of music through the study of scales, chords, basic harmonic progressions, rhythms, and terminology.

MUSC 103. Introduction to Music History. 3 Credits.
Introduction to the major works of music in the Western tradition which define the stylistic elements of musical periods in history.

MUSC 108. Roots of American Popular Music. 3 Credits.
Survey of American popular music and musicians from Civil War times through the present with an emphasis on historical and sociological influences. Designed for non-music majors.

MUSC 111. Marching Band. 1 Credit.
Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 112. University Band. 1 Credit.
Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 114. University Summer Band. 1 Credit.
Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 115. University Chorus. 1 Credit.
Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 116. Cantemus. 1 Credit.
A non-auditioned women's choir which will perform music of all style periods. May be repeated for credit.

MUSC 117. Statesmen of NDSU. 1 Credit.
A non-auditioned men's choir which will perform music of all style periods.

MUSC 130. Theory and Analysis I. 3 Credits.
Introduction to the compositional practices of the 18th and 19th centuries. Coreq: MUSC 132.

MUSC 131. Theory and Analysis II. 3 Credits.
Introduction to the compositional practices of the 18th and 19th centuries. Prereq: MUSC 130. Coreq: MUSC 133.

MUSC 132. Ear Training & Sight Singing I. 1 Credit.
Development of sight singing and ear training skills. Laboratory band and chorus required. Coreq: MUSC 130.

MUSC 133. Ear Training & Sight Singing II. 1 Credit.
Development of sight singing and ear training skills. Laboratory band and chorus required. Coreq: MUSC 131.

MUSC 160. Piano Class I. 1 Credit.
Group instruction in the basic fundamentals of playing the piano. Designed primarily to meet the basic piano proficiency requirements for music education majors.

MUSC 161. Piano Class II. 1 Credit.
Group instruction in the basic fundamentals of playing the piano. Designed primarily to meet the basic piano proficiency requirements for music education majors.

MUSC 162. Voice Class. 1 Credit.
Group instruction in the fundamentals of singing. For music students who do not major in voice. May be repeated.

MUSC 163. Voice Class for Instrumentalists. 2 Credits.
Group instruction in the fundamentals of singing. For instrumental music education students who do not major in voice. May be repeated. Instrumental music majors only.

MUSC 165. Applied Piano. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated.

MUSC 167. Applied Voice. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated.

MUSC 168. Applied Wind Instruments. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated.

MUSC 169. Applied Percussion Instruments. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated.

MUSC 170. Applied Upper Strings. 1 Credit.
Individual lessons for upper strings. May be repeated.

MUSC 171. Applied Lower Strings. 1 Credit.
Individual lessons for lower strings. May be repeated.

MUSC 172. Applied Guitar. 1 Credit.
Individual lessons for guitar. May be repeated.

MUSC 173. Supplementary Applied Study. 1-2 Credits.
Private lessons. Prereq: Qualifying examination in performance. For music performance majors. Registration should be for one credit; add one credit for supplementary pedagogy study. May be repeated.

MUSC 174. Pronunciation for Singers I. 1 Credit.
Instruction in the proper pronunciation of English, Italian, Spanish, and Latin for song, oratorio, and opera.

MUSC 175. Pronunciation for Singers II. 1 Credit.
Instruction in the proper pronunciation of German and French for song, oratorio, and opera. Prereq: MUSC 174.

MUSC 180. Performance Attendance. 0 Credits.
Attendance at regional performances, including NDSU events. Minimum of five registrations necessary for graduation for music majors, two registrations for music minors. May be repeated. P/F only.

MUSC 189. Skills for Academic Success. 1 Credit.
This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

MUSC 194. Individual Study. 1-5 Credits.

MUSC 196. Field Experience. 1-15 Credits.

MUSC 199. Special Topics. 1-5 Credits.

MUSC 215. University Chamber Singers. 1 Credit.
This is a mixed ensemble which will study and perform a wide variety of choral repertoire and become more musically literate. It will meet needs of developing musicianship within an auditioned smaller ensemble. Admission by audition only. Repeatable for credit.

MUSC 230. Theory and Analysis III. 3 Credits.
Advanced harmonic and chromatic materials of the common practice period, and analysis and stylistic compositions of music from ancient Greece to contemporary practice. Prereq: MUSC 130 Coreq: MUSC 232.

MUSC 231. Theory and Analysis IV. 3 Credits.
Advanced harmonic and chromatic materials of the common practice period, and analysis and stylistic compositions of music from ancient Greece to contemporary practice. Prereq: MUSC 230. Coreq: MUSC 233.

MUSC 232. Ear Training & Sight Singing III. 1 Credit.
Advanced work with ear training and sight singing materials. Laboratory band and chorus required. Coreq: MUSC 230.

MUSC 233. Ear Training & Sight Singing IV. 1 Credit.
Advanced work with ear training and sight singing materials. Laboratory band and chorus required. Coreq: MUSC 232.

MUSC 250. Basic Conducting. 2 Credits.
Study and development of basic ensemble conducting skills.

MUSC 260. Piano Class III. 1 Credit.
Intermediate instruction in class piano. Prereq: MUSC 161.

MUSC 261. Piano Class IV. 1 Credit.
Intermediate instruction in class piano. Prereq: MUSC 161.

MUSC 265. Applied Piano. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 267. Applied Voice. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 268. Applied Wind Instruments. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 269. Applied Percussion Instruments. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 270. Applied Upper Strings. 1 Credit.
Individual lessons for upper strings. May be repeated.

MUSC 271. Applied Lower Strings. 1 Credit.
Individual lessons for lower strings. May be repeated.

MUSC 272. Applied Guitar. 1 Credit.
Individual lessons for guitar. May be repeated.

MUSC 273. Supplementary Applied Study. 1-2 Credits.
For music performance majors. Registration should be for one credit; add one credit for supplementary pedagogy study. May be repeated.

MUSC 291. Seminar. 1-3 Credits.

MUSC 292. Study Abroad. 1-15 Credits.

MUSC 294. Individual Study. 1-5 Credits.

MUSC 299. Special Topics. 1-5 Credits.

MUSC 301. Musical Theatre Troupe. 1 Credit.
A select performance ensemble of musical theatre performers. This ensemble meets twice a week to develop scenes, songs, and choreography from classic and contemporary musical theatre repertoire. May be repeated. Prereq: selection by audition only.

MUSC 302. Wind Ensemble. 1 Credit.
Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 303. Wind Symphony. 1 Credit.
Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 304. University Symphony Orchestra. 1 Credit.
Major symphonic ensemble jointly sponsored by NDSU and MSUM. Prereq: Membership by audition only. May be repeated.

MUSC 306. Concert Choir. 1 Credit.
Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 311. Jazz Ensemble. 1 Credit.
Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 312. Percussion Ensemble. 1 Credit.
Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 313. Trombone Ensemble. 1 Credit.
Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 314. Brass Chamber Ensemble. 1 Credit.
Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 315. Woodwind Chamber Ensemble. 1 Credit.
Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 316. String Chamber Ensemble. 1 Credit.
Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 317. Madrigal Singers. 1 Credit.
Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 318. Mixed Chamber Ensemble. 1 Credit.
Mixed chamber ensemble. Membership in all organizations is subject to approval of the director. May be repeated for credit.

MUSC 319. Opera Workshop. 1 Credit.
Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 320. Vocal Chamber Ensemble. 1 Credit.
Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 321. Piano Chamber Music. 1 Credit.
Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 322. Jazz Combo. 1 Credit.
Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 331. Instrumental Arranging. 2 Credits.
Arranging materials for bands. Prereq: MUSC 231.

MUSC 332. Survey of Choral Literature. 2 Credits.
A study of choral literature from Renaissance through the 21st century. Prereq: MUSC 340.

MUSC 340. Music History I. 3 Credits.
Study of the history of music from the Greek period through the Baroque. Prereq: MUSC 103.

MUSC 341. Music History II. 3 Credits.
Study of the history of music from the Classical period through the 20th century. Prereq: MUSC 340.

MUSC 344. Wind Band Literature. 2 Credits.
A survey of suitable literature for the wind band, covering the repertoire considered basic to the wind band as well as literature of quality for a variety of levels of difficulty.

MUSC 346. Survey/Vocal Literature. 2 Credits.
An overview of vocal literature from 1600 to present. Representative works will include literature from the Western tradition.

MUSC 349. Vocal Methods & Pedagogy I. 2 Credits.
Instruction in vocal pedagogy and methods for music majors.

MUSC 350. Vocal Methods & Pedagogy II. 2 Credits.
Advanced instruction in vocal pedagogy and methods for music education majors. Prereq: MUSC 349.

MUSC 351. Instrumental Conducting & Literature. 2 Credits.
Fundamentals and techniques of conducting instrumental ensembles with practical application through the study of instrumental literature.

MUSC 352. Choral Conducting & Literature. 2 Credits.
Fundamentals and techniques of conducting choral ensembles with practical application through the study of choral literature. Prereq: MUSC 103 and MUSC 250.

MUSC 353. Woodwind Methods I. 2 Credits.
Class instruction in woodwind instruments for vocal and instrumental music education majors. Emphasis on pedagogical principles, applied competency of fundamentals, and literature.

MUSC 354. Woodwind Methods II. 2 Credits.
Class instruction in woodwind instruments for instrumental music education majors. Emphasis on advanced pedagogical principles, applied competency of fundamentals and in-depth coverage of literature.

MUSC 355. Brass Methods. 2 Credits.
Class instruction in brass instruments for vocal and instrumental music education majors. Emphasis on pedagogical principles, applied competency of fundamentals, and literature.

MUSC 357. Marching Band Methods & Techniques. 1 Credit.
This course is intended to assist in developing the skill and knowledge essential for the successful administration and implementation of a sports band (marching and pep bands) program within the public school context.

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.

MUSC 359. Percussion Methods. 2 Credits.
Class instruction in percussion instruments for music education majors. Emphasis on pedagogical principles, applied competency, and literature.

MUSC 364. Jazz Improvisation. 2 Credits.
Basic concepts necessary to play and teach the fundamentals of jazz improvisation. May be repeated.

MUSC 365. Applied Piano. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 366. Applied Composition. 1 Credit.
Individual lessons in composition for a variety of musical media. May be repeated twice. Prereq: MUSC 231.

MUSC 367. Applied Voice. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 368. Applied Wind Instruments. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 369. Applied Percussion Instruments. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 370. Applied Upper Strings. 1 Credit.
Individual lessons for upper strings. May be repeated.

MUSC 371. Applied Lower Strings. 1 Credit.
Individual lessons for lower strings. May be repeated.

MUSC 372. Applied Guitar. 1 Credit.
Individual lessons for guitar. May be repeated.

MUSC 373. Supplementary Applied Study. 2-3 Credits.
For music performance majors. Typical registration should be for two credits; add one credit for supplementary pedagogy study. May be repeated.

MUSC 379. Study Tour Abroad. 1-6 Credits.

MUSC 380. Recital. 1 Credit.
Preparation and presentation of a half recital in instrumental, keyboard, or vocal performance. May be repeated.

MUSC 384. Composition I. 1 Credit.
This course will serve as an introduction to compositional techniques. Group and private instruction will be given during the semester. Prereq: MUSC 231.

MUSC 385. Music Entrepreneurship. 3 Credits.
Students will learn and display entrepreneurial skills through class work, guest lectures, and project-based activities and assignments in technology, business, writing, promotion, networking, and other music professional studies.

MUSC 391. Seminar. 1-3 Credits.

MUSC 392. Study Abroad. 1-15 Credits.

MUSC 394. Individual Study. 1-5 Credits.

MUSC 399. Special Topics. 1-5 Credits.

MUSC 411. Form and Analysis. 3 Credits.
Study of the types of tonal relationships which create musical works of art. Examination of small forms such as motive and phrase, and progressing to large forms such as fugue, variation, and sonata. Prereq: MUSC 231. {Also offered for graduate credit - see MUSC 611.}.

MUSC 423. Piano Pedagogy I. 2 Credits.
Methods and materials for teaching beginning and early-grade piano students. Prereq: Music majors or minors. {Also offered for graduate credit - see MUSC 623}.

MUSC 424. Piano Pedagogy II. 2 Credits.
Methods and materials for teaching intermediate and advance-level piano students. Prereq: Music majors or minors. {Also offered for graduate credit - see MUSC 624.}.

MUSC 430. Counterpoint. 3 Credits.
Study of contrapuntal techniques of the Renaissance and Baroque periods through analysis and composition exercises. Prereq: MUSC 231. {Also offered for graduate credit - see MUSC 630.}.

MUSC 431. Contemporary Harmonic Techniques. 3 Credits.
Study of harmonic and contrapuntal techniques of contemporary composers, with exercises in writing in the various styles. Prereq: MUSC 231. {Also offered for graduate credit - see MUSC 631.}.

MUSC 441. Symphonic Literature. 2 Credits.
Survey of the history of symphonic literature with emphasis on selected works. Prereq: Permission of instructor. {Also offered for graduate credit - see MUSC 641.}.

MUSC 442. Opera Literature. 2 Credits.
Survey of the history of opera with emphasis on selected works. Prereq: MUSC 340 and MUSC 341 or consent of instructor. {Also offered for graduate credit - see MUSC 642.}.

MUSC 443. Keyboard Literature. 3 Credits.
Survey of keyboard styles, instrumental development, and literature (excluding organ) from the early 14th century through the 21st century, with special emphasis on works from 1775-1925. Prereq: Permission of instructor. May be repeated. {Also offered for graduate credit - see MUSC 643.}.

MUSC 465. Applied Piano. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 466. Applied Composition. 1 Credit.
Individual lessons in composition for a variety of musical media. May be repeated. Prereq: MUSC 366.

MUSC 467. Applied Voice. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 468. Applied Wind Instruments. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 469. Applied Percussion Instruments. 1 Credit.
Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 470. Applied Upper Strings. 1 Credit.
Individual lessons for upper strings. May be repeated.

MUSC 471. Applied Lower Strings. 1 Credit.
Individual lessons for lower strings. May be repeated.

MUSC 472. Applied Guitar. 1 Credit.
Individual lessons for guitar. May be repeated.

MUSC 473. Supplementary Applied Study. 3-4 Credits.
For music performance majors. Typical registration should be for three credits; add one credit for supplementary pedagogy study. May be repeated.

MUSC 480. Recital. 1 Credit.
Capstone for performance majors. May be repeated.

MUSC 481. Instrumental Music Methods. 2 Credits.
Specialized methods and classroom practices dealing with teaching instrumental music at the secondary level.

MUSC 482. Choral Music Methods. 2 Credits.
Specialized methods and classroom practices dealing with teaching choral music at the secondary level.

MUSC 483. Elementary Music Methods. 2 Credits.
Specialized methods and classroom practices dealing with teaching elementary music.

MUSC 484. Composition II. 1 Credit.
This course will continue study of compositional techniques and will require finished compositions for performances. Group and private instruction will be given during the semester. Prereq: MUSC 231 and MUSC 384.

MUSC 491. Seminar. 1-5 Credits.

MUSC 492. Study Abroad. 1-15 Credits.

MUSC 494. Individual Study. 1-5 Credits.

MUSC 496. Field Experience. 1-15 Credits.

MUSC 499. Special Topics. 1-5 Credits.

MUSC 611. Form and Analysis. 3 Credits.
Study of the types of tonal relationships which create musical works of art. Examination of small forms such as motive and phrase, and progressing to large forms such as fugue, variation, and sonata. {Also offered for undergraduate credit - see MUSC 411.}.

MUSC 623. Piano Pedagogy I. 2 Credits.
Methods and materials for teaching beginning and early-grade piano students. Prereq: Music majors or minors. {Also offered for undergraduate credit - see MUSC 423.}.

MUSC 624. Piano Pedagogy II. 2 Credits.
Methods and materials for teaching intermediate and advance-level piano students. Prereq: Music majors or minors. {Also offered for undergraduate credit - see MUSC 424.}.

MUSC 630. Counterpoint. 3 Credits.
Study of contrapuntal techniques of the Renaissance and Baroque periods through analysis and composition exercises. {Also offered for undergraduate credit - see MUSC 430.}.

MUSC 631. Contemporary Harmonic Techniques. 3 Credits.
Study of harmonic and contrapuntal techniques of contemporary composers, with exercises in writing in the various styles. {Also offered for undergraduate credit - see MUSC 431.}.

MUSC 641. Symphonic Literature. 2 Credits.
Survey of the history of symphonic literature with emphasis on selected works. Prereq: Permission of instructor. {Also offered for undergraduate credit - see MUSC 441.}.

MUSC 642. Opera Literature. 2 Credits.
Survey of the history of opera with emphasis on selected works. Prereq: consent of instructor. {Also offered for undergraduate credit - see MUSC 442.}.

MUSC 643. Keyboard Literature. 3 Credits.
Survey of keyboard styles, instrumental development, and literature (excluding organ) from the early 14th century through the 21st century, with special emphasis on works from 1775-1925. May be repeated. Prereq: Permission of instructor. {Also offered for undergraduate credit - see MUSC 443.}.

MUSC 692. Study Abroad. 1-15 Credits.

MUSC 701. Psychology Of Music. 3 Credits.
Study of acoustics, the anatomy and physiology of hearing, and how the listener perceives music and sound.

MUSC 702. Graduate Theory Survey. 3 Credits.
This course is structured as a theory review course for graduate students in music. It will enable students to be able to do advanced course work in analytical studies and other technical graduate courses.

MUSC 703. Foundations of Music Education. 3 Credits.
This course is designed to provide a comprehensive view of the basic foundations inherent in the study of music education at the graduate level, with the emphasis on the development of a personal philosophical perspective that accounts for historical, philosophical, practical and sociological perspectives. Prereq: admission to the Master of Music program.

MUSC 704. Graduate Music History Survey. 3 Credits.
Reading, discussion and listening assignments covering music from the Medieval period through the 21st Century.

MUSC 705. Graduate Diction Survey I. 2 Credits.
A survey of diction training in English and Italian.

MUSC 706. Graduate Diction Survey II. 2 Credits.
A survey of diction training in German and French.

MUSC 709. Graduate Ensemble. 1 Credit.
Ensemble registration for graduate students. Study and performance of major works of each ensemble. May be repeated.

MUSC 713. Advanced Choral Music Methods. 3 Credits.
Advanced study of current choral music methods, materials and assessment strategies. The course will focus on implementation of teaching strategies into choral music classrooms to increase student learning and understanding. Additional information and resources will be studied and used to develop effective secondary music curriculum guidelines. Prereq: admission to graduate studies in music.

MUSC 714. Advanced Elementary Music Methods. 3 Credits.
Advanced study of current elementary music methodologies and the implementation of teaching strategies into elementary music classrooms. Additional information and resources will be studied and used to develop effective elementary music curriculum guidelines. Prereq: admission to the Master of Music in Music Education program.

MUSC 715. History of Choral Literature. 3 Credits.
A survey of the history of choral literature from the Renaissance to the present, with special emphasis on representative compositions in both large and small forms.

MUSC 721. Advanced Vocal Pedagogy. 3 Credits.
In-depth study of the physical and physiological considerations of vocal technique with application to specific voices and suitable repertoire. May be repeated.

MUSC 722. Applied Instrumental Pedagogy. 1-3 Credits.
Advanced study of the physical and physiological considerations of instrumental technique with application to specific instruments and suitable repertoire. May be repeated.

MUSC 723. Advanced Piano Pedagogy. 3 Credits.
Solutions to common pedagogical issues encountered in teaching standard repertoire to advanced-level piano students. May be taught individually. Prereq: MUSC 423 or MUSC 623 and MUSC 424 or MUSC 624.

MUSC 724. Topics in Piano Pedagogy. 1-3 Credits.
In-depth study of a specific area of piano pedagogy based on the needs and interests of the student. May be taught individually. Prereq: MUSC 723. May be repeated for credit.

MUSC 731. Applied Study. 1-4 Credits.
Private applied music study (instrumental, keyboard, vocal, conducting). Course credit determined by program and recommendation of instructor. May be repeated.

MUSC 733. Choral Studies and Pedagogy. 2 Credits.
Topics in advanced choral pedagogy, historical performance practice, graduate level applied conducting and other choral studies will be explored. This course may be repeated once by MM students and up to 3 times by DMA choral conducting students. Prereq: admission to the MM or DMA in choral conducting.

MUSC 734. Analytical Techniques. 3 Credits.
Analysis of music of all periods, using a variety of techniques. Music to be analyzed will vary with each offering; may be repeated with permission of instructor.

MUSC 735. Classroom Pedagogy. 3 Credits.
Organization, goals, and procedures for teaching face-to-face academic music classes. Topics include: course design and preparation, choice and sequencing of topics, pacing of courses, choosing materials, assessment strategies, teaching technology, and educational philosophies. This course is designed to help musicians develop classroom skills to better prepare performers and conductors for teaching face-to-face academic music classes.

MUSC 736. Music Theory Pedagogy. 3 Credits.
Organization, goals, and procedures for teaching music theory and ear training to undergraduates. 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.

MUSC 740. Medieval/Renaissance Music History. 3 Credits.
In-depth historical study of Medieval and Renaissance musical styles and genres through critical listening, discussions, and student and instructor presentations.

MUSC 741. Baroque Music History. 3 Credits.
In-depth historical study of Baroque musical styles and genres through critical listening, discussions, and student and instructor presentations.

MUSC 742. Classical Music History. 3 Credits.
In-depth historical study of Classical musical styles and genres through critical listening, discussions, and student and instructor presentations.

MUSC 743. Romantic Music History. 3 Credits.
In-depth historical study of Romantic musical styles and genres through critical listening, discussions, and student and instructor presentations.

MUSC 744. 20th Century Music History. 3 Credits.
In-depth study of the 20th century musical language and compositional values and goals through critical listening, score analysis, discussions, and student and instructor presentations.

MUSC 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.

MUSC 748. Music Bibliography/Research Methods. 2 Credits.
Introduction to music reference works, general music bibliography, and research methods.

MUSC 750. Studies in Collaborative Piano. 2 Credits.
A comprehensive exposure to the business as well as professional and musical aspects of a collaborative piano career. May be repeated for credit.

MUSC 758. Jazz Methods and Pedagogy in Music Education. 3 Credits.
Exploration of the historical and creative components of jazz; methodologies for beginning implementation of jazz into the music classroom; and beginning to advanced techniques for performance groups will be identified.

MUSC 760. Medieval/Renaissance Choral Literature. 3 Credits.
A study of choral literature of the Medieval and Renaissance periods, including major composers, genres, forms, and compositional styles.

MUSC 761. Baroque Choral Literature. 3 Credits.
A study of choral literature of the Baroque period, including major composers, genres, forms, and compositional styles.

MUSC 762. Classical/Romantic Choral Literature. 3 Credits.
A study of choral literature of the Classical and Romantic periods, including major composers, genres, forms, and compositional styles.

MUSC 763. Contemporary Choral Literature. 3 Credits.
A study of choral literature of the 20th and 21st centuries, including major composers, genres, forms and compositional styles.

MUSC 764. Applied Instrumental Literature. 1-3 Credits.
Advanced study of historically significant repertoire for the student's applied instrument. Repertoire will include, but not be limited to, solo and chamber works, as well as orchestral excerpts. May be repeated.

MUSC 765. Band Literature:History and Development. 3 Credits.
Historical survey of instrumental literature for wind band, covering repertoire from the Renaissance to the present.

MUSC 766. Band Literature:Chamber Music,Other Genres. 3 Credits.
Survey of instrumental literature for wind band, covering music for young bands, wind band and voice, wind band and solo instruments, chamber music, and other genres.

MUSC 767. Vocal Literature I-Baroque/Classical. 3 Credits.
Performance and research-based study of the vocal literature of the Baroque and Classical eras, including national trends and performance practice.

MUSC 768. Vocal Literature II-Romantic. 3 Credits.
Performance and research-based study of the vocal literature of the Romantic era (1800-1915), including national trends and performance practice.

MUSC 769. Vocal Literature III-20Th Century/Contemporary. 3 Credits.
Performance and research-based study of the vocal literature from 1915 to present, including national trends and performance practice.

MUSC 770. Topics in Keyboard Literature. 1-3 Credits.
In-depth study of a specific area of keyboard literature based on the needs and interests of the student. May be taught individually. May be repeated for credit.

MUSC 771. Orff Schulwerk Level I. 3 Credits.
An introduction to the teaching philosophy, techniques and classroom application of the basic Orff methodology. Students participate in recorder study and movement skills each day while studying the elements of music including improvisation.

MUSC 772. Orff Schulwerk Level II. 3 Credits.
An in-depth study of the teaching philosophy, technique and classroom application of the Orff-Schulwerk methodology. Students further develop their knowledge of classical compositions, recorder study, orchestration techniques and movement skills each day while studying the elements of music including improvisation. Prereq: MUSC 771.

MUSC 773. Orff Schulwerk Level III. 3 Credits.
Pedagogical study for classroom integration of the teaching philosophy, technique and classroom application of the Orff-Schulwerk methodology. Students further develop their knowledge of classical forms, modes, compositions, recorder study, orchestration techniques and movement skills each day while studying the elements of music including improvisation. May be repeated. Prereq: MUSC 771, MUSC 772.

MUSC 780. Recital. 2-4 Credits.
Preparation and presentation of a professional full-length recital in instrument, keyboard, vocal, or conducting performance, with accompanying document. May be repeated for credit.

MUSC 789. D.M.A. Thesis. 1-4 Credits.
Preparation of a capstone written document for the Doctor of Musical Arts degree. At least three registrations required for the Music Education track. At least one registration required for the Performance and Conducting tracks. Restricted to Doctor of Musical Arts program students only.

MUSC 790. Graduate Seminar. 1-5 Credits.

MUSC 791. Temporary/Trial Topics. 1-5 Credits.

MUSC 793. Individual Study/Tutorial. 1-5 Credits.

MUSC 794. Practicum. 1-8 Credits.

MUSC 796. Special Topics. 1-5 Credits.

Natural Resources Management (NRM)

NRM 150. Natural Resource Management Orientation. 1 Credit.
Introduction to natural resources management issues, concepts, and careers.

NRM 199. Special Topics. 1-5 Credits.

NRM 225. Natural Resources & Agrosystems. 3 Credits.
Introduction to scientific theories and their relation to natural resources and agriculture. Influence of these theories on current perspectives toward the environment. 3 lectures. Cross-listed with RNG 225.

NRM 264. Natural Resource Management Systems. 3 Credits.
General principles of natural resource management, including soil and water conservation, soil and wind erosion, use of tillage and vegetation for conservation, drainage, irrigation, and soil and water quality. 3 lectures. Prereq: MATH 103, MATH 104 or MATH 107. Cross-listed with ASM 264 and SOIL 264.

NRM 291. Seminar. 1-3 Credits.

NRM 322. Environmental Law and Policy. 3 Credits.
This course explores selected environmental laws with discussions of federal, state, and local laws; management of natural resources via regulatory policies; and the legal system including levels of government, types of law, and mechanisms for regulating externalities. Prereq: Junior standing.

NRM 379. Study Tour Abroad. 1-6 Credits.

NRM 391. Seminar. 1-3 Credits.

NRM 394. Individual Study. 1-5 Credits.

NRM 397. Fe/Coop Ed/Internship. 1-4 Credits.

NRM 401. Urban-Ecosystem Management. 3 Credits.
An interdisciplinary management survey examining the urban/rural interface and environmental and social factors driving the process of urbanization as a sustainable ecosystem. {Also offered for graduate credit - see NRM 601.}.

NRM 402. River and Stream Resource Management. 3 Credits.
The structure and function of river and stream ecosystems: biotic and abiotic functioning, stream and river ecological theories, management and monitoring practices. {Also offered for graduate credit - see NRM 602.}.

NRM 420. Sustainable Scenarios in Natural Resources Management. 3 Credits.
An interdisciplinary course to investigate the key competencies needed for sustainable social-ecological systems and how sustainable scenarios can be built for the future management of natural resources. {Also offered for graduate credit - see NRM 620.}.

NRM 421. Environmental Outreach Methods. 3 Credits.
Introduction to philosophies, theories, and methods common to environmental education and outreach. {Also offered for graduate credit - see NRM 621.}.

NRM 431. National Environmental Policy Act & Environmental Impact Assessment. 3 Credits.
The interaction and effects of the National Environmental Policy Act (NEPA) with national environmental policy; implementation of the NEPA; public opinion on the state of the environment.; introduction to EIS (Environmental Impact Statements). {Also offered for graduate credit - see NRM 631.}.

NRM 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. S 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 462. Natural Resource and Rangeland Planning. 3 Credits.
Capstone experience for School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Prereq: at least senior standing and must be a Natural Resources Management, Range Science or Soil Science major. Cross-listed with RNG and SOIL. {Also offered for graduate credit - see NRM 662.}.

NRM 491. Seminar. 1-5 Credits.

NRM 494. Individual Study. 1-5 Credits.

NRM 496. Field Experience. 1-15 Credits.

NRM 499. Special Topics. 1-5 Credits.

NRM 601. Urban-Ecosystem Management. 3 Credits.
An interdisciplinary management survey examining the urban/rural interface and environmental and social factors driving the process of urbanization as a sustainable ecosystem. {Also offered for undergraduate credit - see NRM 401.}.

NRM 602. River and Stream Resource Management. 3 Credits.
The structure and function of river and stream ecosystems: biotic and abiotic functioning, stream and river ecological theories, management and monitoring practices. {Also offered for undergraduate credit - see NRM 402.}.

NRM 620. Sustainable Scenarios in Natural Resources Management. 3 Credits.
An interdisciplinary course to investigate the key competencies needed for sustainable social-ecological systems and how sustainable scenarios can be built for the future management of natural resources. {Also offered for undergraduate credit - see NRM 420.}.

NRM 621. Environmental Outreach Methods. 3 Credits.
Introduction to philosophies, theories, and methods common to environmental education and outreach. {Also offered for undergraduate credit - see NRM 421.}.

NRM 631. National Environmental Policy Act & Environental Impact Assessment. 3 Credits.
The interaction and effects of the National Environmental Policy Act (NEPA) with national environmental policy; implementation of the NEPA; public opinion on the state of the environment; introduction to EIS (Environmental Impact Statements). {Also offered for undergraduate credit - see NRM 431.}.

NRM 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. S Cross-listed with RNG 653. {Also offered for undergraduate credit - see NRM 453.}.

NRM 654. Wetland Resource Management. 3 Credits.
Principles of wetland systems, wetland management, wetland functions, wetland assessment, and wetland improvement. {Also offered for undergraduate credit - see NRM 454.}.

NRM 662. Natural Resource and Rangeland Planning. 3 Credits.
Capstone experience for School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Cross-listed with RNG and SOIL. {Also offered for undergraduate credit - see NRM 462.}.

NRM 690. Graduate Seminar. 1-3 Credits.

NRM 695. Field Experience. 1-15 Credits.

NRM 696. Special Topics. 1-5 Credits.

NRM 701. Terrestrial Resources Management. 3 Credits.
Management and ecology of heterogeneous landscapes where ecosystem processes and human activities interact as dynamic components. Prereq: BOT 660 and BOT 754.

NRM 702. Natural Resources Management Planning. 3 Credits.
Presentation of the principles, practices and key policy issues of natural resources management and planning.

NRM 720. Natural Resource Administration & Policy. 2 Credits.
A comprehensive analysis of the theory of externalities and their application to the design of natural resources policy. Prereq: ECON 681, NRM 702.

NRM 761. Current Issues in Natural Resource Management. 1 Credit.
The class will survey current issues in natural resource management. The survey will provide a way to stimulate critical thinking on those issues.

NRM 790. Graduate Seminar. 1-3 Credits.

NRM 791. Temporary/Trial Topics. 1-5 Credits.

NRM 792. Graduate Teaching Experience. 1-6 Credits.

NRM 793. Individual Study. 1-5 Credits.

NRM 794. Practicum. 1-10 Credits.

NRM 795. Field Experience. 1-15 Credits.

NRM 796. Special Topics. 1-5 Credits.

NRM 797. Master's Paper. 1-3 Credits.

NRM 798. Master's Thesis. 1-10 Credits.

NRM 892. Graduate Teaching Experience. 1-6 Credits.

NRM 895. Field Experience. 1-15 Credits.

NRM 899. Doctoral Dissertation. 1-15 Credits.

Nursing (NURS)

NURS 189. Skills for Academic Success. 1 Credit.
This course is designed to ease the transition for new students at NDSU. Students will be introduced to campus and learn skills and techniques used by successful college students.

NURS 194. Individual Study. 1-5 Credits.

NURS 196. Field Experience. 1-15 Credits.

NURS 199. Special Topics. 1-5 Credits.

NURS 210. Orientation to Research and Evidence-Based Practice. 2 Credits.
This course will introduce quantitative and qualitative types of research and various types of evidence used to support nursing practice. Techniques for searching databases will be integrated and the research process will be introduced. Prereq: admission to the professional nursing program.

NURS 250. Health Promotion. 2 Credits.
Introduction to community as client and setting for nursing practice. Focus on theory and methods of health promotion and teaching-learning. Introduction to providing culturally sensitive care. Prereq: Admission to program.

NURS 251. Skills and Concepts for Nursing. 2 Credits.
Introduction to the nursing process, basic nursing skills and clinical decision-making. Prereq: NURS 250 and admission to program.

NURS 252. Gerontologic Nursing. 2 Credits.
This course focuses on health, the deviations of health, and the nursing care of the geriatric population. Prereq: NURS 250 and admission to program.

NURS 289. Transition from Associate LPN to BSN. 2 Credits.
The course is designed to assist returning students in the transition back to school. The course will examine the role of the RN and provide an in-depth review of the nursing process.

NURS 291. Seminar. 1-3 Credits.

NURS 292. Study Abroad. 1-15 Credits.

NURS 294. Individual Study. 1-5 Credits.

NURS 299. Special Topics. 1-5 Credits.

NURS 300. Pharmacology for Nursing. 3 Credits.
Core drug knowledge is presented with major drug classifications emphasized using the prototype method. Emphasis is given to the nursing role in developing a comprehensive approach to the clinical application of drug therapy through the use of the nursing process. Prereq: NURS 252 and NURS 360. Co-req: NURS 342.

NURS 326. Immersion I. 1 Credit.
Introduction to the RN to BSN online program expectations as well as support services available to each student, portfolio introduction, and team building. This course is a hybrid course. The class will meet for 1.5 days at the NDSU Fargo site and additional course work will be completed individually by the student online. Prereq: Licensed as a Registered Nurse and admitted to the RN to BSN Track.

NURS 336. Transcultural Nursing Care. 3 Credits.
Nursing 336 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. Prereq: NURS 326, NURS 356 and students must be accepted to the RN to BSN track in Nursing.

NURS 341. Foundations of Clinical Nursing. 3 Credits.
This course emphasizes the physiologic, psychologic, and pathophysiologic concepts that provide the foundation for professional nursing care. Prereq: second year level nursing courses (NURS 210, NURS 250, NURS 251, NURS 252 and NURS 360) and admission to program.

NURS 342. Adult Health Nursing I. 5 Credits.
This course emphasizes the etiology, pathephysiology, and the nursing care of adult clients experiencing common disorders of body systems. Prereq: second year level nursing courses (NURS 210, NURS 250, NURS 251, NURS 252 and NURS 360) and admission to program.

NURS 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: NURS 326, NURS 336, NURS 356 and acceptance into the RN to BSN track in Nursing.

NURS 352. Family Nursing I. 4 Credits.
This course focuses on nursing care and health promotion for the childbearing family, and includes identification and care of high-risk clients. Prereq: NURS 300, NURS 341 and NURS 342.

NURS 356. The Essence of Nursing. 3 Credits.
This course will explore the current health care environment with special emphasis on patient-centered care, ethics, professionalism and therapeutic communication. This course is offered completely online. The duration of the course is 8 weeks. Co-req: NURS 326.

NURS 360. Health Assessment. 4 Credits.
Focuses on health assessment and health promotion of individual clients through utilization of the nursing process and basic nursing concepts. Prereq: Admission to program.

NURS 362. Family Nursing II. 4 Credits.
Focuses on nursing care of the child and family as client. Includes infancy through adolescence, hospitalized and within the community, acutely ill and chronically ill; common stressors throughout the growing years; strategies for health promotion. Prereq: NURS 300 or PHRM 300, NURS 341 and NURS 342.

NURS 366. Quality and Safety in Nursing. 3 Credits.
This course focuses on the nurse's role in providing safe, quality health care in health systems. Prereq: NURS 386, NURS 388 and students must be accepted into the RN to BSN program.

NURS 372. Integrated Family Nursing. 3 Credits.
Provides the student opportunity to integrate prior learning about pediatric and obstetrical care with an increased knowledge of family dynamics and cultural influences. Prereq: Licensure as practical nurse, admission to program.

NURS 374. Expanded Family Nursing II. 2 Credits.
Provides the student an opportunity to integrate prior learning and knowledge about pediatric nursing care with an increased emphasis on growth and development, family dynamics, health promotion, and cultural influences. Prereq: NURS 360. Co-req: NURS 372.

NURS 379. Study Tour Abroad. 1-6 Credits.

NURS 382. Clinical Applications. 1 Credit.
This course provides nursing practice experiences to enhance problem solving, critical thinking, and communication skills. Prereq: NURS 300, NURS 341, NURS 342. Co-req: NURS 352.

NURS 386. Chronicity Throughout the Lifespan I. 3 Credits.
This course will examine the impact of chronic health conditions on the client, the family, society and the health care system. Prereq: NURS 326, NURS 336, NURS 346 and NURS 356.

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. Prereq: NURS 386.

NURS 391. Seminar. 1-3 Credits.

NURS 392. Study Abroad. 1-15 Credits.

NURS 394. Individual Study. 1-5 Credits.

NURS 397. Fe/Coop Ed/Internship. 1-4 Credits.

NURS 399. Special Topics. 1-5 Credits.

NURS 402. Mental Health Nursing. 4 Credits.
Synthesis and application of nursing and psychiatric-mental health concepts to promote the wellness of individuals and groups. Prereq: NURS 300 or PHRM 300, NURS 341 and NURS 342.

NURS 403. Adult Health Nursing II. 5 Credits.
Focuses on the etiology, pathophysiology, and nursing care of adult clients experiencing selected clinical problems originating from respiratory and cardiovascular systems, neuro trauma, and multisystem problems. Care of families of clients is also emphasized. Prereq: NURS 300 or PHRM 300, NURS 341 and NURS 342.

NURS 404. Adult Health III. 4 Credits.
The etiology, pathophysiologic mechanisms, and organization of nursing care of adult clients experiencing selected complex stressors. Prereq: NURS 342, NURS 403 and admission to program.

NURS 405. Psychsocial Nursing. 2 Credits.
In this course the student will synthesize prior learning with further exploration of psychosocial nursing. Prereq: Licensure as practical nurse, admission to program.

NURS 406. Community & Public Health Nursing. 4 Credits.
The focus of this course will include the core functions of public health, partnering with the community, primary prevention, creation of healthy environments, service to those at risk, stewardship of resources, and multidisciplinary collaboration. Prereq: second and third year level nursing courses (CHP 400, NURS 250, NURS 251, NURS 252, NURS 341, NURS 342, NURS 352, NURS 360, NURS 362, NURS 402, NURS 403 and NURS 460) and admission to program.

NURS 407. Adult Health: Complex Problems. 3 Credits.
Designed for persons with a nursing license, this course focuses on the etiology, pathophysiologic mechanisms, and organization of nursing care for adult clients experiencing selected complex stressors. Prereq: NURS 360.

NURS 407L. Expanded Clinical Practice for the LPN-BSN. 3 Credits.
This course focuses on the etiology, pathophysiologic mechanisms, and mental health aspects of nursing care for patients in a variety of settings including medical/surgical, critical care, labor and delivery and simulation. Prereq: NURS 372 and NURS 407.

NURS 410. Research and Redesign. 2 Credits.
A study of the research process. Emphasis is placed on critically evaluating nursing research and utilizing research for evidence-based practice. Discussion about quality improvement principles prepares the nurse to participate in redesign. Prereq: NURS 210, NURS 342, NURS 360 and admission to the professional nursing program.

NURS 420. Evidence-Based Practice and Research in Nursing. 3 Credits.
This course will introduce the research process with the emphasis on developing skills as a consumer of research. Students will gain knowledge in the areas of research methods, critical appraisal of research, and the concepts of evidence-based practice. Prereq: NURS 289 or NURS 356.

NURS 422. Contemporary Issues in Mental Health Nursing. 2 Credits.
This elective course is designed to increase awareness of contemporary issues in mental health nursing, with emphasis on psychiatric disorders in the general hospital, interpersonal violence, addiction, and emotional intelligence. Prereq: admission to the professional Nursing program.

NURS 426. NDSU RN to BSN Immersion III. 1 Credit.
Face-to-face immersion with introduction to the semester's courses, guest speakers to address nursing roles in the community, portfolio update, and team building projects. Prereq: NURS 366, CHP 400 and students must be accepted to the RN to BSN Nursing track.

NURS 446. Population Focused Nursing Care. 3 Credits.
The focus of this course will include the core functions of public health, partnering with the community, primary and secondary prevention, creation of healthy environments, service to those at risk, stewardship of resources, and multidisciplinary collaboration. Prereq: NURS 366, CHP 400. Co-req: NURS 446L.

NURS 446L. Population Focused Nursing Care - Clinical. 2 Credits.
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: NURS 366, CHP 400. Co-req: NURS 446.

NURS 450. Nursing Synthesis/Practicum. 4 Credits.
NURS 450 is the capstone course in the nursing major and provides a framework for the student's transition to the entry-level professional role. 1 credit didactic, 3 credits clinical. Prereq: CHP 400, NURS 250, NURS 251, NURS 252, NURS 341, NURS 342, NURS 352, NURS 360, NURS 362, NURS 402, NURS 403 and NURS 460 and admission to program. Co-req: NURS 404, NURS 406.

NURS 456. RN to BSN Immersion IV. 1 Credit.
Face-to-face immersion for introduction to the semester's courses. Guest speakers to introduce advancing to master's or doctorate degrees, portfolio update, and leadership workshop. Prereq: NURS 366.

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: CHP 400.

NURS 462. Nurses as Leaders. 3 Credits.
This online course focuses on the study of leadership and management concepts and issues in professional nursing. Prereq: NURS 456.

NURS 462L. Nursing Leadership Practicum. 1 Credit.
Students will develop a capstone project to improve an aspect of health care, utilizing knowledge from previous courses, including research, and evidence-based practice, leadership, quality and safety. Prereq: NURS 456.

NURS 478. BSN Capstone. 2 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: NURS 456.

NURS 479. Study Tour Abroad. 1-6 Credits.

NURS 491. Seminar. 1-5 Credits.

NURS 492. Study Abroad. 1-15 Credits.

NURS 494. Individual Study. 1-5 Credits.

NURS 496. Field Experience. 1-15 Credits.

NURS 499. Special Topics. 1-5 Credits.

NURS 623. The Nurse As Educator. 4 Credits.
Major study in selected area with an emphasis in research. Prereq: NURS 632.

NURS 624. Advanced Transcultural Nursing. 3 Credits.
Program planning to promote the health of diverse populations will be based on epidemiological data, theory and research. Students will select a specific age group or health problem within a population/cultural group to study in depth. Prereq: NURS 608.

NURS 640. Adult Nursing I. 3 Credits.
Evaluation and synthesis of advanced pathophysiology concepts applied to nursing and health related theories, and research related to client outcomes. Health and illness phenomena, symptom management, and nursing interventions will be reviewed. Prereq: NURS 612 and NURS 616.

NURS 641. Adult Nursing II. 3 Credits.
Continuation of Adult Nursing I. Emphasis on clinical decision-making, teaching/learning theory and formulation of researchable questions for advanced nursing practice as an adult CNS. Prereq: NURS 640.

NURS 641P. Adult Nursing Practium II. 3-6 Credits.
An extended practicum time allowing the student a chance to more fully integrate skills and knowledge learned through the graduate program. Emphasis will continue on consultation, program planning, education, health promotion, and prevention of disease/illness. Prereq: NURS 641.

NURS 690. Graduate Seminar. 1-3 Credits.

NURS 695. Field Experience. 1-15 Credits.

NURS 696. Special Topics. 1-5 Credits.

NURS 701. Theoretical Perspectives of the Discipline. 3 Credits.
The course is designed to help the student analyze, critique and apply a variety of nursing theories, models and conceptual frameworks in advanced nursing practice.

NURS 702. Ethics and Health Policy in Nursing. 2 Credits.
Analyze interactions among common clinical, organizational, societal, and policy decisions from ethical and legal perspectives. Evaluates selected theories and models of decision making and health care.

NURS 704. Nursing Research/Evidence Based Practice. 3 Credits.
Research in nursing includes an exploration of the research process and the methodologies appropriate to nursing.

NURS 706. Health Care Delivery Systems, Financing and Informatics. 3 Credits.
Analysis of health care system, financial management, use of informatics, and measurement of patient outcomes are the focus of this course. Advanced practice nurses play a leadership role while participating in system decisions including monitoring financial information, promoting quality improvement and managing and utilizing health care information.

NURS 715. Advanced Community Assessment. 3 Credits.
Epidemiologic techniques, reporting, and research will be presented. Emphasis is placed on disease prevention and control. Health problems of national and international significance will be examined and strategies for solutions and/or management will be proposed. Prereq: an inferential statistics course.

NURS 726. Evaluation and Assessment in Nursing Education. 3 Credits.
Principles of assessment, measurement, and evaluation related to nursing education are analyzed in this course. Topics relevant to evaluation and the assessment of individual learning are examined. Processes of faculty and program evaluation are examined as well as the measurement of program outcomes. Prereq: NURS 725.

NURS 728P. Nurse Educator Practicum I. 2 Credits.
Students apply principles of teaching, learning and assessment of student learning in selected learning settings under the guidance of course faculty and a preceptor. Prereq: NURS 726.

NURS 729P. Nurse Educator Practicum II. 3 Credits.
Students examine elements of the nursing program and participate in a faculty role under the supervision of course faculty and a program faculty preceptor. The focus of this practicum is participation in programmatic development, evaluation and assessment. Prereq: NURS 728P.

NURS 790. Graduate Seminar. 1-3 Credits.

NURS 791. Temporary/Trial Topics. 1-5 Credits.

NURS 793. Individual Study. 1-5 Credits.

NURS 794. Practicum. 1-8 Credits.

NURS 795. Field Experience. 1-15 Credits.

NURS 796. Special Topics. 1-5 Credits.

NURS 797. Master's Paper. 1-3 Credits.

NURS 798. Master's Thesis. 1-10 Credits.

NURS 810. Health Promotion and Disease Prevention. 2 Credits.
This course critically examines patterns of health behaviors, risk assessment, lifestyles, developmental stages, sociocultural, psychological, and spiritual contributions to well-being. Includes data-based assessment and management of preventive health services and common acute and chronic conditions.

NURS 812. Advanced Health Assessment. 3 Credits.
Performance of health histories, complete physical/psychosocial assessments, and developmental assessments of clients from across the lifespan. A laboratory component is included.

NURS 812P. Assessment Practicum. 6 Credits.
In this course the student integrates health history, physical examination and laboratory evaluations in a plan for management of client needs. Prereq: NURS 612.

NURS 814. Advanced Pathophysiology I. 2 Credits.
General pathophysiological responses to selected body systems to disease processes are presented from both biological and behavioral perspectives. Emphasis on normal cellular function, developmental changes and common physiological symptoms.

NURS 816. Advanced Pathophysiology II. 2 Credits.
Builds on the context from NURS 614 with emphasis on normal cellular function, developmental changes and common physiological symptoms. Synergistic clinical manifestations and total body-mind responses to system alterations. Prereq: NURS 614.

NURS 820. Advanced Practice Roles. 2 Credits.
Scope of practice, legal parameters of advanced practice, collaborative and interdisciplinary practice in the advanced nursing role. Prereq: NURS 601, NURS 602, NURS 606.

NURS 830. Clinical Applications. 3 Credits.
Student designs individualized study in an area of focus. Options include extension of a scholarly study, extended clinical practice, intensive study of specialized treatment modality and other appropriate foci. Prereq: NURS 634.

NURS 831. Advanced Pharmacology I. 2 Credits.
Information relative to therapeutic management guidelines for treatment of selected disease processes. Drug information by classification and basic principles of pharmacodynamic and pharmacokinetics, clinical uses, mechanisms of action, contraindications, adverse reactions, and client education implications.

NURS 832. Advanced Pharmacology II. 2 Credits.
Continuation of information relative to therapeutic management guidelines for treatment of selected disease processes. Drug information by classification and basic principles of pharmacodynamic and pharmacokinetics, clinical uses, mechanisms of action, contraindications, adverse reactions, and client education implications. Prereq: NURS 631.

NURS 833. Family Primary Care I:Assessment and Management. 3 Credits.
Clinical decision making skills are fostered in the diagnosis, management, monitoring and evaluation of common acute, emergent, and chronic health conditions. Selected case studies of clients will be examined in relation to problems, diagnoses, plans, and evaluations. Prereq: NURS 612P, NURS 616.

NURS 833P. Family Primary Care:Residency I. 6 Credits.
Student synthesizes skills acquired in previous didactic and clinical courses to provide diagnosis, treatment, and management of an increasingly varied group of clients. Prereq: NURS 633.

NURS 834. Family Primary Care II:Assessment and Management. 3 Credits.
Clinical decision making skills are fostered in the diagnosis, management, monitoring and evaluation of common acute, emergent, and chronic health conditions. Selected case studies of clients will be examined in relation to problems, diagnoses, plans, and evaluations. Prereq: NURS 733.

NURS 834P. Family Primary Care:Residency II. 6 Credits.
Student synthesizes skills acquired in previous didactic and clinical courses, in particular NURS 733P, to provide diagnosis, treatment, and management of an increasingly varied group of clients. Prereq: NURS 634, NURS 733P.

NURS 835. Family Primary Care III: Assessment and Management. 2 Credits.
Continuation of Family Primary Care I and II. Focus on health promotion, maintenance, restoration and disease prevention. Application of health-related theories, family dynamics, methods of human genetics, research protocols, ethics, cost effectiveness and legal ramifications for advanced nursing practice. Prereq: NURS 734.

NURS 835P. Practicum IV: FNP Role Integration. 4-8 Credits.
Application of skills and clinical experiences in primary care. Didactic learning is incorporated in the student's practice, supervised by a health care provider who has documented expertise in the area of specialization. History, PE, and lab will be integrated into evaluation of clients. Prereq: NURS 733P.

NURS 836P. Practicum V: FNP Role Integration. 4-8 Credits.
Application of skills and clinical experiences in primary care. Didactic learning is incorporated in the student's practice, supervised by a health care provider who has documented expertise in the area of specialization. History, PE, and lab will be integrated into evaluation of clients. Culminating in 1020 hours of clinical experience. Prereq: NURS 735P.

NURS 850P. Family Primary Care: Specialty Practicum. 2 Credits.
Students are immersed into a specialty clinical area and supervised by a healthcare provider with expertise in the specialty. Theory, research, and didactic learning are incorporated in the student's clinical experience. Prereq: NURS 834P.

NURS 890. Seminar. 1-5 Credits.

NURS 893. Individual Study/Tutorial. 1-5 Credits.

NURS 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. Study Abroad. 1-15 Credits.

PSCI 294. Individual Study. 1-5 Credits.

PSCI 299. Special Topics. 1-5 Credits.

PSCI 367. Pharmaceutical Calculations. 1 Credit.
Qualitative and quantitative principles encompassing calculations performed by pharmacists in traditional and specialized practice settings. Scope includes computations related to prescriptions and medication orders. Restricted to students in the professional Pharmacy program.

PSCI 368. Pharmaceutics I. 3 Credits.
Quantitative and theoretical principles of science applied to the design, preparation, evaluation, use, and therapeutic limitations of various pharmaceutical dosage forms. Biological and physiochemical principles that govern the absorption, distribution, metabolism, and excretion of drug dosage forms in humans. Prereq: Admission to professional program.

PSCI 369. Pharmaceutics II. 2 Credits.
Quantitative and theoretical principles of science applied to the design, preparation, evaluation, use, and therapeutic limitations of various pharmaceutical dosage forms. Biological and physiochemical principles that govern the absorption of drug dosage forms. Prereq: Admission to professional program.

PSCI 379. Study Tour Abroad. 1-6 Credits.

PSCI 391. Seminar. 1-3 Credits.

PSCI 392. Study Abroad. 1-15 Credits.

PSCI 394. Individual Study. 1-5 Credits.

PSCI 399. Special Topics. 1-5 Credits.

PSCI 400. Vaccinology Research Experience. 1 Credit.
Research-based course covering the principles and techniques involved in development, production and evaluation of vaccines. 1 three-hour laboratory. Prereq: MICR 471.

PSCI 410. Pharmaceutical Biotechnology. 2 Credits.
Current and future biotechnologies in drug discovery, design, and production. Diagnostic technologies for individualized patient therapies. Prereq: admission to PharmD program. {Also offered for graduate credit - see PSCI 610.}.

PSCI 411. Principles of Pharmacokinetics and Pharmacodynamics. 3 Credits.
Basic chemical, biochemical and pharmacological principles applied to the study of therapeutic agents; pharmacologic properties of drugs that affect their ADME and therapeutic effects. Prereq: BIOC 460, BIOC 461, CHEM 341, CHEM 342. {Also offered for graduate credit - see PSCI 611.}.

PSCI 412. Chemotherapeutic/Infectious Disease Pharmacodynamics. 3 Credits.
Pharmacologic and therapeutic properties of chemotherapeutic agents and anti-infective drugs. Prereq: PSCI 411. {Also offered for graduate credit - see PSCI 612.}.

PSCI 413. Endocrine/Respiratory/GI Pharmacodynamics. 3 Credits.
The pharmacological properties and therapeutic uses of therapeutic agents for the treatment of disorders of the endocrine and GI systems, autonomic nervous system, and anti-inflammation agents, will be covered in this course. Prereq: PHRM 340, PHRM 341, PSCI 411 all with a grade of C or higher. {Also offered for graduate credit - see PSCI 613.}.

PSCI 414. Cardiovascular Pharmacodynamics. 3 Credits.
Pharmacologic properties of drugs used in the treatment of cardiovascular disorders. Prereq: PHRM 340 and PSCI 411 both with a grade of C or higher. {Also offered for graduate credit - see PSCI 614.}.

PSCI 415. Neuropsychiatry Pharmacodynamics. 3 Credits.
Pharmacological properties of therapeutic agents used in the treatment of central nervous system disorders. Prereq: PHRM 341 and PSCI 411 both with a grade of C or higher. {Also offered for graduate credit - see PSCI 615.}.

PSCI 417. Pharmacogenomics. 2 Credits.
This course provides students with a broad perspective on the emergence of pharmacogenomics as a new field and the potential role of pharmacogenomics in future clinical therapeutics and drug design. Prereq: Admission to PharmD/graduate PSCI program. {Also offered for graduate credit - see PSCI 617.}.

PSCI 443. Toxicology. 2 Credits.
Poisons, their mode of action, detoxification, and treatment. Prereq: PSCI 412.

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. Study Abroad. 1-15 Credits.

PSCI 494. Individual Study. 1-5 Credits.

PSCI 496. Field Experience. 1-15 Credits.

PSCI 499. Special Topics. 1-5 Credits.

PSCI 545. Clinical Toxicology. 2 Credits.
Toxic potential of various poisonous substances including mechanism of toxicity, toxic doses, clinical presentation, clinical and laboratory monitoring and their specific treatment. Prereq: PSCI 411.

PSCI 590. Graduate Seminar. 1-3 Credits.

PSCI 593. Individual Study/Tutorial. 1-5 Credits.

PSCI 610. Pharmaceutical Biotechnology. 2 Credits.
Current and future biotechnologies in drug discovery, design, and production. Diagnostic technologies for individualized patient therapies. Prereq: admission to PharmD program. {Also offered for undergraduate credit - see PSCI 410.}.

PSCI 611. Principles of Pharmacokinetics and Pharmacodynamics. 3 Credits.
Basic chemical, biochemical and pharmacological principles applied to the study of therapeutic agents; pharmacologic properties of drugs that affect their ADME and therapeutic effects. {Also offered for undergraduate credit - see PSCI 411.}.

PSCI 612. Chemotherapeutic/Infectious Disease Pharmacodynamics. 3 Credits.
Pharmacologic and therapeutic properties of chemotherapeutic agents and anti-infective drugs. {Also offered for undergraduate credit - see PSCI 412.}.

PSCI 613. Endocrine/Respiratory/GI Pharmacodynamics. 3 Credits.
The pharmacological properties and therapeutic uses of therapeutic agents for the treatment of disorders of the endocrine and GI systems, autonomic nervous system, and anti-inflammation agents, will be covered in this course. {Also offered for undergraduate credit - see PSCI 413.}.

PSCI 614. Cardiovascular Pharmacodynamics. 3 Credits.
Pharmacologic properties of drugs used in the treatment of cardiovascular disorders. {Also offered for undergraduate credit - see PSCI 414.}.

PSCI 615. Neuropsychiatry Pharmacodynamics. 3 Credits.
Pharmacological properties of therapeutic agents used in the treatment of central nervous system disorders. {Also offered for undergraduate credit - see PSCI 415.}.

PSCI 617. Pharmacogenomics. 2 Credits.
This course provides students with a broad perspective on the emergence of pharmacogenomics as a new field and the potential role of pharmacogenomics in future clinical therapeutics and drug design. Prereq: Admission to PharmD/graduate PSCI program. {Also offered for undergraduate credit - see PSCI 417.}.

PSCI 670. 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 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 718. Techiques in Pharmaceutical Research. 3 Credits.
Application of modern instrumental techniques in the pharmaceutical sciences; qualitative and quantitative determination of physiologically and pharmacologically important substance.

PSCI 746. Neuropharmacology. 3 Credits.
Study of action mechanisms of drugs affecting the central and peripheral nervous systems.

PSCI 747. Cardiovascular Pharmacology. 3 Credits.
Study of action mechanisms of drugs affecting the circulatory systems, including their pathology.

PSCI 762. Advanced Biopharmaceutics. 2 Credits.
Stability and kinetic factors involved in absorption, distribution, metabolism, and excretion of drug products.

PSCI 765. Cancer Cell Biology. 2 Credits.
This course covers the principles of modern cancer cell biology, including topics on oncogenes, tumor suppressor genes, growth factors, signal transduction, cell cycle, apoptosis, angiogenesis, and mechanism of tumor metastasis.

PSCI 790. Graduate Seminar. 1-3 Credits.

PSCI 791. Temporary/Trial Topics. 1-5 Credits.

PSCI 793. Individual Study/Tutorial. 1-5 Credits.

PSCI 795. Field Experience. 1-15 Credits.

PSCI 796. Special Topics. 1-5 Credits.

PSCI 798. Master's Thesis. 1-10 Credits.

PSCI 899. Doctoral Dissertation. 1-15 Credits.

Pharmacy Practice (PHRM)

PHRM 170. Common Medicines & Diseases. 2 Credits.
Consumer-oriented introduction to drugs, common dosage forms, usage of common classes of prescription, and over-the-counter drug products. Does not count toward a pharmacy major.

PHRM 189. Skills for Academic Success. 1 Credit.
This course is designed to ease the transition for new students at NDSU. Students will be introduced to campus and learn skills and techniques used by successful college students.

PHRM 194. Individual Study. 1-5 Credits.

PHRM 196. Field Experience. 1-15 Credits.

PHRM 199. Special Topics. 1-5 Credits.

PHRM 291. Seminar. 1-3 Credits.

PHRM 292. Study Abroad. 1-15 Credits.

PHRM 294. Individual Study. 1-5 Credits.

PHRM 299. Special Topics. 1-5 Credits.

PHRM 340. Pathophysiology I. 4 Credits.
Comprehensive study of the normal and abnormal physiological processes and the mechanisms important to the understanding of pharmacology and drug therapy. Prereq: Admission to the professional program.

PHRM 341. Pathophysiology II. 3 Credits.
Normal and abnormal physiological processes and the mechanisms important to the understanding of pharmacology and drug therapy. Prereq: Admission to the PharmD program.

PHRM 350. Introduction to Pharmacy Practice. 2 Credits.
Issues related to pharmacy practice, patient medication counseling, retrieval of drug information, cultural competency, health literacy, pharmaceutical care plans, and evaluating adverse drug reactions/interactions are discussed. Prereq: Admission to the Professional Pharmacy Program.

PHRM 351L. Pharmacy Practice Laboratory I. 2 Credits.
Through hands on application, students will develop competence in pharmaceutical care, pharmacy calculations, prescription dispensing and consultation, and compounding nonsterile and sterile products. 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 355. Introductory Pharmacy Practice Experience I: Introduction to Institutional Pharmacy Practice. 3 Credits.
IPPE I is designed to be an introduction to institution based pharmacy practice. This course consists of a 3 week, 120 hour, unpaid, supervised pharmacy practice experience in an institutional pharmacy setting and required reflections. Prereq: PSCI 367, PSCI 368, PSCI 369, PSCI 410, PSCI 411, PSCI 412, PSCI 470, PHRM 340, PHRM 341, PHRM 350, PHRM 351L, PHRM 352 and MICR 470 all with a grade of C or higher. Pass/Fail grading.

PHRM 379. Study Tour Abroad. 1-6 Credits.

PHRM 391. Seminar. 1-3 Credits.

PHRM 392. Study Abroad. 1-15 Credits.

PHRM 394. Individual Study. 1-5 Credits.

PHRM 397. Fe/Coop Ed/Internship. 1-4 Credits.

PHRM 399. Special Topics. 1-5 Credits.

PHRM 400. Top Drugs I. 1 Credit.
Introduction to basic knowledge necessary for success in the professional pharmacy curriculum and in the practice of pharmacy. Prereq: PHRM 351L with a grade of C or higher.

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.
Through hands on application, students will develop competence in pharmaceutical care, pharmacy calculations, prescription dispensing and consultation, compounding nonsterile and sterile products, long term care, and self-care. Prereq: PHRM 351L with a grade of C or higher.

PHRM 455. Introductory Pharmacy Practice Experience II: Introduction to Community Pharmacy Practice. 4 Credits.
IPPE II is designed to be an introduction to community based pharmacy practice. This course consists of a 4 week, 160 hour, unpaid, supervised pharmacy practice experience in a community pharmacy setting and required reflections. Prereq: PSCI 367, PSCI 368, PSCI 369 PSCI 410, PSCI 411, PSCI 412, PSCI 470, PHRM 340, PHRM 341, PHRM 350, PHRM 351L, PHRM 352, PHRM 400, PHRM 450, PHRM 452L, PHRM 480, PHRM 565 and MICR 470. Summarized as: successful completion (Grade of "C" or better) first professional year coursework, PHRM 400, PHRM 450, PHRM 452L, and PHRM 565. Pass/Fail grading.

PHRM 462. Stress Management for Health Care Professionals. 1 Credit.
This course for health care professionals will focus on healthy coping skills and self-care techniques for stress reduction and relaxation, not only in their professional lives, but also in providing patient care. Prereq: Pharmacy or Nursing major.

PHRM 463. Current Issues in Hospital Pharmacy. 2 Credits.
This course will provide students with a working knowledge of issues and requirements faced by hospital pharmacists and the managerial techniques and practice standards utilized in meeting them. Prereq: P2 student.

PHRM 475. Pharmacy Practice Management. 3 Credits.
This course introduces students to management techniques applicable to the contemporary practice of pharmacy in community and institutional settings. Prereq: PHRM 350, PHRM 352, PHRM 452L.

PHRM 479. Study Tour Abroad. 1-6 Credits.

PHRM 480. Drug Literature Evaluation. 3 Credits.
The goals of this course are to achieve a thorough understanding of the structure of the literature and its inherent strengths and weaknesses, such that the student may evaluate scientific studies and utilize the literature to support a point of view. Prereq: Admission to professional program.

PHRM 485. Economic Outcomes Assessment and Relevant Issues. 2 Credits.
The use of pharmacoeconomic analysis and outcomes assessment as applied to health care. Prereq: PHRM 480 or Doctor of Nursing or MBA standing.

PHRM 491. Seminar. 1-5 Credits.

PHRM 492. Study Abroad. 1-15 Credits.

PHRM 494. Individual Study. 1-5 Credits.

PHRM 499. Special Topics. 1-5 Credits.

PHRM 500. Top Drugs II. 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. Neoplastic Disease. 3 Credits.
This course provides a framework for understanding the role molecular biology plays in the pathophysiology and treatment of the most prevalent neoplastic diseases. Students will apply evidence-based principles in assessing/monitoring appropriate therapy for patients with cancer. Prereq: PSCI 410, PSCI 412 both with a grade of C or higher.

PHRM 536. Neurology & Psychiatry Pharmacotherapy. 3 Credits.
The course will focus on the principles, selection and management of pharmacotherapy for the major psychiatric and neurologic diseases. Learning methods will include face-to-face lecture, in-class discussion, small group activities, and case formulations. Prereq: PSCI 415. {Also offered for graduate credit - see PHRM 636.}.

PHRM 537. Renal Disease/Fluid and Electrolytes. 3 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.

PHRM 538. PTDI: Cardiovascular and Pulmonary Diseases. 4 Credits.
Pharmacoptherapy of cardiovascular and pulmonary diseases. Study of the pathophysiology, clinical presentation, and treatment of various cardiovascular and pulmonary diseases. Prereq: PSCI 413 and PSCI 414.

PHRM 540. Public Health for Pharmacists. 3 Credits.
Pharmacy students will be introduced to public health services, health disparities, emergency preparedness, epidemiology, behavioral health, health promotion, and global health. Prereq: PHRM 352.

PHRM 545L. Pharmacotherapy Laboratory. 1 Credit.
This is a problem-based and skills-based laboratory integrating the pathophysiology, pharmacology, and therapeutic aspects of various diseases in order to prepare learners to make sound therapeutic decisions and provide clinical rationale during the pharmacist's patient care process. The class activities are designed as a team-based approach. Prereq: PHRM 450, PHRM 532, PHRM 534, PHRM 538 completed with a grade of C or higher. Co-req: PHRM 536, PHRM 537.

PHRM 546. Advanced Topics in Neuropsychiatry: Major Neurocognitive Disorders. 2 Credits.
The course will provide the most up-to-date information regarding advanced care and management of patients with select major neurocognitive disorders, previously known as dementia. In addition, reversible causes of cognitive problems will be discussed. Prereq: PHRM 341 and PHRM 536.

PHRM 551L. Pharmacy Practice Laboratory III. 2 Credits.
This course focuses on pharmaceutical care, pharmacy calculations, prescription consultation, compounding nonsterile and sterile products, and disease state management. Prereq: PHRM 452L with a grade of C or higher.

PHRM 552L. Pharmacy Practice Laboratory IV. 2 Credits.
Coursework will assist Doctor of Pharmacy candidates to develop competence in recognizing, analyzing, and resolving drug related problems; providing accurate drug information and education; promoting public health and managing a patient oriented pharmacy practice. Prereq: PHRM 551L 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 551L and PHRM 532 with a grade of C or higher.

PHRM 555. Introductory Pharmacy Practice Experience III. 1 Credit.
Introduction to patient care opportunities focused on population and public health opportunities for pharmacists. This course consists of 40 hours of supervised pharmacy practice experiences and required reflections. Prereq: PHRM 452L Coreq or Prereq: PHRM 551L.

PHRM 560. Specialty Care Topics. 2 Credits.
Immunology, vaccine-preventable diseases, indications for vaccination, and implementation and maintenance of a pharmacy-based vaccination program in addition to the pharmacist's role in home health, palliative/hospice care, peri-operative/surgical/critical care, anemia, and nutrition support. Prereq: PHRM 537, PHRM 538.

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 evidence-based medicine (EBM) and practice improvement/evaluation review techniques (PERT) in health care. Prereq: PHRM 475 and PHRM 480 both with a grade of C or higher.

PHRM 572. Pharmacy Law and Ethics. 3 Credits.
Pharmaceutical jurisprudence, including state and federal laws and ethical issues concerned with the practice of pharmacy. Prereq: PHRM 350, PHRM 352, PHRM 452L all with a grade of C or higher.

PHRM 575. Pharmacy Management. 3 Credits.
Case studies of retail and hospital pharmacy management concerns, as well as the unique consideration of retail pharmacy and institutional factors of hospital pharmacy management.

PHRM 580. Pharmacotherapy Capstone. 3 Credits.
Using clinical practice guidelines, current scientific literature, and pharmacotherapy concepts, students will evaluate integrated patient case scenarios. Prereqs: A grade of C or higher in PHRM 532, PHRM 534, PHRM 535, PHRM 536, PHRM 537 and PHRM 538.

PHRM 581. Advanced Pharmacy Practice Experience - Rotation I. 5 Credits.
Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes and values developed through the other components of the curriculum. Enrollment by departmental permission only.

PHRM 582. Advanced Pharmacy Practice Experience - Rotation II. 5 Credits.
Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes and values developed through the other components of the curriculum.

PHRM 583. Advanced Pharmacy Practice Experience - Rotation III. 5 Credits.
Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes and values developed through the other components of the curriculum.

PHRM 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 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 675. Pharmacy Management. 3 Credits.
Case studies of retail and hospital pharmacy management concerns, as well as the unique consideration of retail pharmacy and institutional factors of hospital pharmacy management.

PHRM 685. Economic Outcomes Assessment/Relevant Issues. 2 Credits.
The use of pharmacoeconomic analysis and outcomes assessment as applied to health care. Prereq: PHRM 480 or Doctor of Nursing or MBA standing.

PHRM 696. Special Topics. 1-5 Credits.

PHRM 710. Health Care Systems. 3 Credits.
In this course, students will be introduced to health professions, health care systems, financing, health promotion, and behavioral issues. Prereq: MPH students only.

PHRM 716. Social and Administrative Sciences Research. 3 Credits.
The premise of this course is to provide the student with a basic understanding of how to conduct academic and professional research in the pharmaceutical social and administrative sciences (PS&AS). Prereq: PHRM 715 and STAT 725.

PHRM 795. 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 194. Individual Study. 1-5 Credits.

PHIL 196. Field Experience. 1-15 Credits.

PHIL 199. Special Topics. 1-5 Credits.

PHIL 210. Ethics. 3 Credits.
Overview of different types of approaches to ethical dilemmas such as theistic ethics, naturalistic ethics, and situational ethics. Covers the ethical issues confronted in personal, public, and professional life.

PHIL 215. Contemporary Moral Issues. 3 Credits.
Many contemporary moral issues, such as the developed world's duties to the developing world, war, ethical technology, and gender issues are examined in light of the major ethical theories, such as Utilitarianism, Kantianism, and Relativism.

PHIL 216. Business Ethics. 3 Credits.
Many of the central moral issues of business, such as consumer rights, advertising, employee rights, and business competition, are examined in light of the major ethical theories, such as Utilitarianism, Kantianism, and Relativism.

PHIL 257. Traditional Logic. 3 Credits.
Study of the art and science of critical thinking; scientific method emphasized.

PHIL 291. Seminar. 1-5 Credits.

PHIL 292. Study Abroad. 1-15 Credits.

PHIL 294. Individual Study. 1-5 Credits.

PHIL 299. Special Topics. 1-5 Credits.

PHIL 321. Ancient Philosophy. 3 Credits.
Greco-Roman philosophy from pre-Socratics to the Stoics and Epicureans.

PHIL 322. Medieval Philosophy. 3 Credits.
Western philosophy from St. Augustine to Ockham and Marsilius of Padua.

PHIL 323. Modern Philosophy. 3 Credits.
Western philosophy from Descartes to Kant.

PHIL 324. Contemporary Philosophy. 3 Credits.
An overview of the main philosophical thinkers and positions in the contemporary period.

PHIL 356. Ancient Philosophy. 3 Credits.
An overview of the main philosophical thinkers and positions in the ancient world. Among the key thinkers addressed are Socrates, Plato, and Aristotle.

PHIL 357. Augustine. 3 Credits.
Study of Augustine's thought, especially philosophical, in its historical context.

PHIL 359. Thomas Aquinas. 3 Credits.
The philosophy of Thomas Aquinas as a perennial philosophy. Prereq: Junior standing.

PHIL 369. Philosophy of Religion. 3 Credits.
An introduction of the philosophical analysis of the core concepts of religion, focusing on the possible existence and nature of God, understood philosophically as the maximally perfect being.

PHIL 370. Social and Political Philosophy. 3 Credits.
An overview of the key social and political philosophical theories in the western tradition.

PHIL 379. Study Tour Abroad. 1-6 Credits.

PHIL 391. Seminar. 1-3 Credits.

PHIL 392. Study Abroad. 1-15 Credits.

PHIL 394. Individual Study. 1-5 Credits.

PHIL 399. Special Topics. 1-5 Credits.

PHIL 425. Environmental Ethics. 3 Credits.
An investigation of ethics and the environment, including but not limited to ecofeminism, economics as environmental policy, and deep ecology. Prereq: PHIL 210 or PHIL 215 or PHIL 216. {Also offered for graduate credit - see PHIL 625.}.

PHIL 450. Metaphysics. 3 Credits.
Historical and systematic philosophical study of fundamental principles of reality, especially as concerns the human person.

PHIL 451. Epistemology. 3 Credits.
A detailed study of the philosophical analysis of the nature of knowledge and associated concepts. Prereq: PHIL 257.

PHIL 476. History of Philosophy: Modern Period. 3 Credits.
An overview of the main philosophical thinkers and positions in the modern period of western civilization. Among the thinkers addressed are Descartes, Leibniz, Locke, Hume, and Kant.

PHIL 486. Philosophy & Literature. 3 Credits.
Philosophical elements of selected works from Western literature, such as those of Dante, More, Milton, and Newman. Prereq: PHIL 101.

PHIL 487. Aesthetics. 3 Credits.
Principles of aesthetics as revealed by artists, writers, and philosophers.

PHIL 491. Seminar. 1-5 Credits.

PHIL 491H. Seminar. 3 Credits.

PHIL 492. Study Abroad. 1-15 Credits.

PHIL 494. Individual Study. 1-5 Credits.

PHIL 496. Field Experience. 1-15 Credits.

PHIL 499. Special Topics. 1-5 Credits.

PHIL 625. Environmental Ethics. 3 Credits.
An investigation of ethics and the environment, including but not limited to ecofeminism, economics as environmental policy, and deep ecology. {Also offered for undergraduate credit - see PHIL 425.}.

Physics (PHYS)

PHYS 110. Introductory Astronomy. 3 Credits.
Qualitative survey of the current understanding of the universe including planetary explorations, solar phenomena, stars, black holes, nebulas, galaxies.

PHYS 110L. Introductory Astronomy Lab. 1 Credit.
Qualitative survey of the current understanding of the universe including planetary explorations, solar phenomena, stars, black holes, nebulas, galaxies.

PHYS 120. Fundamentals of Physics. 3 Credits.
Application of physics concepts and principles to the real world. Topics selected from mechanics, heat, optics, electricity, and magnetism.

PHYS 120L. Fundamentals of Physics Laboratory. 1 Credit.
Application of physics concepts and principles to the real world. Topics selected from mechanics, heat, optics, electricity, and magnetism.

PHYS 171. Introductory Projects in Physics. 1 Credit.
Basic computer controlled instrumentation for automation and data acquisition. Design of simple measurement and control projects covering waveforms, temperature measurement and robotics. Elementary data analysis: curve fitting, Fourier theory and statistics.

PHYS 194. Individual Study. 1-5 Credits.

PHYS 196. Field Experience. 1-15 Credits.

PHYS 199. Special Topics. 1-5 Credits.

PHYS 211L. College Physics I Laboratory. 1 Credit.
Beginning course for students without a calculus background. Includes basic principles of bodies at rest and in motion, fluids, vibrations, waves, sound and thermodynamics. Prereq: MATH 105. Co-req: PHYS 211.

PHYS 211. College Physics I. 3 Credits.
Beginning course for students without a calculus background. Includes basic principles of bodies at rest and in motion, fluids, vibrations, waves, sound and thermodynamics. Prereq: MATH 105 or higher.

PHYS 212L. College Physics II Laboratory. 1 Credit.
Second course for students without a calculus background. Includes electricity, magnetism, optics and modern physics. Prereq: PHYS 211, PHYS 211L.

PHYS 212. College Physics II. 3 Credits.
Second course for students without a calculus background. Includes electricity, magnetism, optics and modern physics. Prereq: PHYS 211, PHYS 211L.

PHYS 215. Research For Undergraduates. 1-3 Credits.
Special research studies in physics under the supervision of an instructor.

PHYS 220. Physics for Designers. 3 Credits.
Application of physics concepts and principles for designers such as architects, interior designers, and engineers using focused problem-solving in work-groups. Topics selected from mechanics, sound, thermodynamics, optics, electricity, magnetism, and modern physics. Prereq: MATH 105 or ARCH 233 or equivalent.

PHYS 251L. University Physics I Laboratory. 1 Credit.
Newtonian mechanics of translational and rotational motion, work, energy, power, momentum, conservation of energy and momentum, periodic motion, waves, sound, heat, and thermodynamics. Prereq: MATH 165.

PHYS 251. University Physics I. 4 Credits.
Newtonian mechanics of translational and rotational motion, work, energy, power, momentum, conservation of energy and momentum, periodic motion, waves, sound, heat, and thermodynamics. Prereq: MATH 165.

PHYS 251R. University Physics I Recitation. 1 Credit.
A recitation that complements PHYS 251 with theory and applications. Coreq: PHYS 251.

PHYS 252L. University Physics II Laboratory. 1 Credit.
Electric charge, field, potential, and current; magnetic field; capacitance; resistance; inductance; RC, RL, LC and RLC circuits; waves; optics. Coreq: PHYS 252.

PHYS 252. University Physics II. 4 Credits.
Electric charge, field, potential, and current; magnetic field; capacitance; resistance; inductance; RC, RL, LC and RLC circuits; waves; optics. Prereq: PHYS 251 or ME 222. Coreq: MATH 166.

PHYS 252R. University Physics II Recitation. 1 Credit.
A recitation that complements PHYS 252 with emphasis on theory and applications. Coreq: PHYS 252.

PHYS 291. Seminar. 1-3 Credits.

PHYS 292. Study Abroad. 1-15 Credits.

PHYS 294. Individual Study. 1-5 Credits.

PHYS 299. Special Topics. 1-5 Credits.

PHYS 303. The Science of Learning. 1 Credit.
This course is designed for students serving as Learning Assistants in the College of Science and Mathematics and who are interested in the science behind learning in the STEM disciplines.

PHYS 350. Modern Physics. 3 Credits.
Breakdown of classical physics, special relativity, Bohr model, Schrodinger mechanics of simple systems, atomic structure, selected topics from nuclear and solid state physics. Prereq: PHYS 252, MATH 265.

PHYS 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. Study Tour Abroad. 1-6 Credits.

PHYS 391. Seminar. 1-3 Credits.

PHYS 392. Study Abroad. 1-15 Credits.

PHYS 394. Individual Study. 1-5 Credits.

PHYS 397. Fe/Coop/Internship. 1-4 Credits.

PHYS 399. Special Topics. 1-5 Credits.

PHYS 411. Optics for Scientists & Engineers. 3 Credits.
Introduction to modern optics. Geometric optics, electromagnetic nature of light, polarization, interference, diffraction, fiber optics. Corequisite laboratory with major related optics project. Prereq: PHYS 252. Coreq: PHYS 411L. Cross-listed with ECE 411. {Also offered for graduate credit - see PHYS 611.}.

PHYS 411L. Optics for Scientists and Engineers Lab. 1 Credit.
Required laboratory for PHYS 411 or ECE 411. Ten optics experiments plus a major related optics project. Preq: PHYS 252. Coreq: PHYS 411. Cross-listed with ECE 411L. {Also offered for graduate credit - see PHYS 611L.}.

PHYS 413. Lasers for Scientists and Engineers. 3 Credits.
Lecture and laboratory introduction to lasers. Spontaneous and stimulated transitions, line-broadening, gain, gain saturation, optical resonators, Fabry-Perot interferometers, theory of laser oscillation, rate equations, transverse modes, coherence, and Gaussian beams. Prereq: PHYS 252. 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. {Also offered for graduate credit - see PHYS 615.}.

PHYS 417. Optical Signal Transmission. 3 Credits.
Optical signal transmission including geometric optics and modal analysis for homogeneous and inhomogeneous light guides. Systems studies including coupling, inter-symbol interference, sources, photodetectors, and modulation. Prereq: ECE 351 S/2 Cross-listed with ECE. {Also offered for graduate credit - See PHYS 617.}.

PHYS 462. Thermal and Statistical Physics. 3 Credits.
Classical postulates and laws of thermodynamics; cyclic processes and entropy; thermodynamic potentials, equilibrium, stability, and phase transitions; Maxwell-Boltzmann distribution, applications to classical gases and magnets; quantum statistics, Bose-Einstein and Fermi-Dirac distributions, applications to quantum gases. Prereq: PHYS 350. {Also offered for graduate credit - see PHYS 662.}.

PHYS 463. Statistical Mechanics. 3 Credits.
The Maxwell-Boltzmann distribution function and its applications to thermodynamic problems. Introduction to kinetic theory. Introduction to Bose-Einstein and Fermi-Dirac statistics. Prereq: PHYS 462. {Also offered for graduate credit - see PHYS 663.}.

PHYS 481. Condensed Matter Physics. 3 Credits.
Introduction to the physics of soft condensed matter, composed of polymers, colloids, amphiphiles, and liquid crystals, and of hard condensed matter, including metals, semiconductors, and superconductors, emphasizing phase transitions and materials properties (electrical, magnetic, optical, elastic). Co-req: PHYS 486. {Also offered for graduate credit - see PHYS 681.}.

PHYS 485. Quantum Mechanics I. 3 Credits.
Operators, one-dimensional wells and barriers, Schroedinger equation, uncertainty, duality, Born interpretation, unstable states, bosons and fermions, central force problems, angular momentum, spin. Prereq: PHYS 350, MATH 266. {Also offered for graduate credit - see PHYS 685.}.

PHYS 486. Quantum Mechanics II. 3 Credits.
Continuation of PHYS 485. Perturbation theory, angular momentum addition, variational schemes, WKB method, scattering theory, time dependent problems. Prereq: PHYS 485. {Also offered for graduate credit - see PHYS 686.}.

PHYS 488. Senior Project I. 1 Credit.
This is the first course of the capstone experience in physics. It results in the proposal of an undergraduate research project that is carried out in the second capstone course. Pass/Fail only. Department consent required.

PHYS 489. Senior Project II. 2 Credits.
This is the second course of the capstone experience in physics. The student carries out the research project proposed in the first capstone course. Prereq: PHYS 488.

PHYS 491. Seminar. 1-5 Credits.

PHYS 492. Study Abroad. 1-15 Credits.

PHYS 494. Individual Study. 1-5 Credits.

PHYS 496. Field Experience. 1-15 Credits.

PHYS 499. Special Topics. 1-5 Credits.

PHYS 611. Optics for Scientists & Engineers. 3 Credits.
Introduction to modern optics. Geometric optics, electromagnetic nature of light, polarization, interference, diffraction, fiber optics. Corequisite laboratory with major related optics project. Coreq: PHYS 611L. Cross-listed with ECE 611. {Also offered for undergraduate credit - see PHYS 411.}.

PHYS 611L. Optics for Scientists and Engineers Lab. 1 Credit.
Required laboratory for PHYS 611 or ECE 611. Ten optics experiments plus a major related optics project. Coreq: PHYS 611. Cross-listed with ECE 611L. {Also offered for undergraduate credit - see PHYS 411L.}.

PHYS 613. Lasers for Scientists and Engineers. 3 Credits.
Lecture and laboratory introduction to lasers. Spontaneous and stimulated transitions, line-broadening, gain, gain saturation, optical resonators, Fabry-Perot interferometers, theory of laser oscillation, rate equations, transverse modes, coherence, and Gaussian beams. Cross-listed with ECE 613. {Also offered for undergraduate credit - see PHYS 413.}.

PHYS 615. Elements of Photonics. 3 Credits.
Analysis of optical systems using the matrix formulation, wave propagation in anisotropic media, electro-optic effect and laser modulation, physical origin of optical non-linearities, phase matching, optical second harmonic and parametric generation. Cross-listed with ECE 615. {Also offered for undergraduate credit - see PHYS 415.}.

PHYS 617. Optical Signal Transmission. 3 Credits.
Optical signal transmission including geometric optics and modal analysis for homogeneous and inhomogeneous light guides. Systems studies including coupling, inter-symbol interference, sources, photodetectors, and modulation. Prereq: ECE 351 S/2 Cross-listed with ECE. {Also offered for undergraduate credit - See PHYS 417.}.

PHYS 662. Thermal and Statistical Physics. 3 Credits.
Classical postulates and laws of thermodynamics; cyclic processes and entropy; thermodynamic potentials, equilibrium, stability, and phase transitions; Maxwell-Boltzmann distribution, applications to classical gases and magnets; quantum statistics, Bose-Einstein and Fermi-Dirac distributions, applications to quantum gases. {Also offered for undergraduate credit - see PHYS 462.}.

PHYS 663. Statistical Mechanics. 3 Credits.
The Maxwell-Boltzmann distribution function and its applications to thermodynamic problems. Introduction to kinetic theory. Introduction to Bose-Einstein and Fermi-Dirac statistics. {Also offered for undergraduate credit - see PHYS 463.}.

PHYS 681. Condensed Matter Physics. 3 Credits.
Introduction to the physics of soft condensed matter, composed of polymers, colloids, amphiphiles, and liquid crystals, and of hard condensed matter, including metals, semiconductors, and superconductors, emphasizing phase transitions and materials properties (electrical, magnetic, optical, elastic). {Also offered for undergraduate credit - see PHYS 481.}.

PHYS 685. Quantum Mechanics I. 3 Credits.
Operators, one-dimensional wells and barriers, Schroedinger equation, uncertainty, duality, Born interpretation, unstable states, bosons and fermions, central force problems, angular momentum, spin. {Also offered for undergraduate credit - see PHYS 485.}.

PHYS 686. Quantum Mechanics II. 3 Credits.
Continuation of PHYS 685. Perturbation theory, angular momentum addition, variational schemes, WKB method, scattering theory, time dependent problems. Prereq: PHYS 685. {Also offered for undergraduate credit - see PHYS 486.}.

PHYS 690. Graduate Seminar. 1-5 Credits.

PHYS 696. Special Topics. 1-5 Credits.

PHYS 752. Mathematical Methods in Physics I. 3 Credits.
Review of practical mathematical methods routinely used by physicists, including applications. Focus on differential equations, variational principles, and other selected topics. Cross-listed with MATH 782.

PHYS 753. Mathematical Methods in Physics II. 3 Credits.
Tensor analysis, matrices and group theory, special relativity, integral equations and transforms, and selected advanced topics. Prereq: MATH 629 and MATH 652. Cross-listed with MATH 783.

PHYS 758. Statistical Physics. 3 Credits.
Review of thermodynamics and statistical mechanics; Monte Carlo and molecular dynamics simulation; applications to phase transitions.

PHYS 761. Electromagnetism. 3 Credits.
Review of Maxwell's equations, radiation, collisions between charged particles, dynamics of relativistic particles and fields.

PHYS 771. Quantum Physics I. 3 Credits.
Schroedinger equation, wave packets, uncertainty, angular momentum, spin, second quantization, harmonic oscillator, resistance mechanisms.

PHYS 772. Quantum Physics II. 3 Credits.
Schroedinger equation, wave packets, uncertainty, angular momentum, spin, second quantization, harmonic oscillator, resistance mechanisms. Prereq: PHYS 771.

PHYS 781. Solid State Physics. 3 Credits.
Crystal structure and binding, reciprocal lattices and x-ray diffraction, lattice vibrations, thermal properties, free electron model, band theory, magnetism, superconductivity. Prereq: PHYS 685.

PHYS 782. Condensed Matter Physics. 3 Credits.
An introduction to soft condensed matter, focusing on colloids, polymers, liquid crystals, surfactants, and biological systems. Topics will include characterization of soft materials, interparticle interactions, structure, equilibrium phase behavior, non-equilibrium properties, and practical applications. Prereq: PHYS 663.

PHYS 790. Graduate Seminar. 1-3 Credits.

PHYS 791. Temporary/Trial Topics. 1-5 Credits.

PHYS 793. Individual Study/Tutorial. 1-5 Credits.

PHYS 794. Practicum. 1-10 Credits.

PHYS 796. Special Topics. 1-5 Credits.

PHYS 797. Master's Paper. 1-3 Credits.

PHYS 798. Master's Thesis. 1-10 Credits.

PHYS 899. Doctoral Dissertation. 1-15 Credits.

Plant Pathology (PPTH)

PPTH 194. Individual Study. 1-5 Credits.

PPTH 196. Field Experience. 1-15 Credits.

PPTH 199. Special Topics. 1-5 Credits.

PPTH 291. Seminar. 1-5 Credits.

PPTH 292. Study Abroad. 1-15 Credits.

PPTH 294. Individual Study. 1-5 Credits.

PPTH 299. Special Topics. 1-5 Credits.

PPTH 324. Introductory Plant Pathology. 3 Credits.
Etiology, symptomatology and control of representative plant diseases and demonstrations. 2 lectures, 1 laboratory. F.

PPTH 379. Study Tour Abroad. 1-6 Credits.

PPTH 391. Seminar. 1-5 Credits.

PPTH 392. Study Abroad. 1-15 Credits.

PPTH 394. Individual Study. 1-5 Credits.

PPTH 399. Special Topics. 1-5 Credits.

PPTH 454. Diseases Of Field and Forage Crops. 3 Credits.
Etiology, symptomology, control, and importance of field and forage crop diseases. 2 lectures, 1 laboratory. Prereq: PPTH 324. S (even years) {Also offered for graduate credit - see PPTH 654.}.

PPTH 455. Plant Disease Management. 3 Credits.
Diagnosis and control of horticultural crop diseases. 2 lectures, 1 laboratory. Prereq: PPTH 324. S (odd years) {Also offered for graduate credit - see PPTH 655.}.

PPTH 457. Landscape Plant Pathology. 3 Credits.
Tree and turfgrass pathology with emphasis on disease identification and management strategies for a variety of settings. Two lectures and a 2-hour lab. Prereq: PPTH 324. S (odd years). {offered at the graduate level as PPTH 657}.

PPTH 460. Fungal Biology. 3 Credits.
Fungal ecology, morphology, genetics, physiology, taxonomy, and relevance to humans. 2 lectures, 1 laboratory. Prereq: BIOL 150, PPTH 324. F (even years) {Also offered for graduate credit - see PPTH 660.}.

PPTH 491. Seminar. 1-5 Credits.

PPTH 492. Study Abroad. 1-15 Credits.

PPTH 494. Individual Study. 1-5 Credits.

PPTH 496. Field Experience. 1-15 Credits.

PPTH 499. Special Topics. 1-5 Credits.

PPTH 654. Diseases Of Field and Forage Crops. 3 Credits.
Etiology, symptomology, control, and importance of field and forage crop diseases. 2 lectures, 1 laboratory. S (even years) {Also offered for undergraduate credit - see PPTH 454.}.

PPTH 655. Plant Disease Management. 3 Credits.
Diagnosis and control of horticultural crop diseases. 2 lectures, 1 laboratory. S (odd years) {Also offered for undergraduate credit - see PPTH 455.}.

PPTH 657. Landscape Plant Pathology. 3 Credits.
Tree and turfgrass pathology with emphasis on disease identification and management strategies for a variety of settings. Two lectures and a 2-hour lab. S (odd years). {offered at the undergraduate level as PPTH 457}.

PPTH 660. Fungal Biology. 3 Credits.
Fungal ecology, morphology, genetics, physiology, taxonomy, and relevance to humans. 2 lectures, 1 laboratory. F (even years) {Also offered for undergraduate credit - see PPTH 460.}.

PPTH 690. Graduate Seminar. 1-3 Credits.

PPTH 695. Field Experience. 1-15 Credits.

PPTH 696. Special Topics. 1-5 Credits.

PPTH 751. Physiology Of Plant Disease. 3 Credits.
Infection, penetration, recognition, nutrient transfer, toxins, photosynthesis, and physiological materials. Use of tools, equipment, and supplies used in the industry and application of basic design styles, holiday designs, and displays. 1 lecture, 1 two-hour laboratory. S (odd years).

PPTH 752. Plant Nematology. 3 Credits.
Nematode morphology, classification, biology, molecular identification and quantification; interaction of nematodes with other pathogens, molecular mechanisms of plant-nematode interactions, and nematode disease management. 2 lectures, 1 two-hour laboratory. F (odd years).

PPTH 754. Plant Disease Epidemiology. 3 Credits.
Temporal and spatial dynamics of diseases and causative pathogens in plant populations. 2 lectures, 1 laboratory. F (even years).

PPTH 755. Population Biology of Plant Pathogens. 3 Credits.
Discussion of the biological processes that affect plant pathogens populations and communities in natural and agricultural settings and how these processes affect disease development and their control.

PPTH 756. Fungicides: Development, Modes of Action, and Development of Resistance. 2 Credits.
The course will provide an understanding of fungicides, their mode of action, the development of resistance, and resistance management strategies.

PPTH 758. Bacterial, Nematode and Viral Diseases of Plants. 4 Credits.
Biology, epidemiology, and management of plant diseases caused by bacteria, nematodes and viruses.

PPTH 759. Host-Parasite Genetics. 3 Credits.
Host-parasite genetics including genetics of plant and pathogens and gene-for-gene relationships. 3 lectures. S (even years).

PPTH 760. Advanced Mycology. 4 Credits.
Biology and classification of fungi. Emphasis on identification, growth and development, physiology, and etiology of fungi. 2 lectures, 2 laboratories. F (odd years).

PPTH 790. Graduate Seminar. 1-3 Credits.

PPTH 791. Temporary/Trial Topics. 1-5 Credits.

PPTH 792. Graduate Teaching Experience. 1-6 Credits.

PPTH 793. Individual Study/Tutorial. 1-5 Credits.

PPTH 794. Practicum/Internship. 1-10 Credits.

PPTH 795. Field Experience. 1-15 Credits.

PPTH 796. Special Topics. 1-5 Credits.

PPTH 797. Master's Paper. 1-3 Credits.

PPTH 798. Master's Thesis. 1-10 Credits.

PPTH 899. Doctoral Dissertation. 1-15 Credits.

Plant Sciences (PLSC)

PLSC 110. World Food Crops. 3 Credits.
Scientific principles of crop growth, worldwide production, management alternatives, and processing for domestic and international consumption. 2 lectures, 1 discussion, 1 tutorial laboratory. F, S.

PLSC 111. Genetics and You. 2 Credits.
Basic concepts in genetics with emphasis on current human genetics. 2 lectures. S.

PLSC 150. Introduction to Horticulture Therapy. 3 Credits.
Horticultural therapy involves the use of plants and gardening activities to facilitate mental and physical rehabilitation. Students will become familiar with facilitation techniques, programs, clients, staff, budgets, facilities, equipment, and the various populations that horticulture therapists serve. 2 lectures and 2 lab hours per week. S.

PLSC 177. Floral Design I. 2 Credits.
History of floral design, care, handling, and identification of fresh cut flowers and dried materials. Use of tools, equipment, and supplies used in the industry and application of basic design styles, holiday designs, and displays. 1 lecture, 1 two-hour laboratory. S.

PLSC 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. S.

PLSC 210. Horticulture Science. 3 Credits.
Principles of plant classification, structure, function, growth, propagation, culture, and use of horticultural crops. Covers vegetable and fruit production in the home garden, growing flowers and planting flower beds, and landscaping principles and materials. 3 lectures. F.

PLSC 211. Horticulture Science Lab. 1 Credit.
Exercises in plant identification, propagation, nutrition, gardening, greenhouses, lawn care, landscape design, interior plants, pruning, and culture of horticultural crops. 1 two-hour laboratory. F.

PLSC 215. Weed Identification. 1 Credit.
Identification of weed seeds and plants from seedling to mature stages. Emphasis on life cycles, common distribution, and family groupings. 1 one and one half-hour laboratory plus time by arrangement. F.

PLSC 219. Introduction to Prairie & Community Forestry. 2 Credits.
Urban and traditional forestry as applied to the Great Plains region, as well as global forests. History, opportunities, and basic interactions of forestry with wildlife, parks and recreation, horticulture, and the ecology of the planet. 2 lectures. F (odd years).

PLSC 225. Principles of Crop Production. 3 Credits.
Principles of field crop production with emphasis on relationships of crops to their climate and production considerations as a means of managing resources and environmental factors. 2 lectures, 1 two-hour laboratory. Prereq: PLSC 110. S.

PLSC 291. Seminar. 1-5 Credits.

PLSC 292. Study Abroad. 1-15 Credits.

PLSC 294. Individual Study. 1-5 Credits.

PLSC 296. Field Experience. 1-15 Credits.

PLSC 299. Special Topics. 1-5 Credits.

PLSC 307. History and Evolution of Wine in America. 1 Credit.
Introduction to wines and wine industries from a historical perspective. Include an overview of cultivar selection, cultivation, harvesting, expressing, fermenting, and processing wines for unique characteristics. Wine tasting is needed to link sensory perceptions to wine characteristics. 1 lecture. Students must be at least 21 years old. F.

PLSC 312. Expanding the Boundaries of Learning with Service. 1 Credit.
This course is designed to build on the speaking, writing, interpersonal and team skills, and citizenship of our students. This course uses a service learning approach and can be repeated for credit. S.

PLSC 315. Genetics. 3 Credits.
Study of the basis of heredity with emphasis on structure and function of DNA and Mendelian genetics. 3 lectures. Cross-listed with BIOL 315. F, S.

PLSC 315L. Genetics Laboratory. 1 Credit.
Study of the basis of heredity with emphasis on structure and function of DNA and Mendelian genetics. 1 two-hour laboratory. Cross-listed with BIOL 315L. F, S.

PLSC 320. Principles of Forage Production. 3 Credits.
Introduction to alfalfa and other forage crops and their management, identification, preservation, forage quality characteristics, and use of legumes in rotations. 2 lectures, 1 one-hour laboratory, 1 tutorial by arrangement. Prereq: PLSC 110. F.

PLSC 323. Principles of Weed Science. 3 Credits.
Introduction to biological, chemical, cultural, and mechanical weed control; characteristics of weeds and their identification; pesticides application and dissipation. 2 lectures, 1 discussion, 1 tutorial laboratory. S.

PLSC 335. Seed Technology & Production. 2 Credits.
Techniques involved in production, harvest, and processing of seed. Special attention to maintenance of genetic and mechanical quality during growth, harvesting, and processing. 3 lectures, 2 two-hour laboratories. Prereq: PLSC 110. S/2.

PLSC 340. Grain Grading. 2 Credits.
Description and interpretation of the Grain Standards Act and instruction in grading of grain. 3 lectures, 3 two-hour laboratories. Recommended Prereq: PLSC 225. S/2.

PLSC 341. Landscape Bidding, Contracting and Operations. 2 Credits.
This course presents an overview of the landscaping industry from a business perspective. Students will learn about bidding, business law, employee and customer relations, money management, installation, and maintenance. Two lecture hours per week. S.

PLSC 350. Sugarbeet Production. 2 Credits.
History, growth, and development; soil and fertility management; weeds, insect, and disease control; cultivars; harvesting, storage, and processing of sugarbeets. Prereq: PLSC 110, PLSC 210. F.

PLSC 355. Woody Landscape Plants. 3 Credits.
Nomenclature, identification, and landscape characteristics of native and introduced deciduous and evergreen woody plants commonly used in the Northern Plains. Field trips. 1 lecture, 2 two-hour laboratories. Recommended Coreq: BIOL 150 or BIOL 151, PLSC 210. F.

PLSC 365. Herbaceous Landscape Plants. 2 Credits.
Production, identification, and uses of annual, perennial, and bulbous ornamentals in home and public landscapes with consideration to insect and disease problems. 3 one-hour lecture/laboratories. Recommended Coreq: PLSC 210. F (odd years).

PLSC 368. Plant Propagation. 3 Credits.
Principles and practices of seed propagation and of asexual propagation: cuttings, layering division, specialized structures, grafting, budding, and micropropagation. 2 lectures, 1 two-hour laboratory. Recommended Coreq: BIOL 150 or BIOL 151, PLSC 210. S.

PLSC 370. Landscape Management. 3 Credits.
Introduction to basic landscape management principles and practices. Commercial management practices associated with the landscape design/build and maintenance industry are emphasized. F (odd years).

PLSC 375. Turfgrass Management. 3 Credits.
Species characteristics of cool and warm season turfgrasses, including cultural requirements for home lawns, parks, and sports turf. 3 lectures. Coreq: BIOL 150 or BIOL 151, PLSC 110 or PLSC 210. F.

PLSC 375L. Turfgrass Management Laboratory. 1 Credit.
This lab will provide students an opportunity to gain hands-on experience in turf-related topics discussed in the turfgrass management class. 1 two-hour laboratory. Co-req: PLSC 375. F.

PLSC 379. Study Tour Abroad. 1-6 Credits.

PLSC 380. Principles of Plant Physiology. 3 Credits.
Study of plant physiological principles, including photosynthesis, respiration, water and nutrient uptake, plant growth and development, and stress responses, and the relationships between plant physiology and agricultural cultural practice. 3 lectures. S. Prereq: BIOL 150 and BIOL 151.

PLSC 381. Sports Turf Operations. 3 Credits.
Strategic management practices in sports turf and golf course operations, including development of cultural practices adhering to environmental regulations, personnel management, and budgeting. 3 lectures. Prereq: PLSC 375. F.

PLSC 386. Arboriculture Climbing and Rigging Operations. 2 Credits.
Introduction to the basics of tree climbing and rigging focusing on tree hazard assessment, climbing line placement, ascending, descending and moving around in the canopy as well as methods of safely rigging down branches and trunk sections of trees.

PLSC 391. Seminar. 1-5 Credits.

PLSC 392. Study Abroad. 1-15 Credits.

PLSC 394. Individual Study. 1-5 Credits.

PLSC 397. Cooperative Education. 1-4 Credits.

PLSC 399. Special Topics. 1-5 Credits.

PLSC 411. Genomics. 3 Credits.
An integrated presentation of genome organization, genome sequencing and characterization, comparative genomics, transcriptomics, proteomics, and metabolomics. Recommended Prereq: BIOL 150, STAT 330. F {Also offered for graduate credit - see PLSC 611.}.

PLSC 412. Nursery Production and Management. 3 Credits.
Industry overview, production-management practices, facilities, equipment, nursery stock standards, storage, and over wintering. Field trips. 3 lectures. Coreq: PLSC 368. S (odd years).

PLSC 415. Vegetable Crop Production. 2 Credits.
Vegetable Crop Production explores the history, classification, culture, physiological principles, post-harvest handling, and marketing of major vegetable crops. 2 lectures. Recommended Prereq: BIOL 150 or BIOL 151; PLSC 210 and PLSC 211. S (odd years). {Also offered for graduate credit - see PLSC 615}.

PLSC 416. Fruit Crop Production. 2 Credits.
Principles of tree fruit and small fruit production, emphasizing cool climate production. Plant establishment, pruning and training, harvesting and storage, and physiological, environmental, and cultural control of productivity, fruit quality, and pest damage. Recommended Prereq: BIOL 151, PLSC 210 and PLSC 211. F (even years). {Also offered for graduate credit - see PLSC 616}.

PLSC 422. Greenhouse Production and Management. 3 Credits.
Greenhouse structure and construction, environmental control, plant nutrition, growth regulation, pest control, and business management in relation to commercial production of greenhouse crops, including pot, cut flower, bedding, foliage, and vegetable crops. Field trips. 2 lectures, 1 two-hour laboratory. Recommended Coreq: PLSC 368. S (even years).

PLSC 425. Potato Science. 2 Credits.
History, botany, cultural practices, harvesting, breeding, physiology, storage, and processing of the potato. 2 lectures. Half semester long course beginning in October. Recommended Prereq: BIOL 150, BIOL 151, PLSC 110, and PLSC 210. F/2 (odd years) {Also offered for graduate credit - see PLSC 625}.

PLSC 431. Intermediate Genetics. 3 Credits.
Expansion of classical and molecular concepts of genetics; basic concepts of Mendelian, quantitative, population, molecular, and evolutionary genetics. 2 lectures. Prereq: PLSC 315. F {Also offered for graduate credit - see PLSC 631.}.

PLSC 433. Weed Biology and Ecology. 2 Credits.
Principles of weed biology and ecology including seed biology, phenotypic plasticity, seedbank dynamics, population and community structure and dynamics, interference, invasion biology, gene flow and evolution, biological control, and ecologically based weed management. Prereq: BOT 380. S (even years).

PLSC 444. Applied Plant Breeding and Research Methods. 3 Credits.
Principles of genetics, experimental design, and crop management applied to conventional and transgenic crop improvement methodologies. Ethical and societal issues will be considered, in addition to technical and economic constraints. F Prereq: PLSC 225, PLSC 315, STAT 330.

PLSC 453. Advanced Weed Science. 2 Credits.
Integrated weed control programs for crops, pastures, non-cropland, and aquatic environments. Herbicide formulation and mixtures. Herbicide absorption, translocation, and action. 2 lectures. Prereq: PLSC 323. F {Also offered for graduate credit - see PLSC 653.}.

PLSC 455. Cropping Systems:An Integrated Approach. 3 Credits.
Integrative capstone focus on the scientific professional and ethical issues associated with crop production and management practices using decision case studies. 3 lectures. Recommended Prereq: Senior standing. S {Also offered for graduate credit - see PLSC 655.}.

PLSC 457. Horticulture and Turfgrass Systems. 3 Credits.
A problem-solving approach to many facets of horticulture and turfgrass management that addresses important issues such as the environment, ecology, biotechnology, pesticides, employment, and business management. An emphasis will be placed on literature reviews, problem solving and communications. 3 lectures. Recommended Prereq: Senior Standing. S.

PLSC 465. Advanced Landscape Plants. 2 Credits.
Nomenclature, identification, and landscape characteristics of native and introduced deciduous and evergreen woody plants grown in Upper Midwest. Emphasis on cultivar introduction, trademarks/patents, adaptation, and diversity within species. Field trips required. 2 two-hour laboratories. Prereq: PLSC 355. S (even years) {Also offered for graduate credit - see PLSC 665.}.

PLSC 468. Landscape Irrigation Design. 2 Credits.
Students will learn the basic issues of water resources, water management, and irrigation system design. 2 lectures. Prereq: Junior standing. Cross-listed with ASM 468. F (odd years).

PLSC 469. Landscape Irrigation Installation and Management. 2 Credits.
Irrigation system installation, winterization, start-up, troubleshooting, renovation, and drainage. 2 lectures. Prereq: Junior standing. Cross-listed with ASM 469. S (even years).

PLSC 480. Advanced Turfgrass Topics. 3 Credits.
Development of the turfgrass industry and the scientific basis of strategic turfgrass management, including relationships between turfgrasses, the environment, management and methodologies in turfgrass research. Prereq: PLSC 375. S (even years) {Also offered for graduate credit - see PLSC 680.}.

PLSC 484. Plant Tissue Culture and Biotechnology. 3 Credits.
Principles and techniques of plant tissue culture and genetic manipulation and their applications to plant improvement. Hands-on experience with plant tissue culture and genetic engineering. 2 lectures, 1 two-hour laboratory. Prereq: PLSC 315. F {Also offered for graduate credit - see PLSC 684.}.

PLSC 485. Arboriculture Science. 3 Credits.
Tree, shrub, and vine care based on the physiology of shoot and root growth and limitations of the environment. Includes plant and site selection, transplanting, staking, fertilizing, pruning, mulching, and related subjects. 3 lectures. Recommended Prereq: PLSC 355. F (even years) {Also offered for graduate credit - see PLSC 685.}.

PLSC 486. Applied Crop Physiology. 3 Credits.
Application of physiological principles on plant growth and development and crop production. 3 lectures. Prereq: BOT 380. S {Also offered for graduate credit - see PLSC 686.}.

PLSC 491. Seminar. 1-5 Credits.

PLSC 492. Study Abroad. 1-15 Credits.

PLSC 493. Undergraduate Research. 1-5 Credits.

PLSC 494. Individual Study. 1-5 Credits.

PLSC 496. Field Experience. 1-15 Credits.

PLSC 499. Special Topics. 1-5 Credits.

PLSC 611. Genomics. 3 Credits.
An integrated presentation of genome organization, genome sequencing and characterization, comparative genomics, transcriptomics, proteomics, and metabolomics. F {Also offered for undergraduate credit - see PLSC 411.}.

PLSC 615. Vegetable Crop Production. 2 Credits.
Vegetable Crop Production explores the history, classification, culture, physiological principles, post-harvest handling, and marketing of major vegetable crops. 2 lectures. S (odd years). {Also offered for undergraduate credit - see PLSC 415}.

PLSC 616. Fruit Crop Production. 2 Credits.
Principles of tree fruit and small fruit production, emphasizing cool climate production. Plant establishment, pruning and training, harvesting and storage, and physiological, environmental, and cultural control of productivity, fruit quality, and pest damage. F (even years). {Also offered for undergraduate credit - see PLSC 416}.

PLSC 625. Potato Science. 2 Credits.
History, botany, cultural practices, harvesting, breeding, physiology, storage, and processing of the potato. 2 lectures. Half semester long course beginning in October. F/2 (odd years) {Also offered for undergraduate credit - see PLSC 425}.

PLSC 631. Intermediate Genetics. 3 Credits.
Expansion of classical and molecular concepts of genetics; basic concepts of Mendelian, quantitative, population, molecular, and evolutionary genetics. 2 lectures. F {Also offered for undergraduate credit - see PLSC 431.}.

PLSC 633. Weed Biology and Ecology. 2 Credits.
Principles of weed biology and ecology including seed biology, phenotypic plasticity, seedbank dynamics, population and community structure and dynamics, interference, invasion biology, gene flow and evolution, biological control, and ecologically based weed management. S (even years) {Also offered for undergraduate credit - see PLSC 433.}.

PLSC 653. Advanced Weed Science. 2 Credits.
Integrated weed control programs for crops, pastures, non-cropland, and aquatic environments. Herbicide formulation and mixtures. Herbicide absorption, translocation, and action. 2 lectures. F {Also offered for undergraduate credit - see PLSC 453.}.

PLSC 655. Cropping Systems:An Integrated Approach. 3 Credits.
Integrative capstone focus on the scientific professional and ethical issues associated with crop production and management practices using decision case studies. 3 lectures. S {Also offered for undergraduate credit - see PLSC 455.}.

PLSC 665. Advanced Landscape Plants. 2 Credits.
Nomenclature, identification, and landscape characteristics of native and introduced deciduous and evergreen woody plants grown in Upper Midwest. Emphasis on cultivar introduction, trademarks/patents, adaptation, and diversity within species. Field trips required. 2 two-hour laboratories. S (even years) {Also offered for undergraduate credit - see PLSC 465.}.

PLSC 680. Advanced Turfgrass Topics. 3 Credits.
Development of the turfgrass industry and the scientific basis of strategic turfgrass management, including relationships between turfgrasses, the environment, management and methodologies in turfgrass research. S (even years) {Also offered for undergraduate credit - see PLSC 480.}.

PLSC 684. Plant Tissue Culture and Biotechnology. 3 Credits.
Principles and techniques of plant tissue culture and genetic manipulation and their applications to plant improvement. Hands-on experience with plant tissue culture and genetic engineering. 2 lectures, 1 two-hour laboratory. F {Also offered for undergraduate credit - see PLSC 484.}.

PLSC 685. Arboriculture Science. 3 Credits.
Tree, shrub, and vine care based on the physiology of shoot and root growth and limitations of the environment. Includes plant and site selection, transplanting, staking, fertilizing, pruning, mulching, and related subjects. 3 lectures. F (even years) {Also offered for undergraduate credit - see PLSC 485.}.

PLSC 686. Applied Crop Physiology. 3 Credits.
Application of physiological principles on plant growth and development and crop production. 3 lectures. S {Also offered for undergraduate credit - see PLSC 486.}.

PLSC 690. Graduate Seminar. 1-3 Credits.

PLSC 695. Field Experience. 1-15 Credits.

PLSC 696. Special Topics. 1-5 Credits.

PLSC 710. Professional Development I. 1 Credit.
This course introduces students to professional society structure and function, mechanics of data presentation, and written discussion. Assignments will emphasize skills needed to complete a research proposal and prepare a research presentation. F.

PLSC 711. Professional Development II. 1 Credit.
This course emphasizes manuscript preparation, manuscript review, poster development, and grantsmanship. Consideration of professional ethics underlies all topics. S.

PLSC 718. Genetics & Plant Improvement. 3 Credits.
Genetic principles and their application to plant improvement. Crop evolution, chromosome structure, and population dynamics related to crop improvement methodology. Genetically modified plants, their impact on breeding technique, and the release of improved varieties. 3 one-hour lectures. Prereq: PLSC 315 and PLSC 315L. F.

PLSC 721. Genomics Techniques. 2 Credits.
Principles, techniques, and applications of the large-scale analysis of DNA organization and sequence, RNA expression, protein sequence, and structure. Prereq: PLSC 611. S.

PLSC 724. Field Design I. 3 Credits.
Application of various field designs, factorial and split-plot arrangements, orthogonal and non-orthogonal comparisons, models, components of variance, correlation, and regression to biological problems. 3 lectures. Recommended Prereq: STAT 725. F.

PLSC 727. Crop Breeding Techniques. 1 Credit.
Evaluation and practice of breeding methods used to develop superior genotypes in crop species across public and private breeding programs. Understanding why certain breeding techniques are used for adaptation, genetic improvement, and cultivar development. Prereq: PLSC 718, PLSC 724. Recommended prereq: PLSC 710, PLSC 734. SS (odd years).

PLSC 731. Plant Molecular Genetics. 3 Credits.
Molecular aspects of plant genome organization and expression; basic and applied usages of molecular markers and gene transfer techniques. 3 lectures. Prereq: PLSC 631. S (even years).

PLSC 734. Field Design II. 2 Credits.
Application of incomplete block designs, confounding and covariance analyses to biological problems. 2 lectures. Prereq: PLSC 724. S (odd years).

PLSC 741. Cytogenetics. 4 Credits.
Chromosome behavior during mitosis and meiosis; chromosome structure, function, and recombination; inheritance in aneuploids and polyploids; haploid formation and utilization. 3 lectures, 1 three-hour laboratory. F (even years).

PLSC 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. S (odd years). Prereq: PLSC 718.

PLSC 750. Crop Stress Physiology. 3 Credits.
Application of physiological principles to enhancement of stress tolerance in crops. S (odd years) Prereq: PLSC 686.

PLSC 751. Advanced Plant Genetics. 3 Credits.
Advanced topics in plant genetics regarding the study of genetic linkage, marker-assisted selection, statistical analysis and interpretation of genetic data, and the study of the inheritance in autotetraploid species. 3 lectures. Prereq: PLSC 631. S (odd years).

PLSC 753. Action & Fate Of Herbicides. 2 Credits.
Herbicide mode of action and fate of herbicides in plants and soil, physiology of herbicide resistance, and herbicide antidotes. 2 lectures. Prereq: PLSC 653. S (even years).

PLSC 755. Advanced Crop Management Decision Making. 3 Credits.
Problem-based learning approach focusing on the scientific, professional, personal, and ethical issues associated with advanced crop management decision-making. Recommended Prereq: PLSC 655. F (even years).

PLSC 763. Laboratory Methods-Weed Science. 2 Credits.
Chemical, analytical, and physiological methods for determining pesticide residues in soil and ground water; and herbicide absorption, translocation, and metabolism in plants. 2 two-hour laboratories. Prereq: PLSC 653. S (odd years).

PLSC 776. Advanced Plant Breeding. 4 Credits.
Application of genetic principles to improvement of self- and cross-pollinated crops. 4 lectures. Prereq: PLSC 718, PLSC 724. S (odd years).

PLSC 779. Study Abroad: Sustainable Agriculture and Renewable Energies in Europe. 1-3 Credits.
This study abroad course covers the main aspects of sustainable agriculture and renewable energy production in Europe. SS.

PLSC 782. Population and Quantitative Genetics. 4 Credits.
Population and quantitative genetics theories and application to applied plant breeding. Prereq: PLSC 718 and PLSC 724.

PLSC 785. Crop Breeding Programs Management. 2 Credits.
Development of student ability to understand, examine, and evaluate crop breeding and improvement programs. Prereq: PLSC 718, PLSC 724. S (even years).

PLSC 790. Graduate Seminar. 1-3 Credits.

PLSC 791. Temporary/Trial Topics. 1-5 Credits.

PLSC 792. Graduate Teaching Experience. 1-6 Credits.

PLSC 793. Individual Study/Tutorial. 1-5 Credits.

PLSC 794. Practicum. 1-8 Credits.

PLSC 795. Field Experience. 1-15 Credits.

PLSC 796. Special Topics. 1-5 Credits.

PLSC 797. Master's Paper. 1-3 Credits.

PLSC 798. Master's Thesis. 1-10 Credits.

PLSC 892. Graduate Teaching Experience. 1-6 Credits.

PLSC 899. Doctoral Dissertation. 1-15 Credits.

Political Science (POLS)

POLS 110. Introduction to Political Science. 3 Credits.
Problems of political science as a discipline, political systems, and political behavior. Includes causes and consequences of individual and group political behavior.

POLS 115. American Government. 3 Credits.
Principles of American government, political behavior, and institutions.

POLS 120. Terrorism. 3 Credits.
Examination of problems of terrorism. Includes its historical perspectives; terrorist motivations, organizations, tactics, strategies; role of media; government responses; future trends, prospects.

POLS 194. Individual Study. 1-5 Credits.

POLS 196. Field Experience. 1-15 Credits.

POLS 199. Special Topics. 1-5 Credits.

POLS 210. Current Politics. 3 Credits.
Study of current national and state political issues.

POLS 215. Problems and Policies In American Government. 3 Credits.
Study of the functioning of American government focusing on the policy process.

POLS 216. Campaigns and Elections. 3 Credits.
Examination of political campaigns and elections with special emphasis for voting behavior, history and theory of political advertising, and effectiveness/ethics of negative advertising. Prereq: POLS 115.

POLS 220. International Politics. 3 Credits.
Concepts, theories, and issues in international relations.

POLS 225. Comparative Politics. 3 Credits.
Comparative analysis of contemporary political systems, practices, institutions, and actors.

POLS 230. Judicial Process. 3 Credits.
Role of lawyers, judges, and courts in the political system. Special emphasis on judicial decision-making and the ideas behind law.

POLS 240. Political Ideologies. 3 Credits.
Study of ideas, belief systems, and basic principles of ideologies.

POLS 291. Seminar. 1-5 Credits.

POLS 292. Study Abroad. 1-15 Credits.

POLS 294. Individual Study. 1-5 Credits.

POLS 299. Special Topics. 1-5 Credits.

POLS 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.

POLS 325. Applied Research Methods. 4 Credits.
This course provides an overview of the scientific model, the philosophy and goals of science, and a detailed study of qualitative and quantitative methodologies. Lecture, laboratory. Co-req or Prereq: STAT 330. Cross-listed with COMM 325 and CJ 325.

POLS 350. Gender Issues and the Law. 3 Credits.
This course examines gender differentiations reflected in the U.S. law from both the historical and contemporary perspectives and the impact of that differentiation, particularly on women, in the areas of employment, education and family law.

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. Study Tour Abroad. 1-6 Credits.

POLS 391. Seminar. 1-5 Credits.

POLS 392. Study Abroad. 1-15 Credits.

POLS 394. Individual Study. 1-5 Credits.

POLS 399. Special Topics. 1-5 Credits.

POLS 420. Political Behavior-Executive-Legislative Process. 3 Credits.
Behavioral study of executives and legislators with emphasis on examination of empirical data. {Also offered for graduate credit - see POLS 620.}.

POLS 421. Political Behavior-Political Parties. 3 Credits.
Behavioral study of political leaders with emphasis on examination of empirical data. Prereq: admission to the Political Science professional program. {Also offered for graduate credit - see POLS 621.}.

POLS 422. State and Local Politics. 3 Credits.
This course is designed to guide students through a discovery of American politics at the sub-national level. From a comparative perspective, students examine differences between states in terms of their political structures, behavior, and environments. Prereq: POLS 110 or POLS 115, at least junior standing and admission to the Political Science professional program. {Also offered for graduate credit - see POLS 622.}.

POLS 423. Public Policy Analysis. 3 Credits.
Provides an overview of public policy analysis, from development to implementation to evaluation. Students explore these skills through the in-depth examination of one or two current public policy issues. Prereq: Political Science majors or minors only.

POLS 430. Constitutional Law-Civil Liberties. 3 Credits.
Examination of First Amendment rights including freedom of speech, press, religion, association, and assembly. Due process and equal protection concerns are also addressed. Prereq: at least junior standing {Also offered for graduate credit - see POLS 630.}.

POLS 431. Constitutional Law-Criminal Justice. 3 Credits.
Study of Fourth, Fifth, and Sixth Amendment rights. Emphasis on the law of arrest, search and seizure, self-incrimination, and right to counsel. Prereq: admission to the Criminal Justice professional program. {Also offered for graduate credit - see POLS 631.}.

POLS 442. Global Policy Issues. 3 Credits.
Analysis of the impact of planetary limits to growth, increasing globalization of the world economy, and changing control over resource systems on global politics. {Also offered for graduate credit - see POLS 642.}.

POLS 444. International Law. 3 Credits.
Examines the history and foundation of the international legal system, including custom, treaties, jurisdiction, and the relationship between international and municipal law. Prereq: POLS 220. {Also offered for graduate credit - see POLS 644.}.

POLS 445. Ethnic Conflicts. 3 Credits.
Explores numerous topics and cases related to ethnic conflicts, including the nature of ethnic identity, the causes of ethnic conflicts, and ethnic conflict prevention/resolution. {Also offered for graduate credit - see POLS 645.}.

POLS 446. Current Topics in International Law. 3 Credits.
Examines a special topic within the field of international law. Some examples include: the use of force, international criminal law, and the intersection of international law and U.S. domestic law. Prereq: POLS 220 or POLS 225.

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 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. Study Abroad. 1-15 Credits.

POLS 494. Individual Study. 1-5 Credits.

POLS 496. Field Experience. 1-15 Credits.

POLS 499. Special Topics. 1-5 Credits.

POLS 620. Political Behavior-Executive-Legislative Process. 3 Credits.
Behavioral study of executives and legislators with emphasis on examination of empirical data. {Also offered for undergraduate credit - see POLS 420.}.

POLS 621. Political Behavior-Political Parties. 3 Credits.
Behavioral study of political leaders with emphasis on examination of empirical data. {Also offered for undergraduate credit - see POLS 421.}.

POLS 622. State and Local Politics. 3 Credits.
This course is designed to guide students through a discovery of American politics at the sub-national level. From a comparative perspective, students examine differences between states in terms of their political structures, behavior, and environments. {Also offered for undergraduate credit - see POLS 422.}.

POLS 630. Constitutional Law-Civil Liberties. 3 Credits.
Examination of First Amendment rights including freedom of speech, press, religion, association, and assembly. Due process and equal protection concerns are also addressed. {Also offered for undergraduate credit - see POLS 430.}.

POLS 631. Constitutional Law-Criminal Justice. 3 Credits.
Study of Fourth, Fifth, and Sixth Amendment rights. Emphasis on the law of arrest, search and seizure, self-incrimination, and right to counsel. {Also offered for undergraduate credit - see POLS 431.}.

POLS 642. Global Policy Issues. 3 Credits.
Analysis of the impact of planetary limits to growth, increasing globalization of the world economy, and changing control over resource systems on global politics. {Also offered for undergraduate credit - see POLS 442.}.

POLS 644. International Law. 3 Credits.
Examines the history and foundation of the international legal system, including custom, treaties, jurisdiction, and the relationship between international and municipal law. {Also offered for undergraduate credit - see POLS 444.}.

POLS 645. Ethnic Conflicts. 3 Credits.
Explores numerous topics and cases related to ethnic conflicts, including the nature of ethnic identity, the causes of ethnic conflicts, and ethnic conflict prevention/resolution. {Also offered for undergraduate credit - see POLS 445.}.

POLS 650. Politics of the Developing Countries. 3 Credits.
Comparative examination of the government and politics of developing countries. Attention is given to special economic and cultural circumstances facing the political systems of these countries. {Also offered for undergraduate credit - see POLS 450.}.

POLS 651. Politics of the Industrialized Countries. 3 Credits.
Comparative study of government and politics in the industrialized countries including the analysis of legislative and executive branches, parties, bureaucracies, constitutions, policies, and voting behavior. {Also offered for undergraduate credit - see POLS 451.}.

POLS 652. Comparative Political Economy. 3 Credits.
Comparative study of the relationship between politics and the economy in industrialized and developing countries. Topics include elections, trade, development, investment, redistribution, and the political business cycle. {Also offered for undergraduate credit - see POLS 452 .}.

POLS 653. Environmental Policy and Politics. 3 Credits.
Course is designed to provide students with both a general and advanced understanding of environmental issues. Will examine philosophical underpinnings informing environmental policy making as well as analyze various substantive environmental issues in US. {Also offered for undergraduate credit - see POLS 453.}.

POLS 696. Special Topics. 1-5 Credits.

POLS 720. Theoretical Perspectives to the Study of Political Science. 3 Credits.
Designed to guide beginning graduate students through the dominant paradigms and emerging subject areas of political science scholarship.

POLS 797. Master's Paper. 1-3 Credits.

Psychology (PSYC)

PSYC 111. Introduction to Psychology. 3 Credits.
Survey of the scientific study of behavior and mental processes.

PSYC 189. Skills for Academic Success. 1 Credit.
This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

PSYC 194. Individual Study. 1-5 Credits.

PSYC 196. Field Experience. 1-15 Credits.

PSYC 199. Special Topics. 1-5 Credits.

PSYC 210. Human Sexuality. 3 Credits.
Survey of biological, developmental, and psychological aspects of human sexuality. Prereq: PSYC 111.

PSYC 211. Introduction To Behavior Modification. 3 Credits.
Basic principles and procedures governing acquisition, maintenance, and change of behavior, emphasizing human applications. Laboratory involves designing, implementing, and reporting an individual project. Prereq: PSYC 111.

PSYC 212. Psychological Aspects of Drug Use and Abuse. 3 Credits.
Examination of legal and illegal psychoactive drugs. Emphasis on psychological, physiological, and behavioral effects of these drugs and problems of drug abuse. Prereq: PSYC 111.

PSYC 214. Social Interaction. 3 Credits.
Examination of issues relevant to the study of individual behavior (e.g., self-concept, attitudes, social perception) in a social context. Cross-listed with SOC 214.

PSYC 216. Cultural Psychology. 3 Credits.
Examines the different ways in which cultural variables affect human cognition, emotion, and behavior. This course uses the lens of culture to consider topics such as cognition and emotion, personality, psychopathology, the self, prejudice and intergroup relations, and cultural conflict (e.g., terrorism, genocide). Prereq: PSYC 111.

PSYC 221. Psychology Applied to Work. 3 Credits.
Applications of psychology to people at work. Topics include employee selection, job interviewing, performance appraisal, psychological testing, Equal Employment Opportunity, leadership, motivation, job satisfaction, organizational theory, employee safety and health. Prereq: PSYC 111.

PSYC 250. Developmental Psychology. 3 Credits.
Survey of the psychology of human life span development. Coverage also includes heredity and prenatal development. Prereq: PSYC 111.

PSYC 260. Introduction to Neuroscience. 3 Credits.
An introduction to behavioral neuroscience with an emphasis on what we know about human brain function and what it means for studying and understanding complex human behavior.

PSYC 261. Introduction to Cognitive Psychology. 3 Credits.
An introduction to the scientific study of human cognition covering topics including perception, attention, memory, language, reasoning, problem solving, and intelligence. Prereq: PSYC 111.

PSYC 270. Abnormal Psychology. 3 Credits.
Survey of the classification, symptoms, and etiology of psychological disorders. Attention given to diagnosis, etiology, and treatment according to prominent theoretical perspectives. Focus on empirical basis for understanding these problems. Prereq: PSYC 111.

PSYC 280. Introduction to Health Psychology. 3 Credits.
Describes the interaction of psychology and health, including the ways in which thoughts, emotions, and behavior influence one's health. Prereq: PSYC 111.

PSYC 291. Seminar. 1-5 Credits.

PSYC 292. Study Abroad. 1-15 Credits.

PSYC 294. Individual Study. 1-5 Credits.

PSYC 299. Special Topics. 1-5 Credits.

PSYC 322. Judgment & Decision-Making. 3 Credits.
Covers the functional uses of critical thinking. Focuses on uses in problem solving and decision-making. Applications are directed at both personal and professional concerns. Prereq: PSYC 111.

PSYC 340. Psychology in Sport. 3 Credits.
This is a survey course outlining the applications of psychological theory to sport settings. Prereq: PSYC 111.

PSYC 350. Research Methods I. 3 Credits.
This course teaches scientific method and analysis of data for the social and behavioral sciences. Students completing this course will gain an understanding of descriptive and inferential analyses, including correlation, group comparisons, and non-parametric techniques. Prereq: PSYC 111, MATH 103.

PSYC 351. Research Methods II. 3 Credits.
Experimental and quasi-experimental designs in psychological research. Laboratory includes performance of experiments, data analysis, and preparation of research reports. Prereq: PSYC 350.

PSYC 360. Animal Behavior. 3 Credits.
Description of the principal behavior patterns of animals with consideration of ecological, evolutionary, and internal mechanisms.

PSYC 370. Forensic Psychology. 3 Credits.
Broad overview of the interactions of psychology and the law, including current areas of practice, assessment, and forensic techniques. Special focus upon psychology as applied to and affected by family, civil, and criminal law. Prereq: PSYC 270.

PSYC 379. Study Tour Abroad. 1-6 Credits.

PSYC 380. Clinical Psychology. 3 Credits.
Introduction to the science and practice of clinical psychology. Includes a survey of the assumptions on which clinical methods are based and an overview of clinical assessment and treatment techniques. Prereq: PSYC 270.

PSYC 381. Understanding Suicideand its Impact. 3 Credits.
Overview of current understanding of the dynamics of suicide and its impact upon people left behind following the death.

PSYC 382. Self-Injury:Recognition & Treatment. 3 Credits.
Overview of the current understanding of the dynamics of self injurious behavior, of the prevalence of various types of harmful behavior, and of the populations most at risk.

PSYC 385. Psychology on Film. 3 Credits.
Many important issues and topics in psychology have been portrayed in feature films and documentaries. Movies and associated readings present significant concepts, persons, and historical events in psychology. Primary focus is on clinical psychology. Prereq: PSYC 111.

PSYC 391. Seminar. 1-5 Credits.

PSYC 392. Study Abroad. 1-15 Credits.

PSYC 394. Individual Study. 1-5 Credits.

PSYC 397. Coop/Internship. 1-5 Credits.

PSYC 399. Special Topics. 1-5 Credits.

PSYC 440. Experimental Methods. 3 Credits.
Intermediate experimental design and data analysis with emphasis on the analysis of variance. Laboratory includes data analysis on the computer. Prereq: PSYC 351. {Also offered for graduate credit - see PSYC 640.}.

PSYC 450. Computational Methods in Experimental Psychology. 3 Credits.
An introduction to fundamental research methods in visual and cognitive neuroscience. This is a computer-based course using MatLab and Psychtoolbox to prepare students for modern psychology laboratory research. Prereq: PSYC 260 or PSYC 351. {Also offered for graduate credit - see PSYC 650.}.

PSYC 453. Organizational Psychology. 3 Credits.
Survey of topics related to application of psychology to organizational settings. Emphasis on theoretical bases of the individual (motivation, satisfaction) and social (leadership, work group) factors involved in work behavior. Coreq: PSYC 351. {Also offered for graduate credit - see PSYC 653.}.

PSYC 457. Managing Work Motivation and Morale. 3 Credits.
An exploration of how the theories of work motivation and morale can be applied to manage the behavior and performance of people at work. Cognitive, behavioral, attitudinal, organizational and individual psychological approaches are considered. Prereq: PSYC 111. {Also offered for graduate credit - see PSYC 657.}.

PSYC 460. Sensation & Perception. 3 Credits.
Explores physical, anatomical, and physiological bases of sensation and perception and their psychophysical measurement. Laboratory experiments complement lectures and demonstrate various experimental techniques and sensory phenomena. 2 lectures, equivalent of 2-hour laboratory. Prereq: PSYC 351 or PSYC 260. {Also offered for graduate credit - see PSYC 660.}.

PSYC 461. Memory And Knowledge. 3 Credits.
Examination of current behavioral and neuropsychological research and theory in the area of memory and knowledge representation. Various cognitive phenomena are demonstrated and relevant design issues are highlighted via laboratory experiments. Prereq: PSYC 260 or PSYC 351. {Also offered for graduate credit - see PSYC 661.}.

PSYC 463. Experimental Developmental Psychology. 3 Credits.
Examination of historical and contemporary theory and research in social and cognitive development. Topics include attachment, adolescent risk-taking, theories of intelligence, and meta-cognition. Laboratory experiences illustrate methods of investigating psychological development. Prereq: PSYC 351. {Also offered for graduate credit - see PSYC 663.}.

PSYC 464. Attention & Thinking. 3 Credits.
Examines current behavioral and neuropsychological research and theory in the area of attention and thought processes. Laboratory experiments will demonstrate various attentional phenomena and highlight relevant design issues. Prereq: PSYC 351.{Also offered for graduate credit - see PSYC 664.}.

PSYC 465. Psychobiology. 3 Credits.
Fundamental anatomy (structure) and physiology (function) of the nervous system. Physiological bases of behavior. 2 lectures, equivalent of 2-hour laboratory. Prereq: PSYC 351 or PSYC 260. {Also offered for graduate credit - see PSYC 665.}.

PSYC 468. Personality. 3 Credits.
Study of complex human behavior with attention to historically significant theories and current empirical issues. Laboratory experiences illustrate methods of investigating individual differences. Prereq: PSYC 351. {Also offered for graduate credit - see PSYC 668.}.

PSYC 470. Experimental Social Psychology. 3 Credits.
Examination of historical and contemporary theory and research in social psychology. Study of the relationship between the individual and social context. 2 lectures, equivalent of 2-hour laboratory. Prereq: PSYC 351. {Also offered for graduate credit - see PSYC 670.}.

PSYC 471. The Psychology Of Aging. 3 Credits.
Survey of cognitive and psychosocial development in adulthood and old age, including psychopathologies of old age. Contemporary research findings are emphasized. Prereq: PSYC 111, Junior standing. {Also offered for graduate credit - see PSYC 671.}.

PSYC 472. Advanced Psychopathology. 3 Credits.
In-depth coverage of recent research on diagnosis, etiology, and maintenance of behavior disorders emphasizing the interaction of biological, behavioral, and social factors. Prereq: PSYC 270, Junior standing. {Also offered for graduate credit - see PSYC 672.}.

PSYC 473. Child Psychopathology and Therapy. 3 Credits.
Overview of the etiology and treatment of behavior disorders in children and adolescents. Emphasis on recent research findings and behavioral intervention strategies. Prereq: PSYC 270 or PSYC 351. {Also offered for graduate credit - see PSYC 673.}.

PSYC 480. History & Systems. 3 Credits.
Historical development of scientific psychology. Emphasis on the development of various systems of psychology in America. Capstone experience. Prereq: PSYC 351 or Senior standing. {Also offered for graduate credit - see PSYC 680.}.

PSYC 481. Health Psychology. 3 Credits.
Application of behavioral procedures to the prevention, treatment, and rehabilitation of medical disorders. Emphasis on contemporary research findings. Prereq: PSYC 350 or PSYC 260. {Also offered for graduate credit - see PSYC 681.}.

PSYC 486. Neuropsychology. 3 Credits.
Introduction to human neuropsychology with emphasis on the neural basis of motor, perceptual, cognitive, emotive, and language behavior. Topics include normal and pathological conditions from clinical and experimental perspectives. Prereq: PSYC 260 or PSYC 351. {Also offered for graduate credit - see PSYC 686.}.

PSYC 489. Honors Thesis. 1-6 Credits.
Capstone experience option.

PSYC 491. Seminar. 1-5 Credits.

PSYC 492. Study Abroad. 1-15 Credits.

PSYC 493. Undergraduate Research. 1-5 Credits.

PSYC 494. Individual Study. 1-5 Credits.

PSYC 496. Field Experience. 1-15 Credits.

PSYC 499. Special Topics. 1-5 Credits.

PSYC 640. Experimental Methods. 3 Credits.
Intermediate experimental design and data analysis with emphasis on the analysis of variance. Laboratory includes data analysis on the computer. {Also offered for undergraduate credit - see PSYC 440.}.

PSYC 650. Computational Methods in Experimental Psychology. 3 Credits.
An introduction to fundamental research methods in visual and cognitive neuroscience. This is a computer-based course using MatLab and Psychtoolbox to prepare students for modern psychology laboratory research. {Also offered for undergraduate credit - see PSYC 450.}.

PSYC 653. Organizational Psychology. 3 Credits.
Survey of topics related to application of psychology to organizational settings. Emphasis on theoretical bases of the individual (motivation, satisfaction) and social (leadership, work group) factors involved in work behavior. {Also offered for undergraduate credit - see PSYC 453.}.

PSYC 657. Managing Work Motivation and Morale. 3 Credits.
An exploration of how the theories of work motivation and morale can be applied to manage the behavior and performance of people at work. Cognitive, behavioral, attitudinal, organizational and individual psychological approaches are considered. {Also offered for undergraduate credit - see PSYC 457.}.

PSYC 660. Sensation & Perception. 3 Credits.
Explores physical, anatomical, and physiological bases of sensation and perception and their psychophysical measurement. Laboratory experiments complement lectures and demonstrate various experimental techniques and sensory phenomena. 2 lectures, equivalent of 2-hour laboratory. {Also offered for undergraduate credit - see PSYC 460.}.

PSYC 661. Memory and Knowledge. 3 Credits.
Examination of current behavioral and neuropsychological research and theory in the area of memory and knowledge representation. Various cognitive phenomena are demonstrated and relevant design issues are highlighted via laboratory experiments. {Also offered for graduate credit - see PSYC 461.}.

PSYC 663. Experimental Developmental Psychology. 3 Credits.
Examination of historical and contemporary theory and research in social and cognitive development. Topics include attachment, adolescent risk-taking, theories of intelligence, and meta-cognition. Laboratory experiences illustrate methods of investigating psychological development. {Also offered for undergraduate credit - see PSYC 463.}.

PSYC 664. Attention & Thinking. 3 Credits.
Examines current behavioral and neuropsychological research and theory in the area of attention and thought processes. Laboratory experiments will demonstrate various attentional phenomena and highlight relevant design issues. {Also offered for undergraduate credit - see PSYC 464.}.

PSYC 665. Psychobiology. 3 Credits.
Fundamental anatomy (structure) and physiology (function) of the nervous system. Physiological bases of behavior. 2 lectures, equivalent of 2-hour laboratory. {Also offered for undergraduate credit - see PSYC 465.}.

PSYC 668. Personality. 3 Credits.
Study of complex human behavior with attention to historically significant theories and current empirical issues. Laboratory experiences illustrate methods of investigating individual differences. {Also offered for undergraduate credit - see PSYC 468.}.

PSYC 670. Experimental Social Psychology. 3 Credits.
Examination of historical and contemporary theory and research in social psychology. Study of the relationship between the individual and social context. 2 lectures, equivalent of 2-hour laboratory. {Also offered for undergraduate credit - see PSYC 470.}.

PSYC 671. The Psychology Of Aging. 3 Credits.
Survey of cognitive and psychosocial development in adulthood and old age, including psychopathologies of old age. Contemporary research findings are emphasized. {Also offered for undergraduate credit - see PSYC 471.}.

PSYC 672. Advanced Psychopathology. 3 Credits.
In-depth coverage of recent research on diagnosis, etiology, and maintenance of behavior disorders emphasizing the interaction of biological, behavioral, and social factors. {Also offered for undergraduate credit - see PSYC 472.}.

PSYC 673. Child Psychopathology and Therapy. 3 Credits.
Overview of the etiology and treatment of behavior disorders in children and adolescents. Emphasis on recent research findings and behavioral intervention strategies. {Also offered for undergraduate credit - see PSYC 473.}.

PSYC 680. History & Systems. 3 Credits.
Historical development of scientific psychology. Emphasis on the development of various systems of psychology in America. Capstone experience. {Also offered for undergraduate credit - see PSYC 480.}.

PSYC 681. Health Psychology. 3 Credits.
Application of behavioral procedures to the prevention, treatment, and rehabilitation of medical disorders. Emphasis on contemporary research findings. {Also offered for undergraduate credit - see PSYC 481.}.

PSYC 686. Neuropsychology. 3 Credits.
Introduction to human neuropsychology with emphasis on the neural basis of motor, perceptual, cognitive, emotive, and language behavior. Topics include normal and pathological conditions from clinical and experimental perspectives. {Also offered for undergraduate credit - see PSYC 486.}.

PSYC 690. Graduate Seminar. 1-3 Credits.

PSYC 695. Field Experience. 1-15 Credits.

PSYC 696. Special Topics. 1-5 Credits.

PSYC 718. Visual Neuroscience. 3 Credits.
A detailed survey of current ideas, methods, and perspectives in visual neuroscience.

PSYC 720. Advanced Topics in Cognitive Neuroscience. 3 Credits.
Examines prominent theories, research approaches, and experimental findings in the field of cognitive neuroscience. Included topics are methodological issues and cognitive neuroscience approaches to research questions in a broad range of areas within cognitive psychology.

PSYC 727. Advanced Topics in Visual Perception. 3 Credits.
Integrated overview of the field of vision research. Addresses recent developments in the study of the phenomenology, psychophysics, and neural substrates of human visual sensation and perception.

PSYC 731. Fundamental Processes in Cognition. 3 Credits.
Explores the underlying architecture of the human cognitive system; how it takes in, processes, stores, and retrieves information.

PSYC 732. Applied Cognitive Process. 3 Credits.
Explores the ways cognitive principles operate in ecologically valid (real-world) situations.

PSYC 733. Social Judgment. 3 Credits.
Explores issues and topics related to judgment and decision-making in social contexts as well as the influence of social factors on judgment processes.

PSYC 735. Neural Networks. 3 Credits.
See Computer Science for description.

PSYC 750. Introduction to Clinical Issues and Practices. 1 Credit.
Instruction and practice in clinical interview techniques and discussion of clinical issues including ethics, laws, and crisis intervention.

PSYC 755. Empirically Supported Interventions I. 4 Credits.
Introduction to assessment and intervention with a focus on principles of clinical psychological science, case conceptualization, and foundational therapeutic skills.

PSYC 756. Empirically Supported Interventions II. 4 Credits.
In depth review of contemporary psychological interventions and skill development for evidence based practice. Prereq: PSYC 755.

PSYC 758. Diversity in Clinical Psychology. 3 Credits.
This course emphasizes issues of cultural and individual diversity within the context of scientific research. In addition, the course will train students in culturally competent techniques for the assessment, diagnosis, and treatment of mental disorders in clinical practice.

PSYC 760. Research Methods in Visual and Cognitive Neuroscience. 3 Credits.
This course provides both theoretical and practical training in methodological skills essential for the conduct of high-quality research in the field of visual and cognitive neuroscience. May be repeated for credit with a change in topic.

PSYC 761. Applied Research Methods. 3 Credits.
Experimental methodology and design skills useful in clinical research including N=1 designs, experimental, and quasi-experimental designs. Laboratory includes reports on recent research articles, presentations on specific content areas, and development of a detailed research proposal.

PSYC 762. Advanced Research Methods and Analysis. 3 Credits.
Advanced experimental design and data analysis. Emphasis on regression models as applied to psychological data and designs. Includes analysis on the computer. Lecture, laboratory. Prereq: PSYC 640.

PSYC 764. Advanced Topics in Attention. 3 Credits.
Examines prominent theories of attention and empirical evidence in support of those theories. Included topics focus on the role of attention in thought, perception, and action.

PSYC 770. Testing and Assessment. 3 Credits.
Introduction to scale construction and test theory. Administration, interpretation, and reporting of intelligence and objective personality testing.

PSYC 771. Social/Health Psychology Research. 3 Credits.
Covers research designs frequently utilized in conducting social psychology related research with particular emphasis on health psychology.

PSYC 782. Emotions. 3 Credits.
Focused on basic questions about defining emotions, differences in experiencing or expressing emotions, and relatedness to cognition. Includes emotions and psychotherapy, emotions in a social context, and the impact of emotional expressions versus repression on health.

PSYC 787. Advanced Social Psychology and Health. 3 Credits.
Covers theory and research from social psychology that has implications for health behavior. Emphasizes theories of attitudes and behavior applied to such topics as regimen adherence, self-protective health behavior, and disease prevention. Prereq: PSYC 670, 681.

PSYC 790. Graduate Seminar. 1-3 Credits.

PSYC 791. Temporary/Trial Topics. 1-5 Credits.

PSYC 793. Individual Study/Tutorial. 1-5 Credits.

PSYC 794. Practicum/Internship. 1-8 Credits.

PSYC 795. Field Experience. 1-15 Credits.

PSYC 796. Special Topics. 1-5 Credits.

PSYC 797. Master's Paper. 1-3 Credits.

PSYC 798. Master's Thesis. 1-10 Credits.

PSYC 892. Graduate Teaching Experience. 1-6 Credits.

PSYC 894. Practicum/Internship. 1-8 Credits.

PSYC 897. Cooperative Education. 1-4 Credits.

PSYC 899. Doctoral Dissertation. 1-15 Credits.

Public Health (PH)

Courses

PH 101. Introduction to Public Health. 3 Credits.
This course introduces undergraduate students to the interdisciplinary and exciting field of public health. Discussing and studying the processes and practices of public health enhances the population health perspective of healthcare and other professionals.

PH 379. Study Tour Abroad. 1-6 Credits.

PH 479. Study Tour Abroad. 1-6 Credits.

PH 491. Seminar. 1-5 Credits.

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. Leading and Managing Public Health Systems. 3 Credits.
A pragmatic study of the issues, constituents, processes, and tools of public health leadership and management.

PH 705. Global Health. 3 Credits.
This course will survey the health of populations globally and introduce strategies, programs and health systems designed to improve the health of those populations. Prereq: Admission to PH program.

PH 710. Healthcare Delivery in the United States. 3 Credits.
Introduction to health professions, health care delivery systems, financing, health promotion, and behavioral issues.

PH 712. Health Outcomes Research. 3 Credits.
This course provides PH students enrolled in the public health in clinical systems track with the skills and tools necessary to assess studies and conduct basic assessment in a variety of health care settings. Prereq: PH 731 and PH 751.

PH 720. Environmental Health. 3 Credits.
Analysis of key concepts, principles, and applications of the primary natural and social science disciplines that underpin the core of environmental health.

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 751. Essentials in Epidemiology. 3 Credits.
Emphasis on application of the principles of epidemiology as applied to the investigation and prevention of individual and population health problems.

PH 752. Advanced Topics in Epidemiology. 3 Credits.
Distribution and dynamics of disease in populations, and factors contributing to the costs of foodborne illness and its prevention.

PH 755. Integrating Primary Care and Public Health. 3 Credits.
This course explores the intersections of public health and primary care and their roles in addressing personal and population health issues. Prereq: PH students only.

PH 765. Cultural Competence in Health Professions. 3 Credits.
The purpose of this course is to provide education and skill building that will enable students to effectively utilize cultural and linguistic competence as a key tool to improve health outcomes and understanding of communication for diverse populations. PH students only.

PH 771. American Indian Health Policy. 3 Credits.
The course will provide a detailed overview of the unique policy issues that form the legal basis for provision of public health and healthcare services to American Indians and Alaska Natives. Prereq: Admission to the PH program.

PH 772. American Indian Health Disparities. 3 Credits.
The course will provide a detailed overview of the basis for and regional differences in American Health Disparities. Strategies to reduce disparities will be highlighted. Prereq: Admission to the PH program.

PH 773. Cultural Competence in Indian Health. 3 Credits.
The course will provide a detailed overview of numerous American Health Cultures in the United States and Canada. Cultural aspects of health and strategies to develop culturally appropriate health programs will be highlighted. Prereq: Admission to PH program.

PH 774. Research Issues in Tribal Communities. 3 Credits.
This course will provide a detailed overview of the numerous unique considerations for conducting health-related research in tribal communities. These issues include tribal sovereignty, tribal approval processes, historical distrust of research, and cultural factors. Prereq: Admission to PH program.

PH 775. Case Studies in Indian Health. 3 Credits.
This course will provide an overview of several case studies in American Indian and Alaska Native Health that have been successfully implemented. The cases will be examined to determine what worked, why it worked, and challenges in developing successful programs. Prereq: Admission to the PH program.

PH 789. Integrative Learning Experience. 3 Credits.
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.

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.

Radiologic Sciences (RS)

RS 199. Special Topics. 1-5 Credits.

RS 200. Introduction to Radiologic Sciences. 1 Credit.
Lectures, discussions, and field trips focus on professional traits, ethical behavior of the health care provider, major curriculum requirements, and scope of practice.

RS 496. Field Experience. 1-15 Credits.
Radiologic Sciences professional majors only.

RS 499. Special Topics. 1-5 Credits.

Range Science (RNG)

RNG 136. Introduction to Range Management. 3 Credits.
Principles of range management which include plant identification, range evaluation, and range improvement. 3 lectures. F.

RNG 194. Individual Study. 1-5 Credits.

RNG 196. Field Experience. 1-15 Credits.

RNG 213. Rangeland Sampling Techniques. 3 Credits.
Introduction to rangeland aquatic, invertebrate, soil, and vegetation sampling techniques, and the proper procedures for basic data entry and interpretation. Prereq: RNG 136.

RNG 225. Natural Resource & Agro-Ecosystems. 3 Credits.
Introduction to scientific theories and their relation to natural resources and agriculture. Influence of these theories on current perspectives toward the environment. 3 lectures. Cross-listed with NRM 225.

RNG 294. Individual Study. 1-5 Credits.

RNG 296. Field Experience. 1-15 Credits.

RNG 326. Modeling of Range and Agro-Ecosystems. 3 Credits.
Introduction and applications of systems analysis and simulation modeling to agriculture, biology, range ecology, and natural resources management. 2 lectures, 1 two-hour laboratory. (even years).

RNG 394. Individual Study. 1-5 Credits.

RNG 397. Fe/Coop Ed/Internship. 1-15 Credits.

RNG 450. Range Plants. 3 Credits.
Identification, distribution, and forage value of important U.S. range plants. 1 lecture, 2 two-hour laboratories. Prereq: BOT 314. F {Also offered for graduate credit - see RNG 650.}.

RNG 451. Ecology of Fire-Dependent Ecosystems. 3 Credits.
Overview of the evolution and ecology of wildland fire in fire-dependent ecosystems globally, with an emphasis on the ecology and management of fire in North America. Prereq: RNG 336, BOT 460 or RNG 460. {Also available for graduate credit - see RNG 651.}.

RNG 452. Geographic Information Systems in Range Survey. 3 Credits.
Analysis of methods for determining range composition, condition, and productivity. Emphasis will be given to the use of Geographic Information Systems. 3 lectures. Prereq: RNG 136. S (odd years) {Also offered for graduate credit - see RNG 652.}.

RNG 453. Rangeland Resources Watershed Management. 3 Credits.
Study of the management of physical/biological settings and processes along with human activities on water and watersheds considering preventative and restorative strategies in a rangeland setting. S Prereq: RNG 136 or NRM 225. Cross-listed with NRM 453. {Also offered for graduate credit - see RNG 653.}.

RNG 454. Wetland Resources Management. 3 Credits.
Principles of wetland systems, wetland management, wetland functions, wetland delineation, wetland assessment, and wetland improvement. Prereq: SOIL 210. Cross-listed with NRM 454 and SOIL 454. F (even years) {Also offered for graduate credit - see RNG 654.}.

RNG 456. Range Habitat Management. 3 Credits.
Study of specific techniques and systems approaches to maintenance and improvement of rangeland ecosystems. 3 lectures. Prereq: RNG 136. F (odd years) {Also offered for graduate credit - see RNG 656.}.

RNG 458. Grazing Ecology. 3 Credits.
Grazing processes and systems and their effects on plants and herbivores. 3 lectures. Prereq: RNG 136. F (even years) {Also offered for graduate credit - see RNG 658.}.

RNG 460. Plant Ecology. 3 Credits.
Ecological structure, processes, and patterns observed with plant communities and populations as influenced by environmental conditions. Illustrations provided with local fieldwork. Prereq: BIOL 151, BIOL 151L. {Also offered for graduate credit - see RNG 660.}.

RNG 462. Natural Resource and Rangeland Planning. 3 Credits.
Capstone experiencefor School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Prereq: at least senior standing and must be a Natural Resources Management, Range Science or Soil Science major. Cross-listed with NRM and SOIL. {Also offered for graduate credit - see RNG 662.}.

RNG 491. Seminar. 1-5 Credits.

RNG 492. Study Abroad. 1-15 Credits.

RNG 494. Individual Study. 1-5 Credits.

RNG 496. Field Experience. 1-15 Credits.

RNG 650. Range Plants. 3 Credits.
Identification, distribution, and forage value of important U.S. range plants. 1 lecture, 2 two-hour laboratories. Cross-listed with BOT 650. F {Also offered for undergraduate credit - see RNG 450.}.

RNG 651. Ecology of Fire-Dependent Ecosystems. 3 Credits.
Overview of the evolution and ecology of wildland fire in fire-dependent ecosystems globally, with an emphasis on the ecology and management of fire in North America. {Also available for undergraduate credit - see RNG 451.}.

RNG 652. Geographic Information Systems in Range Survey. 3 Credits.
Analysis of methods for determining range composition, condition, and productivity. Emphasis will be given to the use of Geographic Information Systems. 3 lectures. S (odd years) {Also offered for undergraduate credit - see RNG 452.}.

RNG 653. Rangeland Resources Watershed Management. 3 Credits.
Study of the management of physical/biological settings and processes along with human activities on water and watersheds considering preventative and restorative strategies in a rangeland setting. S Cross-listed with NRM 653. {Also offered for undergraduate credit - see RNG 453.}.

RNG 654. Wetland Resources Management. 3 Credits.
Principles of wetland systems, wetland management, wetland functions, wetland assessment, and wetland improvement. {Also offered for undergraduate credit - see RNG 454.}.

RNG 656. Range Habitat Management. 3 Credits.
Study of specific techniques and systems approaches to maintenance and improvement of rangeland ecosystems. 3 lectures. F (odd years) {Also offered for undergraduate credit - see RNG 456.}.

RNG 658. Grazing Ecology. 3 Credits.
Grazing processes and systems and their effects on plants and herbivores. 3 lectures. F (even years) {Also offered for undergraduate credit - see RNG 458.}.

RNG 660. Plant Ecology. 3 Credits.
Ecological structure, processes, and patterns observed with plant communities and populations as influenced by environmental conditions. Illustrations provided with local fieldwork. {Also offered for undergraduate credit - see RNG 460.}.

RNG 662. Natural Resources and Rangeland Planning. 3 Credits.
Capstone experience for School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Cross-listed with NRM and SOIL. {Also offered for undergraduate credit - see RNG 462}.

RNG 695. Field Experience. 1-15 Credits.

RNG 716. Agrostology. 3 Credits.
Identification and description of U.S. grasses and grass-like plants. 2 lectures, 2 two-hour laboratories. F (even years).

RNG 717. Aquatic Vascular Plants. 3 Credits.
Identification of major aquatic vascular plants in the Northern Great Plains, utilization of major plant identification keys for the region, and descriptions of ecological roles of species for utilization in assessment, monitoring, and delineation. 1 lecture, 2 two-hour laboratories. F (odd years).

RNG 737. Agroecosystem Management and Conservation. 3 Credits.
Discussion and field course that emphasizes current conservation and management practices influencing agroecosystems. The overarching concepts will link soils, vegetation, invertebrates, vertebrates and society.

RNG 749. Applied Global Change Ecology. 3 Credits.
Discussion driven course that emphasizes current peer-review literature investigating the influence of human-driven global changes on natural resources. The class will include topics ranging from climate change to energy expansion and assisted colonization.

RNG 765. Analysis Of Ecosystems. 3 Credits.
Introduction to advanced statistical techniques to evaluate plant communities, plant-animal interactions, and plant-soil relationships. Emphasis on multivariate analysis. 2 lectures, 1 two-hour laboratory. S (even years).

RNG 790. Graduate Seminar. 1-5 Credits.

RNG 791. Temporary/Trial Topics. 1-5 Credits.

RNG 792. Graduate Teaching Experience. 1-6 Credits.

RNG 793. Individual Study/Tutorial. 1-5 Credits.

RNG 794. Practicum/Internship. 1-8 Credits.

RNG 795. Field Experience. 1-15 Credits.

RNG 796. Special Topics. 1-5 Credits.

RNG 797. Master's Paper. 1-3 Credits.

RNG 798. Master's Thesis. 1-10 Credits.

RNG 892. Graduate Teaching Experience. 1-6 Credits.

RNG 899. Doctoral Dissertation. 1-15 Credits.

Religious Studies (RELS)

RELS 100. World Religions. 3 Credits.
Explores the beliefs, practices and origins of the world's major religions and introduces analytical approaches to studying religion.

RELS 194. Individual Study. 1-5 Credits.

RELS 196. Field Experience. 1-15 Credits.

RELS 199. Special Topics. 1-5 Credits.

RELS 220. Old Testament. 3 Credits.
Study of the religious, political, and social history of ancient Israel as reflected in the Hebrew Bible.

RELS 230. New Testament. 3 Credits.
Overview of the developments in the primitive Christian community as reflected in the New Testament.

RELS 270. American Religious History. 3 Credits.
Introduction to the basic issues in American history including the study of Puritans, immigration, church and state, revivalism, civil and military religion, apocalypticism, and new age religion. Cross-listed with HIST 270.

RELS 291. Seminar. 1-5 Credits.

RELS 292. Study Abroad. 1-15 Credits.

RELS 294. Individual Study. 1-5 Credits.

RELS 299. Special Topics. 1-5 Credits.

RELS 315. Contemporary Religion. 3 Credits.
Study of how contemporary cultural developments require the rethinking of historic religious perspectives in such topics as natural science, political thought, psychology, history, and gender.

RELS 320. History of Christianity. 3 Credits.
Major developments in the Christian religion including scriptures, persecution, monasticism, papacy, Reformation, science and religion, and the ecumenical movement. Cross-listed with HIST 320.

RELS 340. New Religious Movements. 3 Credits.
This course examines the creation and sustainability of new religious movements, including Scientology, Jehovah's Witness, Aum Shinrikyo, Peoples Temple and the Church of Latter Day Saints, and the history of anti-cult movements.

RELS 345. Religion and Politics. 3 Credits.
Religion and politics are intertwined throughout national and international politics. This class will explore the historical precedent for this entanglement as well as current issues concerning gender, sexuality, religious nationalism and religious liberty.

RELS 355. History of Global Islam. 3 Credits.
Examination of the foundational history, texts, laws and rituals of Islam, in addition to the lived experience of Islam and related political dynamics in the Middle East, Europe, Asia, Africa and North America.

RELS 379. Study Tour Abroad. 1-6 Credits.

RELS 391. Seminar. 1-5 Credits.

RELS 394. Individual Study. 1-5 Credits.

RELS 399. Special Topics. 1-5 Credits.

RELS 401. Sociology of Religion. 3 Credits.
See Sociology for description. {Also offered for graduate credit - see RELS 601.}.

RELS 410. Religion and Violence. 3 Credits.
An analysis and assessment of critical theories on religion and violence, including examinations of martyrdom and redemptive suffering, the violence of social stratification and "othering", war and terrorism, and apocalyptic and spiritual warfare.

RELS 453. Magic And Religion. 3 Credits.
Comparative religion, religious concepts, practices, and practitioners. In-depth study of selected religious systems with a focus on shamanic religions. Prereq: ANTH 111. Cross-listed with ANTH 453.

RELS 460. Theory and Methods of Religious Studies. 3 Credits.
Analysis, assessment, and application of classic and contemporary theories of religious studies. {Also offered for graduate credit - see RELS 660}.

RELS 491. Seminar. 1-5 Credits.

RELS 492. Study Abroad. 1-15 Credits.

RELS 494. Individual Study. 1-5 Credits.

RELS 496. Field Experience. 1-15 Credits.

RELS 499. Special Topics. 1-5 Credits.

RELS 660. Theory and Methods of Religious Studies. 3 Credits.
Analysis, assessment, and application of classic and contemporary theories of religious studies. {Also offered for undergraduate credit - see RELS 460}.

Respiratory Care (RC)

RC 194. Individual Study. 1-5 Credits.

RC 196. Field Experience. 1-15 Credits.

RC 199. Special Topics. 1-5 Credits.

RC 200. Introduction to Respiratory Care. 1 Credit.
Introduction to the profession of respiratory care. Lectures, discussions, and field trips focus on professional traits and communication, ethical behavior of the health care provider, major curriculum requirements, and scope of practice.

RC 291. Seminar. 1-3 Credits.

RC 292. Study Abroad. 1-15 Credits.

RC 294. Individual Study. 1-5 Credits.

RC 299. Special Topics. 1-5 Credits.

RC 379. Study Tour Abroad. 1-6 Credits.

RC 391. Seminar. 1-5 Credits.

RC 392. Study Abroad. 1-15 Credits.

RC 394. Individual Study. 1-5 Credits.

RC 399. Special Topics. 1-5 Credits.

RC 491. Seminar. 1-5 Credits.

RC 492. Study Abroad. 1-15 Credits.

RC 494. Individual Study. 1-5 Credits.
Respiratory Care professional majors only.

RC 496. Field Experience. 1-15 Credits.
Respiratory Care professional majors only.

RC 499. Special Topics. 1-5 Credits.

Science, Technology, Engineering, and Mathematics (STEM)

STEM 303. The Science of Learning. 1 Credit.
This course is designed for students serving as Learning Assistants in the College of Science and Mathematics and who are interested in the science behind learning in the STEM disciplines.

STEM 790. Graduate Seminar. 1-5 Credits.

STEM 795. Field Experience. 1-15 Credits.

STEM 810. Teaching College Science. 3 Credits.
This course is designed for graduate students in the sciences who are interested in learning more about science teaching and student learning at the undergraduate level.

STEM 820. STEM Curriculum and Instruction. 3 Credits.
This course focuses on research on assessment and curricula designed to identify and address conceptual and reasoning difficulties of students in math and science. A variety of assessments and research-based curricula will be used and critically analyzed. Issues related to challenges of implementing reform-based curricula will also be discussed.

STEM 830. Research Methods in STEM Education. 3 Credits.
Course covers an array of research methods that are commonly used within discipline-based education research literature and discusses those methods within the framework of the primary literature of those disciplines.

STEM 840. Designing Technology-infused Learning Environments in Higher Education. 3 Credits.
This course will prepare current and future college-level instructors to effectively infuse appropriate technology tools into contemporary higher education learning environments.

STEM 890. Graduate Seminar. 1-5 Credits.

STEM 893. Individual Study/Tutorial. 1-5 Credits.

Sociology (SOC)

SOC 110. Introduction to Sociology. 3 Credits.
Introductory analysis of the nature of society, the interrelationship of its component groups, and the process whereby society persists and changes.

SOC 115. Social Problems. 3 Credits.
Sociological analysis of major social problems.

SOC 116. Global Social Problems. 3 Credits.
Sociological analysis of global social problems.

SOC 179. Study Tour Abroad. 1-6 Credits.

SOC 194. Individual Study. 1-5 Credits.

SOC 196. Field Experience. 1-15 Credits.

SOC 199. Special Topics. 1-5 Credits.

SOC 214. Social Interaction. 3 Credits.
Examination of issues relevant to the study of individual behavior (e.g., self-concept, attitudes, social perception) in a social context. Cross-listed with PSYC 214.

SOC 233. Sociology of Organizations and Work. 3 Credits.
This course examines major types of organizations, their goals, and characteristics. The course focuses on social issues as they relate to organizations and work.

SOC 235. Cultural Diversity. 3 Credits.
Analysis of lifestyles and characteristics of racial, cultural, and ethnic groups in society. Review of processes of discrimination, prejudice, and related dehumanizing biases toward culturally diverse groups including women. Prereq: SOC 110.

SOC 279. Study Tour Abroad. 1-6 Credits.

SOC 291. Seminar. 1-5 Credits.

SOC 292. Study Abroad. 1-15 Credits.

SOC 294. Individual Study. 1-5 Credits.

SOC 299. Special Topics. 1-5 Credits.

SOC 340. Social Research Methods. 3 Credits.
Overview of the scientific method, the philosophy of science, and the goals of science. Detailed study of qualitative and quantitative methodologies. Cross-listed with COMM 340.

SOC 341. Social Research Methods Laboratory. 1 Credit.
Laboratory to accompany SOC 340. Provides application of conceptualization, operationalization, sampling methods, qualitative and quantitative research methods, and computer statistical analysis. Cross-listed with COMM 341.

SOC 379. Study Tour Abroad. 1-6 Credits.

SOC 391. Seminar. 1-3 Credits.

SOC 392. Study Abroad. 1-15 Credits.

SOC 394. Individual Study. 1-5 Credits.

SOC 399. Special Topics. 1-5 Credits.

SOC 401. Sociology of Religion. 3 Credits.
Study of religion viewed as a social institution with a characteristic history, ecology, structure, behavior, and purpose. Cross-listed with RELS 401. {Also offered for graduate credit - see SOC 601.}.

SOC 403. Sociology of The Great Plains. 3 Credits.
Social and cultural patterns, trends, and problems peculiar to life in the semi-arid Great Plains. {Also offered for graduate credit - see soc 603.}.

SOC 404. Community Assessment. 3 Credits.
Students work with community leaders and their towns to conduct an asset-based community assessment of the town's human, social, cultural, political, built, financial, and natural capitals. {Also offered for graduate credit - see SOC 604.}.

SOC 405. Community Development. 3 Credits.
Study of communities viewed as social systems. Includes political, economic, social, and economic factors affecting community growth and decline. Community development methods are addressed. Prereq: SOC 404. {Also offered for graduate credit - see SOC 605.}.

SOC 407. Deviant Behavior. 3 Credits.
See Criminal Justice for description. {Also offered for graduate credit - see SOC 607.}.

SOC 410. Social Inequality. 3 Credits.
Analysis of social and economic inequities and investigation of the relationship between inequity and life chances. {Also offered for graduate credit - see SOC 610.}.

SOC 412. Sociology of Gender. 3 Credits.
This course examines the institutional norms, values, and attitudes that shape gender identity, as well as their affects on women and men's lives. Prereq: SOC 110. {Also offered for graduate credit - see SOC 612.}.

SOC 416. Sociology Through Literature. 3 Credits.
Study of basic concepts of sociology as illustrated in selected literature from 19th and 20th century English, American, French, and Russian novels. Prereq: SOC 110.

SOC 417. Sociology of the Family. 3 Credits.
Comparative family types, member relationships, family dynamics in relation to personality, social change, and social values. {Also offered for graduate credit - see SOC 617.}.

SOC 418. Social Psychology. 3 Credits.
Examination of both historical and contemporary research and theory in social psychology: the study of the relationship between the individual and the social context. Prereq: SOC 110. {Also offered for graduate credit - see SOC 618.}.

SOC 422. Development Of Social Theory. 3 Credits.
Sociological theories and systems from Comte, Marx, Durkheim, and Weber through the 20th century. Prereq: SOC 110. {Also offered for graduate credit - see SOC 622.}.

SOC 424. Feminist Theory and Discourse. 3 Credits.
Historical overview of feminist ideas and major writings from the 18th century to the present, which includes issues related to women's personal, social, and public lives.{Also offered for graduate credit - see SOC 624.}.

SOC 425. Sociology of Culture. 3 Credits.
This course introduces students to the foundations of the sociology of culture. Building on the ideas of the Frankfurt School and Birmingham Centre, this course explores topics such as subcultures and media culture. Prereq: SOC 110 or ANTH 111. {Also offered for graduate credit - see SOC 625.}.

SOC 426. Sociology of Medicine. 3 Credits.
Analysis of the social aspects of health and illness, the health care professions, organization of health care, and related issues. {Also offered for graduate credit - see SOC 626.}.

SOC 427. Public Health Law and Policy for Non-urban, Rural and Frontier Areas. 3 Credits.
This course explores the ways that laws and policies impact rural public health and medical care in the US, the impact of potential policies on public health, and the courts' role and interpretations of public health law.

SOC 431. Environmental Sociology. 3 Credits.
Examines the interactions between the biophysical environment and human society, how social processes define, construct, and threaten the environment, and the human causes and consequences of environmental problems and their solutions.{Also offered for graduate credit - see SOC 631.}.

SOC 439. Social Change. 3 Credits.
Analysis of the complex nature of social change in communities, the nation, and internationally. Prereq: SOC 110. {Also offered for graduate credit - see SOC 639.}.

SOC 440. Sociology of Aging. 3 Credits.
Examination of sociological perspectives on aging. Topics include social theories of aging, retirement, long-term care, chronic illness, and death.{Also offered for graduate credit - see SOC 640.}.

SOC 441. Death and Dying. 3 Credits.
Examination of research, theories, and case studies on the sociocultural dimensions of death and dying across time and societies. Topics include suicide, funerals, hospice practice, disasters, afterlife beliefs, grief, bereavement and memory, organ donation, death in popular culture, end-of-life issues, cemeteries and body disposition, euthanasia, art, film, music and literature, genocide, and war. Cross-listed with ANTH 441. {Also offered for graduate credit - see SOC 641.}.

SOC 443. International Disasters. 3 Credits.
Impacts of natural and human-made disasters on industrialized and developing societies; relief and reconstruction post-disaster programs. {Also offered for graduate credit - see SOC 643.}.

SOC 445. Special Populations in Disasters. 3 Credits.
Identification of special populations and their needs that arise in emergency or disaster situations both in industrialized and developing countries. {Also offered for graduate credit - see SOC 645.}.

SOC 465. Applied Demographics. 3 Credits.
Overview of demographic concepts and principles and their application to business and planning decisions. Emphasis on using databases and information sources available on the Internet. {Also offered for graduate credit - see SOC 665.}.

SOC 489. Senior Capstone In Sociology. 1 Credit.
Synthesis of social research methods, sociological theory, and sub-discipline content material. Emphasis on integrative skills needed to interrelate the basic concepts of the discipline. Prereq: SOC 340 or Senior standing.

SOC 491. Seminar. 1-5 Credits.

SOC 492. Study Abroad. 1-15 Credits.

SOC 494. Individual Study. 1-5 Credits.

SOC 496. Field Experience. 1-15 Credits.

SOC 499. Special Topics. 1-5 Credits.

SOC 601. Sociology of Religion. 3 Credits.
Study of religion viewed as a social institution with a characteristic history, ecology, structure, behavior, and purpose. Cross-listed with RELS 601. {Also offered for undergraduate credit - see SOC 401.}.

SOC 603. Sociology of The Great Plains. 3 Credits.
Social and cultural patterns, trends, and problems peculiar to life in the semi-arid Great Plains. {Also offered for undergraduate credit - see SOC 403.}.

SOC 604. Community Assessment. 3 Credits.
Students work with community leaders and their towns to conduct an asset-based community assessment of the town's human, social, cultural, political, built, financial, and natural capitals. {Also offered for undergraduate credit - see SOC 404.}.

SOC 605. Community Development. 3 Credits.
Study of communities viewed as social systems. Includes political, economic, social, and economic factors affecting community growth and decline. Community development methods are addressed. Prereq: SOC 604. {Also offered for undergraduate credit - see SOC 405.}.

SOC 607. Deviant Behavior. 3 Credits.
See Criminal Justice for description. {Also offered for undergraduate credit - see SOC 407.}.

SOC 610. Social Inequality. 3 Credits.
Analysis of social and economic inequities and investigation of the relationship between inequity and life chances. {Also offered for undergraduate credit - see SOC 410.}.

SOC 612. Sociology of Gender. 3 Credits.
This course examines the institutional norms, values, and attitudes that shape gender identity, as well as their affects on women and men's lives. {Also offered for undergraduate credit - see SOC 412.}.

SOC 617. Sociology Of The Family. 3 Credits.
Comparative family types, member relationships, family dynamics in relation to personality, social change, and social values. {Also offered for undergraduate credit - see SOC 417.}.

SOC 618. Social Psychology. 3 Credits.
Examination of both historical and contemporary research and theory in social psychology: the study of the relationship between the individual and the social context. {Also offered for undergraduate credit - see SOC 418.}.

SOC 622. Development Of Social Theory. 3 Credits.
Sociological theories and systems from Comte, Marx, Durkheim, and Weber through the 20th century. {Also offered for undergraduate credit - see SOC 422.}.

SOC 624. Feminist Theory and Discourse. 3 Credits.
Historical overview of feminist ideas and major writings from the 18th century to the present, which includes issues related to women's personal, social, and public lives. {Also offered for undergraduate credit - see SOC 424.}.

SOC 625. Sociology of Culture. 3 Credits.
This course introduces students to the foundations of the sociology of culture. Building on the ideas of the Frankfurt School and Birmingham Centre, this course explores topics such as subcultures and media culture. {Also offered for undergraduate credit - see SOC 425.}.

SOC 626. Sociology of Medicine. 3 Credits.
Analysis of the social aspects of health and illness, the health care professions, organization of health care, and related issues. {Also offered for undergraduate credit - see SOC 426.}.

SOC 631. Environmental Sociology. 3 Credits.
Examines the interactions between the biophysical environment and human society, how social processes define, construct, and threaten the environment, and the human causes and consequences of environmental problems and their solutions. {Also offered for undergraduate credit - see SOC 431.}.

SOC 639. Social Change. 3 Credits.
Analysis of the complex nature of social change in communities, the nation, and internationally. {Also offered for undergraduate credit - see SOC 439.}.

SOC 640. Sociology Of Aging. 3 Credits.
Examination of sociological perspectives on aging. Topics include social theories of aging, retirement, long-term care, chronic illness, and death. {Also offered for undergraduate credit - see SOC 440.}.

SOC 641. Death and Dying. 3 Credits.
Examination of research, theories, and case studies on the sociocultural dimensions of death and dying across time and societies. Topics include suicide, funerals, hospice practice, disasters, afterlife beliefs, grief, bereavement and memory, organ donation, death in popular culture, end-of-life issues, cemeteries and body disposition, euthanasia, art, film, music and literature, genocide, and war. Cross-listed with ANTH 641. {Also offered for undergraduate credit - see SOC 441.}.

SOC 643. International Disasters. 3 Credits.
Impacts of natural and human-made disasters on industrialized and developing societies; relief and reconstruction post-disaster programs. {Also offered for undergraduate credit - see SOC 443.}.

SOC 645. Special Populations in Disasters. 3 Credits.
Identification of special populations and their needs that arise in emergency or disaster situations both in industrialized and developing countries. {Also offered for undergraduate credit - see SOC 445.}.

SOC 665. Applied Demographics. 3 Credits.
Overview of demographic concepts and principles and their application to business and planning decisions. Emphasis on using databases and information sources available on the Internet. {Also offered for undergraduate credit - see SOC 465.}.

SOC 690. Graduate Seminar. 1-3 Credits.

SOC 692. Study Abroad. 1-15 Credits.

SOC 695. Field Experience. 1-15 Credits.

SOC 696. Special Topics. 1-5 Credits.

SOC 700. Qualitative Methods. 3 Credits.
Advanced analysis of the methods used in qualitative research projects such as intensive interviewing, focus groups, and participant observation.

SOC 701. Quantitative Methods. 3 Credits.
Advanced analysis of the methods used in quantitative research projects, such as survey design, experimental design, and evaluation research. Prereq: STAT 725.

SOC 723. Social Theory. 3 Credits.
Examination of contemporary social theories and theory construction. Prereq: SOC 622.

SOC 790. Graduate Seminar. 1-3 Credits.

SOC 791. Temporary/Trial Topics. 1-5 Credits.

SOC 793. Individual Study/Tutorial. 1-5 Credits.

SOC 794. Practicum/Internship. 1-8 Credits.

SOC 795. Field Experience. 1-15 Credits.

SOC 796. Special Topics. 1-5 Credits.

SOC 797. Master's Paper. 1-3 Credits.

SOC 798. Master's Thesis. 1-10 Credits.

Soil Science (SOIL)

SOIL 194. Individual Study. 1-5 Credits.

SOIL 196. Field Experience. 1-15 Credits.

SOIL 199. Special Topics. 1-5 Credits.

SOIL 210. Introduction to Soil Science. 3 Credits.
Physical, chemical and biological properties of soils, as related to use, conservation and plant growth. 2 lectures, 1 laboratory. F,S.

SOIL 217. Introduction to Meteorology & Climatology. 3 Credits.
Basic meteorology-climatology concepts and their application; includes energy balance, greenhouse effect, temperature, pressure systems, lows, highs, fronts, winds, clouds, storms, humidity, precipitation, and measurements. Lectures, discussions, demonstrations. S.

SOIL 264. Natural Resource Management Systems. 3 Credits.
General principles of natural resource management, including soil and water conservation, soil and wind erosion, use of tillage and vegetation for conservation, drainage, irrigation, and soil and water quality. 3 lectures. Prereq: MATH 103, MATH 104 or MATH 107. Cross-listed with ASM 264 and NRM 264.

SOIL 291. Seminar. 1-5 Credits.

SOIL 292. Study Abroad. 1-15 Credits.

SOIL 294. Individual Study. 1-5 Credits.

SOIL 299. Special Topics. 1-5 Credits.

SOIL 322. Soil Fertility and Fertilizers. 3 Credits.
Principles of plant nutrition and soil nutrient availability; soil testing and fertilizer recommendations and management. Macronutrient emphasis. 2 lectures, 1 two-hour laboratory. Prereq: SOIL 210, CHEM 121, CHEM 121L. S.

SOIL 351. Soil Ecology. 3 Credits.
Principles of soil-plant-animal interactions and their influences on environmental and agricultural issues of global significance (e.g. sustainable agriculture, global climate change, diversity conservation. Prereq: SOIL 210.

SOIL 379. Study Tour Abroad. 1-6 Credits.

SOIL 391. Seminar. 1-5 Credits.

SOIL 392. Study Abroad. 1-15 Credits.

SOIL 394. Individual Study. 1-5 Credits.

SOIL 397. Fe/Coop Ed/Internship. 1-4 Credits.

SOIL 399. Special Topics. 1-5 Credits.

SOIL 410. Soils and Land Use. 3 Credits.
Principles of chemistry, physics and biology will be used to determine the effects of soil management, agrichemical usage, livestock production, and vegetation on the environment using scales ranging from microsite to watershed. Prereq: SOIL 210, CHEM 121, CHEM 121L.{Also offered for graduate credit - see SOIL 610.}.

SOIL 433. Soil Physics. 3 Credits.
Soil as a three-phase system. Application to soil of physical principles and measurements of soil properties, including density, texture, structure, water content, heat capacity, and transport coefficients. Relationship of properties to agricultural and industrial contamination. 2 lectures, 1 laboratory. Prereq: SOIL 210, PHYS 211, MATH 146. F {Also offered for graduate credit - see SOIL 633.}.

SOIL 444. Soil Genesis and Survey. 3 Credits.
Introduction to soil genesis, morphology, geography and soil survey, 2 lectures, 1 four-hour laboratory (first 10 weeks only) focuses on soil description and properties in situ. Prereq: SOIL 210. F {Also offered for graduate credit - see SOIL 644.}.

SOIL 447. Microclimatology. 3 Credits.
Characteristics and causes of the climate near the ground and its interaction with living organisms. Energy and mass transfer concepts. Lectures, discussions, demonstrations, field trips. Prereq: PHYS 211. F (odd years) {Also offered for graduate credit - see SOIL 647.}.

SOIL 454. Wetland Resources Management. 3 Credits.
Principles of wetland systems, wetland management, wetland functions, wetland delineation, wetland assessment, and wetland improvement. Prereq: SOIL 210. Cross-listed with NRM 454 and RNG 454. F (even years) {Also offered for graduate credit - see SOIL 654.}.

SOIL 462. Natural Resource and Rangeland Planning. 3 Credits.
Capstone experience for School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Prereq: at least senior standing and must be a Natural Resources Management, Range Science or Soil Science major. Cross-listed with NRM and RNG. {Also offered for graduate credit - see SOIL 662.}.

SOIL 465. Soil And Plant Analysis. 3 Credits.
Laboratory analysis of soil, plant, and environmental materials for constituent elements. 2 lectures, 1 laboratory. Prereq: SOIL 210, CHEM 121, CHEM 122. S (odd years) {Also offered for graduate credit - see SOIL 665.}.

SOIL 491. Seminar. 1-5 Credits.

SOIL 492. Study Abroad. 1-15 Credits.

SOIL 494. Individual Study. 1-5 Credits.

SOIL 496. Field Experience. 1-15 Credits.

SOIL 499. Special Topics. 1-5 Credits.

SOIL 610. Soils and Land Use. 3 Credits.
Principles of chemistry, physics and biology will be used to determine the effects of soil management, agrichemical usage, livestock production, and vegetation on the environment using scales ranging from microsite to watershed. {Also offered for undergraduate credit - see SOIL 410.}.

SOIL 633. Soil Physics. 3 Credits.
Soil as a three-phase system. Application to soil of physical principles and measurements of soil properties, including density, texture, structure, water content, heat capacity, and transport coefficients. Relationship of properties to agricultural and industrial contamination. 2 lectures, 1 laboratory. F {Also offered for undergraduate credit - see SOIL 433.}.

SOIL 644. Soil Genesis and Survey. 3 Credits.
Introduction to soil genesis, morphology, geography and soil survey, 2 lectures, 1 four-hour laboratory (first 10 weeks only) focuses on soil description and properties in situ. F {Also offered for undergraduate credit - see SOIL 444.}.

SOIL 647. Microclimatology. 3 Credits.
Characteristics and causes of the climate near the ground and its interaction with living organisms. Energy and mass transfer concepts. Lectures, discussions, demonstrations, field trips. F (odd years) {Also offered for undergraduate credit - see SOIL 447.}.

SOIL 654. Wetland Resources Management. 3 Credits.
Principles of wetland systems, wetland management, wetland functions, wetland delineation, wetland assessment, and wetland improvement. Cross-listed with NRM 654 and RNG 654. F (even years) {Also offered for undergraduate credit - see SOIL 454.}.

SOIL 662. Natural Resource and Rangeland Planning. 3 Credits.
Capstone experience for School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Cross-listed with NRM and RNG. {Also offered for undergraduate credit - see SOIL 462.}.

SOIL 665. Soil And Plant Analysis. 3 Credits.
Laboratory analysis of soil, plant, and environmental materials for constituent elements. 2 lectures, 1 laboratory. S (odd years.) {Also offered for undergraduate credit - see SOIL 465.}.

SOIL 690. Graduate Seminar. 1-3 Credits.

SOIL 695. Field Experience. 1-15 Credits.

SOIL 696. Special Topics. 1-5 Credits.

SOIL 721. Environmental Field Instrumentation and Sampling. 2 Credits.
To provide an overview of the tools (manual and electronic) concepts, and theories used to sample for physical, chemical, and biological parameters. F (odd years) (Two one-hour lectures and one four-hour laboratory per week.).

SOIL 733. Advanced Soil Nutrient Cycling. 3 Credits.
Overview of origins, nature, fate, and measurements of organic matter in soils, with specific focus on microbially-mediated, physical, and chemical processing of carbon, nitrogen, phosphorus, and other plant nutrients. Three lectures per week. Offered spring semester, even years.

SOIL 755. Soil Chemistry. 3 Credits.
Chemical reactions and equilibria, solubility relationships, mineral weathering, cation and anion adsorption, redox reactions, metal chelation, and fixation of nutrients in the soil. 3 lectures. F.

SOIL 763. Advanced Soil Physics. 3 Credits.
Composition of soil in terms of solid, liquid, and gaseous phases. Theory of water, heat, and solute transport processes. Water availability for plant growth. 2 lectures, 1 laboratory. Prereq: SOIL 633. (even years).

SOIL 782. Advanced Soil Fertility. 2 Credits.
Advanced study of soil-plant-nutrient relationships with emphasis on concepts of soil fertility, ion absorption, nutrient transformation, and interpretation of experimental data. 2 lectures. F (even years).

SOIL 790. Graduate Seminar. 1-3 Credits.

SOIL 791. Temporary/Trial Topics. 1-5 Credits.

SOIL 792. Graduate Teaching Experience. 1-6 Credits.

SOIL 793. Individual Study/Tutorial. 1-5 Credits.

SOIL 794. Practicum/Teaching. 1-8 Credits.

SOIL 795. Field Experience. 1-15 Credits.

SOIL 796. Special Topics. 1-5 Credits.

SOIL 797. Master's Paper. 1-3 Credits.

SOIL 798. Master's Thesis. 1-10 Credits.

SOIL 892. Graduate Teaching Experience. 1-6 Credits.

SOIL 893. Individual Study. 1-5 Credits.

SOIL 899. Doctoral Dissertation. 1-15 Credits.

Spanish (SPAN)

SPAN 101. First-Year Spanish I. 4 Credits.
Basic structures and vocabulary of Spanish. Practice in the fundamentals of listening, speaking, reading, and writing. No previous knowledge of Spanish required.

SPAN 102. First-Year Spanish II. 4 Credits.
Basic structures and vocabulary of Spanish. Practice in the fundamentals of listening, speaking, reading, and writing. Prereq: SPAN 101.

SPAN 194. Individual Study. 1-3 Credits.

SPAN 196. Field Experience. 1-15 Credits.

SPAN 199. Special Topics. 1-5 Credits.

SPAN 201. Second-Year Spanish I. 3 Credits.
Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary readings. Prereq: SPAN 102.

SPAN 202. Second-Year Spanish II. 3 Credits.
Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary readings. Prereq: SPAN 201.

SPAN 291. Seminar. 1-5 Credits.

SPAN 292. Study Abroad. 1-15 Credits.

SPAN 294. Individual Study. 1-5 Credits.

SPAN 299. Special Topics. 1-5 Credits.

SPAN 311. Spanish Conversation and Composition I. 3 Credits.
Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: SPAN 202.

SPAN 312. Spanish Conversation and Composition II. 3 Credits.
Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: SPAN 202.

SPAN 330. Introduction to Spanish Civilization. 3 Credits.
Introduction to the social, political and cultural history of Spain. Taught in Spanish. Prereq: SPAN 312.

SPAN 331. Introduction to Spanish American Civilization. 3 Credits.
Introduction to the social, political and cultural history of the Spanish-speaking Americas. Taught in Spanish. Prereq: SPAN 312.

SPAN 332. Introduction to Hispanic Cinema. 3 Credits.
Study of film genres, styles, or movements, focusing on aesthetic conventions, cultural context, socio-historical significance and critical approaches. Prereq: SPAN 312.

SPAN 379. Study Tour Abroad. 1-6 Credits.

SPAN 391. Seminar. 1-5 Credits.

SPAN 392. Study Abroad. 1-15 Credits.

SPAN 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 430. Approaches to Literature. 3 Credits.
Emphasis on critical analysis of Spanish-language literary texts from a variety of theoretical perspectives so that students will develop the technical vocabulary necessary to discuss literary texts in Spanish and grasp levels of meaning in the literature. Taught in Spanish. Prereq: SPAN 312.

SPAN 440. Traditions in Spanish American Literature. 3 Credits.
Representative works from the pre-conquest era to the 21st century. Overview of literary movements, genres, and cultural background. Taught in Spanish. Prereq: SPAN 312. Formerly SPAN 411.

SPAN 441. Contemporary Spanish American Literature. 3 Credits.
Developments and techniques in contemporary texts through representative works. Overview of cultural, historical, and socio-political aspects, as well as literary background. Taught in Spanish. Prereq: SPAN 312. Formerly SPAN 412.

SPAN 442. Introduction to Chicano Literature. 3 Credits.
Study of Chicano Literature, from the 19th century "californios" through the Chicano Renaissance to recent work by Chicana writers. Taught in Spanish. Prereq: SPAN 312 plus 6 additional upper-division credits. {Also offered for graduate credit - see SPAN 642.}.

SPAN 443. Spanish American Women Writers. 3 Credits.
Developments and techniques in major texts by Spanish American women writers through representative works. Overview of cultural, historical and socio-political aspects, as well as literary background and criticism. Taught in Spanish. Prereq: SPAN 312.

SPAN 450. Traditions in Spanish Literature. 3 Credits.
Representative works of the literature of Spain from its epic beginnings to the contemporary period. Overview of literary movements, genres, and cultural background. Taught in Spanish. Prereq: SPAN 312. Formerly SPAN 410.

SPAN 451. Contemporary Spanish Literature. 3 Credits.
Representative works of the literature of Spain from modernity forward. Overview of literary movements, genres, and cultural background. Taught in Spanish. Prereq: SPAN 312.

SPAN 452. Cervantes. 3 Credits.
Study of representative works by Miguel de Cervantes, including Don Quixote. Taught in Spanish. Prereq: SPAN 312.

SPAN 453. Spanish Women Writers. 3 Credits.
Survey of representative works by women in the Spanish literary tradition. Prereq: SPAN 312.

SPAN 489. Senior Thesis. 1 Credit.
Integrative capstone experience for seniors majoring in Spanish; faculty guided research within the context of a 400-level literature or culture course leading to a substantive written project in Spanish and oral presentation to faculty and departmental majors. Prereq: Senior standing, study abroad.

SPAN 491. Seminar. 1-5 Credits.

SPAN 492. Study Abroad. 1-15 Credits.

SPAN 494. Individual Study. 1-5 Credits.

SPAN 496. Field Experience. 1-15 Credits.

SPAN 499. Special Topics. 1-5 Credits.

SPAN 642. Introduction to Chicano Literature. 3 Credits.
Study of Chicano Literature, from the 19th century "californios" through the Chicano Renaissance to recent work by Chicana writers. Taught in Spanish. {Also offered for undergraduate credit - see SPAN 442.}.

Statistics (STAT)

STAT 194. Individual Study. 1-5 Credits.

STAT 196. Field Experience. 1-15 Credits.

STAT 199. Special Topics. 1-5 Credits.

STAT 291. Seminar. 1-5 Credits.

STAT 292. Study Abroad. 1-15 Credits.

STAT 294. Individual Study. 1-5 Credits.

STAT 299. Special Topics. 1-5 Credits.

STAT 330. Introductory Statistics. 3 Credits.
Frequency tables, histograms, probability, well-known probability distributions, one and two sample tests of hypotheses, confidence intervals, and contingency tables. Prereq: MATH 103, MATH 104 or MATH 107 or Math placement into MATH 105, MATH 146 or MATH 165.

STAT 331. Regression Analysis. 2 Credits.
Simple and multiple regression techniques and correlation coefficients. Extensive use of SAS. Emphasis on applications. Prereq: STAT 330.

STAT 367. Probability. 3 Credits.
Probability, probability distributions for discrete random variables, probability density functions, marginal joint probability density functions, expected value and variance, and transformations. Prereq: MATH 166.

STAT 368. Statistics. 3 Credits.
Moments, moment generating functions, central limit theorem, one and two sample tests of hypotheses, estimation, and simple linear regression and correlation. Prereq: STAT 367.

STAT 379. Study Tour Abroad. 1-6 Credits.

STAT 391. Seminar. 1-5 Credits.

STAT 392. Study Abroad. 1-15 Credits.

STAT 394. Individual Study. 1-5 Credits.

STAT 399. Special Topics. 1-5 Credits.

STAT 450. Stochastic Processes. 3 Credits.
Discrete time Markov chains, Poisson processes, continuous time Markov chains, birth and death processes, renewal processes, branching processes, queuing systems, and applications. Prereq: STAT 368. {Also offered for graduate credit - see STAT 650.}.

STAT 460. Applied Survey Sampling. 3 Credits.
Simple random, stratified, systematic and cluster sampling; two-stage sampling. Estimation of population means and variances. Ratio and regression estimators. Prereq: STAT 330 or STAT 368. {Also offered for graduate credit - see STAT 660.}.

STAT 461. Applied Regression Models. 3 Credits.
Simple linear regression, matrix approach to multiple regression, and introduction to various tests and confidence intervals. Includes discussion of multicollinearity and transformations. Prereq: STAT 330 or STAT 368. {Also offered for graduate credit - see STAT 661.}.

STAT 462. Introduction to Experimental Design. 3 Credits.
Fundamental principles of designing an experiment, randomized block, Latin square, and factorial. Also covers analysis of covariance and response surface methodology. The class is designated as an undergraduate capstone course. Prereq: 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. {Also offered for graduate credit - see STAT 671.}.

STAT 472. Time Series. 3 Credits.
Estimation of trend in time series data; seasonal models; stationary models; moving average, autoregressive, and ARMA models; model identification; forecasting; and intervention analysis. Prereq: STAT 468, STAT 461, course in matrix algebra. {Also offered for graduate credit - see STAT 672.}.

STAT 473. Actuarial Statistical Risk Analysis. 3 Credits.
Individual and collective actuarial risk models for claim random variables with applications in risk and survival analysis. Basics of interest theory and utility theory are also covered. The course is intended to prepare students for taking SOA/CAS Exam-2. Prereq: STAT 367 or STAT 467. {Also offered for graduate credit - see STAT 673.}.

STAT 476. Actuary Exam Study II. 1 Credit.
Selected material from probability and mathematical statistics in preparation for the national actuarial exam. Prereq: STAT 368 or STAT 468.

STAT 477. Introductory Survival and Risk Analysis I. 3 Credits.
Survival distributions, life tables, and various risk models, intended to prepare students for taking higher level actuarial exams: SOA1 Course FM/CAS2 Exam 2 and SOA Course MLC/CAS Exam 3L. Prereq: STAT 367 or STAT 467. {Also offered for graduate credit - see STAT 677 .}.

STAT 478. Introductory Survival & Risk Analysis II. 3 Credits.
Distribution of the random variable- the time until future of a joint-life status, life tables, competing risks and multiple decrement probabilities, Markov chain and Poisson models, indented to prepare students for taking the actuarial exams: SOA1 Course MLC/CAS2 Exam 3L. Prereq: STAT 477 or STAT 677. {Also offered for graduate credit - see STAT 678.}.

STAT 491. Seminar. 1-5 Credits.

STAT 492. Study Abroad. 1-15 Credits.

STAT 494. Individual Study. 1-5 Credits.

STAT 496. Field Experience. 1-15 Credits.

STAT 499. Special Topics. 1-5 Credits.

STAT 650. Stochastic Processes. 3 Credits.
Discrete time Markov chains, Poisson processes, continuous time Markov chains, birth and death processes, renewal processes, branching processes, queuing systems, and applications. {Also offered for undergraduate credit - see STAT 450.}.

STAT 660. Applied Survey Sampling. 3 Credits.
Simple random, stratified, systematic and cluster sampling; two-stage sampling. Estimation of population means and variances. Ratio and regression estimators. {Also offered for undergraduate credit - see STAT 460 .}.

STAT 661. Applied Regression Models. 3 Credits.
Simple linear regression, matrix approach to multiple regression, and introduction to various tests and confidence intervals. Includes discussion of multicollinearity and transformations. {Also offered for undergraduate credit - see STAT 461.}.

STAT 662. Introduction to Experimental Design. 3 Credits.
Fundamental principles of designing an experiment, randomized block, Latin square, and factorial. Also covers analysis of covariance and response surface methodology. {Also offered for undergraduate credit - see STAT 462.}.

STAT 663. Nonparametric Statistics. 3 Credits.
Various tests and confidence intervals that may be used when the underlying probability distributions are unknown. Includes the Wilcoxon, Kruskal-Wallis, and Friedman. {Also offered for undergraduate credit - see STAT 483.}.

STAT 664. Discrete Data Analysis. 3 Credits.
Application of binomial, hypergeometric, Poisson, mixed Poisson, and multinomial distributions in discrete data analysis. Log-linear models and contingency tables. Logistic regression. Discrete discriminant analysis. {Also offered for undergraduate credit - see STAT 464.}.

STAT 665. Meta-Analysis Methods. 3 Credits.
Statistical methods for meta-analysis with applications. Various parametric effect size from a series of experiments: fixed effect, random effect linear models; combining estimates of correlation coefficients; meta-analysis in the physical and biological sciences. Prereq: STAT 661 or STAT 725. {Also offered for undergraduate credit - see STAT 465.}.

STAT 669. Introduction to Biostatistics. 3 Credits.
Introduction to biostatistical concepts and reasoning. Inference on means and proportion; Hypothesis testing; Group comparisons; Nonparametric methods; Sample size estimation; Contingency table; Simple and multiple regression; Logistic regression. {Also offered for undergraduate credit - see STAT 469.}.

STAT 670. Statistical SAS Programming. 3 Credits.
Focuses on statistical problem solving and writing SAS computer code. Data types, data management, data input/output, SAS as a programming language, data analysis, report writing, and graphing. Prereq: STAT 661 or STAT 662. {Also offered for undergraduate credit - see STAT 470.}.

STAT 671. Introduction to the R Language. 3 Credits.
R commands, expressions, functions, and matrix operations. Elements of programming and graphics in R. Statistical problem solving with R: linear regression, experimental design. {Also offered for undergraduate credit - see STAT 471.}.

STAT 672. Time Series. 3 Credits.
Estimation of trend in time series data; seasonal models; stationary models; moving average, autoregressive, and ARMA models; model identification; forecasting; and intervention analysis. Prereq: STAT 768, STAT 661, course in matrix algebra. {Also offered for undergraduate credit - see STAT 472.}.

STAT 673. Actuarial Statistical Risk Analysis. 3 Credits.
Individual and collective actuarial risk models for claim random variables with applications in risk and survival analysis. Basics of interest theory and utility theory are also covered. The course is intended to prepare students for taking SOA/CAS Exam-2. {Also offered for undergraduate credit - See STAT 473.}.

STAT 677. Introductory Survival and Risk Analysis I. 3 Credits.
Survival distributions, life tables, and various risk models, intended to prepare students for taking higher level actuarial exams: SOA1 Course FM/CAS2 Exam 2 and SOA Course MLC/CAS Exam 3L. {Also offered for undergraduate credit - see STAT 477.}.

STAT 678. Introductory Survival and Risk Analysis II. 3 Credits.
Distribution of the random variable- the time until future of a joint-life status, life tables, competing risks and multiple decrement probabilities, Markov chain and Poisson models, indented to prepare students for taking the actuarial exams: SOA1 Course MLC/CAS2 Exam 3L. Prereq: STAT 677. {Also offered for undergraduate credit - see STAT 478.}.

STAT 690. Graduate Seminar. 1-3 Credits.

STAT 696. Special Topics. 1-5 Credits.

STAT 725. Applied Statistics. 3 Credits.
Data description, probability, inference on means, proportions, difference of means and proportions, categorical data, regression, analysis of variance, and multiple comparisons. Prereq: Knowledge of algebra. This course is not intended for statistics or mathematics majors.

STAT 726. Applied Regression and Analysis of Variance. 3 Credits.
Simple and multiple regression, ANOVA tables, correlation, regression diagnostics, selection procedures, analysis of covariance, one-way ANOVA, two-way ANOVA. Prereq: STAT 725.

STAT 730. Biostatistics. 3 Credits.
Logit model, 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 774. Linear Models I. 3 Credits.
This course introduces the statistical theory and inference of generalized linear models (GLMs) which deals the cases that the normality of response data is in absence. The course starts from a review of linear regression with matrix approach. The topic includes exponential distribution family, link functions, contingency tables, GLMs, quasi-GLMs, deviance, residuals, model selection and diagnostics. Students are expected to be able to apply GLMs technique to deal with real world problems in diverse areas. Prereq: STAT 768.

STAT 775. Using Statistics in Sports. 3 Credits.
This course explores the use of statistics in various sports including football, basketball, baseball, among others. Research articles in sports statistics will be discussed. Various statistical techniques will be considered. Prereq: STAT 661, 662, 768.

STAT 777. Multivariate Theory. 3 Credits.
Wishart distribution, distribution of Hotelling's T-square and Lambda statistics, cluster analysis, correspondence analysis, principal components, factor analysis, discriminant analysis, multidimensional scaling. Prereq: STAT 764.

STAT 778. Modern Probability Theory. 3 Credits.
Probability theory presented from the measure theoretic perspective. Emphasis on various types of convergence and limit theorems. Discussion of random walks, conditional expectations, and martingales. Prereq: STAT 768 or MATH 750. Cross-listed with MATH 778.

STAT 780. Asymptotics, Bootstrap, and Other Resampling Plans. 3 Credits.
Development of large sample and small sample properties of a variety of estimators. Prereq: STAT 768.

STAT 786. Advanced Inference. 3 Credits.
This course is aimed at providing theoretical tools in mathematical statistics and cultivating students' ability in understanding statistical research papers. Theory of point estimation and asymptotic theory will be covered. Prereq: STAT 768.

STAT 790. Graduate Seminar. 1-3 Credits.

STAT 791. Temporary/Trial Topics. 1-5 Credits.

STAT 793. Individual Study/Tutorial. 1-5 Credits.

STAT 794. Practicum/Internship. 1-15 Credits.

STAT 795. Field Experience. 1-15 Credits.

STAT 796. Special Topics. 1-5 Credits.

STAT 797. Master's Paper. 1-3 Credits.

STAT 798. Master's Thesis. 1-10 Credits.

STAT 840. Introduction to Statistical Design and Analysis of Gene Expression Experiments. 3 Credits.
Introduction to microarray and next generation sequencing technologies; design of gene expression experiments; normalization methods; methods for identifying differentially expressed genes; multiple testing and false discovery rate; gene category analysis.Prereq: STAT 661, STAT 662. Prereq or Co-req: STAT 671.

STAT 851. Bayesian Statistical Inference. 3 Credits.
Bayesian approach to statistics inference including model estimation and hypothesis test. The topic covers prior and posterior, Bayes estimate, credible interval, risk, Bayes factor, hypothesis testing, Bayesian hierarchical models, and Bayes computational methods. Prereq: STAT 768.

STAT 852. Longitudinal Data Analysis. 3 Credits.
To introduce students to statistical models and methods for the analysis of the longitudinal data, i.e. data collected repeatedly on experimental units over time. The topic covers repeated measurements; event history studies; linear and nonlinear mixed effects models; marginal mean and rate models; joint analysis of longitudinal and survival data. Prereq: STAT 661, STAT 768.

STAT 859. Applied Spatial Statistics. 3 Credits.
Elementary statistical analysis of spatial data are covered. The course is repeatable for credit on a non-standard basis. Prereq: STAT 661, STAT 764 and STAT 768. Co-req: STAT 671.

STAT 899. Doctoral Dissertation. 1-15 Credits.

Theatre Arts (THEA)

THEA 101. Department Participation. 0 Credits.
Fulfillment of various departmental co-curricular obligations. May be repeated.

THEA 110. Introduction to Theatre Arts. 3 Credits.
Basic orientation and historical perspective to the art of theatre. Includes the spectrum of dramatic literature, theatrical production, and performance.

THEA 115. World Film. 3 Credits.
Study of the development and practice of the art of film and its relationship to the theater emphasizing performance and production angles.

THEA 150. Theatre Foundations I. 1 Credit.
Seminar course for first year Theatre majors. Covers various topics related to resume and portfolio building. Meets once a week.

THEA 160. Storytelling. 3 Credits.
Students will explore narrative, story structure, and theatrical storytelling through creative drama and performance techniques. This class will serve as a prerequisite for the Theatre for Young Audiences Ensemble.

THEA 161. Acting I. 3 Credits.
Beginning actors are introduced to basic mental and physical performance skills, stage conventions, and scene work. Emphasis on enhancing the student's spontaneity, imagination, and awareness.

THEA 180. Dramatic Literature and Style I. 3 Credits.
Introductory survey of theatrical performance and dramatic writing from the Greeks through the eighteenth century.

THEA 181. Dramatic Literature & Style II. 3 Credits.
Survey of dramatic literature from 19th century to present, with emphasis on historical and cultural context, production style, and problems inherent in contemporary production.

THEA 194. Individual Study. 1-5 Credits.

THEA 196. Field Experience. 1-15 Credits.

THEA 199. Special Topics. 1-5 Credits.

THEA 210. Theatre Practicum. 1-2 Credits.
Participation in Theatre NDSU's production season. May be repeated for credit.

THEA 211. Stage Management Practicum and Seminar. 2 Credits.
Practical application of stage management's practices including independent study and mentorship. Students must serve as an assistant stage manager on a mainstage production to enroll in this practicum. May be repeated for credit.

THEA 220. Stagecraft Lab. 1 Credit.
Stagecraft Lab for participation inTheatre NDSU's production season by working hands-on in the scene shop to create scenery and properties. Prereq or Co-req: THEA 270.

THEA 221. Costume Craft Lab. 1 Credit.
Participation in Theatre NDSU's production season by working hands-on in the costume shop. Co-req: THEA 271.

THEA 222. Scenic Design Lab. 1 Credit.
Further study and practice of scenic design by participating in the preparation of scenery and props for the Theatre NDSU production season. Co-req: THEA 278.

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 250. Theatre Foundations II. 1 Credit.
Seminar course for second year Theatre majors. Covers various topics related to auditions/interviews and pursuing careers in theatre. Meets once a week.

THEA 260. Theatre for Young Audiences Ensemble. 3 Credits.
The Theatre for Young Audiences Ensemble will use improvisation, storytelling, and creative drama techniques to create an original play for young audiences. Class will culminate with the ensemble presenting their play in local schools. Prereq: THEA 160.

THEA 261. Advanced Acting. 3 Credits.
Practical application of fundamental skills to textual work. Prereq: THEA 161.

THEA 262. Introduction to Dance. 2 Credits.
Practicum course expanding the beginning student performer's physical/kinesthetic awareness. Examines basic styles of dance as employed in theatrical presentation (ballet, modern dance, jazz, and/or tap). Basics in theatre dance audition techniques, and choreography.

THEA 263. Dance Studio. 2 Credits.
Introduction to the basic concepts and principles of ballet, modern, jazz, ballroom, swing, or tap dance through studio experiences. Each semester will focus on one specific style. May be repeated for credit with change in topic.

THEA 266. Voice and Movement for the Actor. 3 Credits.
An introduction to the theory and practice of ideal vocal production and physical self-use. Exercises are offered addressing breath control, alignment, relaxation, resonance, articulation, projection, and expansion of physical and vocal creative expression. Prereq: THEA 161.

THEA 267. Acting for the Camera. 3 Credits.
An introductory examination and exploration of the technique of acting for the camera. This class is a practical studio course where students take their acting skills and adapt them for the use of camera acting. Prereq: THEA 161.

THEA 268. Acting the Song I. 3 Credits.
Study and application of the integration of acting and singing techniques. Restricted to Theatre and Music majors only. Prereq: MUSC 167 (1 semester). Co-req: THEA 161.

THEA 270. Stagecraft. 3 Credits.
An introduction to the crafts and technologies used in the production of scenery, lighting and sound in the theatre. Three 1-hour lectures, one 2-hour laboratory.

THEA 271. Costume Craft. 3 Credits.
Introduction to the techniques used for constructing costumes for theatre. 3 lectures, 1 two-hour laboratory.

THEA 272. Drawing for the Theatre. 3 Credits.
Introduction to drawing for the theatre to include hand and computer-assisted drafting techniques.

THEA 274. Introduction To Stage Design. 3 Credits.
Translation of text and music into ideas for stage design (scenery, costumes, lights) and introduction to use of both traditional and modern technologies in the process.

THEA 275. Theatrical Makeup Design. 3 Credits.
Fundamentals of stage makeup.; facial analysis and introduction to materials and techniques. Character interpretation through two and three-dimensional application.

THEA 276. Lighting and Sound Design for the Theatre. 3 Credits.
An introduction to the art of theatrical lighting and sound design.

THEA 277. Costume Design for the Theatre. 3 Credits.
Introduction to the principles and practices of costume design for the theatre through script analysis, research, fabric selection, and sketching.

THEA 278. Introduction to Design: Scenic Design. 3 Credits.
This course introduces students to scenic design for the stage through play analysis, research, preliminary sketches, drafting, paint elevations and model building.

THEA 279. Scenic Painting. 3 Credits.
This course covers basic scenic painting techniques and common practices.

THEA 280. World Theatre. 3 Credits.
Survey of the theatre and drama of various European and non-Western cultures.

THEA 291. Seminar. 1-5 Credits.

THEA 292. Study Abroad. 1-15 Credits.

THEA 294. Individual Study. 1-5 Credits.

THEA 296. Field Experience. 1-15 Credits.

THEA 299. Special Topics. 1-5 Credits.

THEA 301. Musical Theatre Troupe. 1 Credit.
A select performance ensemble of 10-20 students. Students will develop, do research on, and present songs and choreography from musical theatre productions. By audition and permission of instructor. May be repeated.

THEA 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. 1 Credit.
Integration of beginning dance techniques in the standard theatre dance repertoire through studio experiences. Prereq: THEA 262.

THEA 363. Dance Studio II. 2 Credits.
Intermediate study in the study of the concepts and principles of ballet, modern, jazz, or tap dance through studio practice and performance. May be repeated for credit. Prereq: THEA 263.

THEA 365. Directing I. 3 Credits.
Introduction to the creative process of directing. Focus on script analysis, basic directing tools, and scene work. Prereq: THEA 161.

THEA 368. Business of Acting. 3 Credits.
Advanced study in business of acting, addressing resume/portfolio, photos, audition package/interviews, agents, unions, graduate programs, national theatre organizations, and audition resources. Prereq: BFA standing, THEA 261, THEA 266.

THEA 370. Technical Theatre Production. 1-3 Credits.
Advanced study in technical theatre production. Emphasis on planning and realization of technical theatre elements. Hours arranged as appropriate to assignment. Student should consult with instructor on number of credits to take. May be repeated for credit.

THEA 376. Theatrical Design Studio I: Theatrical Drawing and Rendering. 3 Credits.
Drawing and rendering techniques for theatrical designers.

THEA 377. Theatrical Design Studio II: Collaboration of the Designer. 3 Credits.
Development of collaboration, enhancement of design theory, and advanced practice of the design process.

THEA 379. Study Tour Abroad. 1-6 Credits.

THEA 381. Technical Theatre Seminar. 1 Credit.
A detailed study into the different technologies and processes involved in the technical areas of theatrical production. Each class will involve concentrated study in one category of technical production skills. May be repeated for credit.

THEA 386. Theatrical Design Studio III; Design for Alternative Venues. 3 Credits.
Advanced study, studio practice and critique. Development of concept and content for alternative venues. Prereq: THEA 286, THEA 287.

THEA 387. Theatrical Design Studio IV; Research in the Studio. 3 Credits.
Advanced study, studio practice and critique. Emphasis on research techniques, professional practice, and presentation. Prereq: THEA 286, THEA 287.

THEA 391. Seminar. 1-5 Credits.

THEA 392. Study Abroad. 1-15 Credits.

THEA 394. Individual Study. 1-5 Credits.

THEA 396. Field Experience. 1-15 Credits.

THEA 397. Co-op Internship. 1-5 Credits.

THEA 399. Special Topics. 1-5 Credits.

THEA 450. Capstone Experience. 3 Credits.
Demonstration of mastery in selected area of theatre through an advanced project in acting, directing, design/technical theatre, or dramaturgy. Departmental capstone experience. Prereq: Senior standing.

THEA 461. Acting Shakespeare. 3 Credits.
Advanced training in techniques for analysis, preparation and performance of Shakespeare's plays and sonnets. Prereq: BFA standing with emphasis in Performance,THEA 261, THEA 266.

THEA 462. Acting Styles. 3 Credits.
Introduction to various major performance styles, ranging from Greek tragedy through twentieth century nonrealism Styles covered include Greek, French neoclassical, Brechtian epic theatre, and absurdism. Prereq: THEA 261.

THEA 465. Directing II. 3 Credits.
Problems in directing, formulating production concepts, casting, working with actors, and aiding characterization. Includes preliminary work with thrust and arena staging. Prereq: THEA 365. {Also offered for graduate credit - see THEA 665.}.

THEA 466. Advanced Voice for the Actor. 3 Credits.
Intensive examination/development of the vocal mechanism. Focus on consonant/vowel production, diction/articulation, resonance/placement, and breath/posture complemented by introduction of IPA, character voices, and dialects. Prereq: BFA standing in Performance Track, THEA 266.

THEA 467. Advanced Movement for the Actor. 3 Credits.
Advanced level movement course introducing codified styles of theatre movement including neutral and character mask, pedestrian mime, unarmed and armed stage combat Prereq: BFA standing, THEA 266.

THEA 468. Acting the Song II. 3 Credits.
Advanced study/application of the integration of acting and singing techniques. Restricted to Theatre and Music majors only. Prereq: MUSC 167 (2 semesters), MUSC 267 (2 semesters), THEA 161, THEA 268, and either THEA 262 or THEA 263.

THEA 480. History and Literature of Theatre I. 3 Credits.
Historical study of theatre architecture, staging methods, individual artists and plays from the theatre's origins through the 17th century. Prereq: THEA 180 and THEA 181.

THEA 481. History and Literature of the Theatre II. 3 Credits.
Historical study of theatre architecture, staging methods, individual artists and plays from the 18th century to the present. Prereq: THEA 480.

THEA 486. History of Dress and Decor I; the Foundations of Western Style. 3 Credits.
Survey of historical architecture, interiors, and clothing beginning with antiquity through the 18th century.

THEA 487. History of Dress and Decor II; Western Style since 1800. 3 Credits.
Survey of historical architecture, interiors, and clothing after 1800 through the 1970s.

THEA 491. Seminar. 1-5 Credits.

THEA 492. Study Abroad. 1-15 Credits.

THEA 494. Individual Study. 1-5 Credits.

THEA 494H. Individual Study. 1-3 Credits.

THEA 496. Field Experience. 1-15 Credits.

THEA 499. Special Topics. 1-5 Credits.

THEA 665. Directing II. 3 Credits.
Problems in directing, formulating production concepts, casting, working with actors, and aiding characterization. Includes preliminary work with thrust and arena staging. {Also offered for undergraduate credit - see THEA 465.}.

THEA 797. Master's Paper. 1-3 Credits.

Transportation & Logistics (TL)

TL 711. Logistics Systems. 4 Credits.
Foundation material critical to establishing effective supply chains in various decision making environments. Topics include inventory theory, forecasting, aggregate planning, and project management. Decision making techniques include linear programming, process flow analysis, and simulation.

TL 715. 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. International Logistics Management. 4 Credits.
This course provides a coherent perspective on contemporary global logistics from raw materials through production to the customer. Addresses the roles of governments and intermediaries, international sourcing and the application of local trade laws. Discussion of economic, political, and social issues that may affect international transportation. Prereq: TL 711.

TL 723. Advanced Supply-Chain Planning Across the Enterprise. 3 Credits.
Builds on theories and tools developed in TL 711. By understanding both current capabilities and evolving needs of an organization, the appropriate modifications to the organization's supply chain can be identified. Prereq: TL 711.

TL 725. 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 727. Organizational Change Management. 3 Credits.
Change management as the process of making either incremental improvements or radical changes to an organization for the purpose of enhancing both organizational and individual effectiveness. A multi-perspective systems viewpoint is employed, stressing pragmatic implications for leadership.

TL 729. Adaptive Planning in Logistics Systems. 3 Credits.
Presents a systems view with a focus on how remote sensing technology enables sense and respond logistics. Topics include organizational structure, strategic alliances, programmed decision making, supply-chain dynamics, and the value of information transparency. Prereq: TL 711.

TL 731. Logistics Decision Analysis. 3 Credits.
This course covers collection, management and analysis of logistics information necessary to make good decisions as well as quantitative decision analysis models for systematic evaluation of decision situations involving uncertainty, complexity, alternatives, and preferences.

TL 733. Case Studies in Logistics. 3 Credits.
This course will focus on actual logistics cases along with solutions and how individual/organizational decisions relate to the ultimate outcome. Analyzing processes which would have reduced/eliminated the supply chain's susceptibility to success or failure.

TL 735. Practical Data Analytics. 3 Credits.
This course provides a comprehensive overview of data analytics and business intelligence concepts with practical experience using market-leading enterprise software solutions. Topics include data management, the extract-transform-load process, data cleansing, data reporting and visualization, building dashboards, development and use of online analytical processing (OLAP) cubes, data warehouses, and data mining.

TL 751. Transportation Systems Security. 3 Credits.
This course examines security threats and solutions related to transportation systems. Specific focus is placed securing passenger and freight modes of transportation including railroad, highway, aviation, maritime and pipelines from acts of terrorism and intentional disruption.

TL 752. Transportation Planning and Environmental Compliance. 3 Credits.
This course provides an overview of the procedures of transportation planning and environmental compliance, to include an understanding of the related policies and procedures as they relate to transportation systems, and compliance with local, state, and federal laws. A discussion of emissions, hazardous cargo, and permitting also will be provided.

TL 753. Transportation System Modeling. 3 Credits.
This course focuses on quantitative techniques used for planning and operation of transportation systems. Topics include: system capacities and flows, comprehensive models of transportation and urban systems, and understanding how political processes, new technologies, and economic considerations affect transportation decisions.

TL 754. Urban Transportation Systems Analysis. 3 Credits.
This course provides students with an understanding of system analysis tools used in urban transportation. Students will work with analytical techniques employed in urban transportation planning, such as traffic forecasting and system capacity analysis and apply these techniques using real-world data for analyzing both the demand and supply of transportation.

TL 755. Context Sensitive Solutions. 3 Credits.
Examine traditional transportation engineering factors, impacts on communities, and natural and human environments. Introduce students to principles of CSS and allow them to learn how they are applied through case studies and demonstrated principles.

TL 756. Transportation and Land Use Integration. 3 Credits.
This course provides students with an understanding of the interrelationships that exist between land use and transportation and the related impacts to the economy, environment and to society as a whole in the planning context.

TL 757. Intelligent Transportation Solutions. 3 Credits.
Fundamentals and field studies of information technologies deployed and emerging to address critical transportation issues such as congestion, safety, security, and energy efficiency.

TL 781. Program Evaluation. 3 Credits.
This course details program evaluation and its usefulness to organizational planning. Students will learn how program data is relevant to evaluation, scoping, research methods, assessment, planning, and sharing findings with topic experts.

TL 782. Highway Planning and Logistics. 3 Credits.
Fundamentals of highway transportation and freight logistics, including motor carrier economics and operations, effects of heavy trucks on highway infrastructure, truck size and weight issues, regulations, highway classifications, highway capacity planning, and level of service.

TL 783. Transportation Systems II. 3 Credits.
This course focuses on railroads and freight multimodal planning. It includes an introduction to railroads, an overview of the railroad industry and services, cost models, regulations, energy requirements, route analysis, operations, line capacities, intermodal terminals, environmental considerations, and multimodal freight issues. Prereq: TL 782.

TL 785. Spatial Analysis in Transportation. 3 Credits.
This course focuses on applications of Geographic Information Systems (GIS) to transportation networks and problems. The emphasis is on data modeling. Topics include: linear referencing, dynamic segmentation, network analysis, urban and land use planning, routing of hazardous materials, and asset management applications.

TL 786. Public Transportation. 3 Credits.
Focuses on public transportation issues and models. Topics include: policy issues, government's role in transit, transit planning, demand forecasting, performance evaluation, and system costing. Students will work on projects directly related to a transit system.

TL 787. Public Transportation II. 3 Credits.
This course focuses on concepts and modeling procedures used when planning and operating public transportation systems. Topics covered include transit demand analysis, quality of service concepts and estimation, bus and rail capacity, and service planning. Prereq: TL 786.

TL 788. Research in Transportation and Logistics. 3 Credits.
This course focuses on the conduct of scientific research in transportation and the application of a wide range of quantitative methods to transportation problems. The emphasis is on selecting the appropriate techniques for a problem and integrating them into interdisciplinary models. Critical research issues are highlighted.

TL 789. Leadership, Ethics, and Academic Conduct in Transportation. 3 Credits.
This course focuses on academic conduct in students' educational programs, and then goes on to explore theories, concepts, and practices of leadership and ethics that students may apply to their academic programs and transportation careers.

TL 790. Graduate Seminar. 1-5 Credits.

TL 791. Temporary/Trial Topics. 1-5 Credits.

TL 793. Individual Study. 1-5 Credits.

TL 794. Practicum/Internship. 1-8 Credits.

TL 795. Field Experience. 1-10 Credits.

TL 796. Special Topics. 1-5 Credits.

TL 797. Master's Paper. 1-3 Credits.

TL 798. Master's Thesis. 1-10 Credits.

TL 811. Modeling for Logistics Research. 4 Credits.
Models used in logistics research are studied. Topics include statistical models, mathematical programming, network models, stochastic decision processes, and simulation. The ability to perform and present logistics research is cultivated.

TL 823. Contemporary Supply Chain Research. 3 Credits.
This course focuses on contemporary research in supply chain management. Topics include advertising, information technology, game theory, supply chain contracts, and sustainability. The ability to perform and present supply chain research is cultivated. Prereq: TL 811.

TL 829. Supply Chain Risk Management. 3 Credits.
This course focuses on risk management in supply chains. Topics include random yields, exchange rates, real options, complex systems, and disruptions. The ability to perform and present supply chain risk management research is cultivated. Prereq: TL 811.

TL 831. Modeling for Transportation and Logistics Decision Analysis. 3 Credits.
This course emphasizes critical thinking skills and excel spreadsheet modeling skills to solve, and analyze logistics and transportation issues. It includes an introduction to modeling, excel, add-in tools, optimization, and uncertainty analysis. Prereq: ENGR 770.

TL 885. Geospatial Information Systems for Transportation. 3 Credits.
This course focuses on spatial analysis in transportation using Geographic Information Systems to build research framework and solve problems in transportation and logistics. The emphasis is on data modeling and the cutting-edge theories. Prereq: GEOG 655 or TL 785.

TL 892. Graduate Teaching Experience. 1-6 Credits.

TL 893. Individual Study/Tutorial. 1-5 Credits.

TL 899. Doctoral Dissertation. 1-15 Credits.

University, General (UNIV)

UNIV 101. Major Exploration and Academic Planning. 1 Credit.
This course will guide students through the process of exploring academic majors and related careers using a variety of methods. Additionally, students will learn to navigate NDSU resources and technologies as well as integrate success strategies into their college careers. Prereq: Restricted to first-year students only.

UNIV 150. Foundations of Science. 3 Credits.
This course covers basic findings from several scientific fields, including chemistry, physics, geology, biology, and psychology, with an emphasis on the methods of discovery in these disciplines.

UNIV 151. Science and Society. 3 Credits.
Explores interplay between scientific, economic, and political aspects of technically based, possibly politically contentious, societal challenges. Aims to instill appreciation for breadth, complexity of emerging societal challenges; need for collaboration among disciplines to realize solutions.

UNIV 189. Skills For Academic Success. 1 Credit.
This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation. Cross-listed with ABEN 189, AGRI 189, BUSN 189, HD&E 189, ME 189, NURS 189 and PHRM 189. F, S.

UNIV 194. Individual Study. 1-5 Credits.

UNIV 196. Field Experience. 1-15 Credits.

UNIV 199. Special Topics. 1-5 Credits.

UNIV 291. Seminar. 1-5 Credits.

UNIV 292. Study Abroad. 1-15 Credits.

UNIV 294. Individual Study. 1-5 Credits.

UNIV 297. FE/Coop Ed/Internship. 1-15 Credits.

UNIV 299. Special Topics. 1-5 Credits.

UNIV 379. Study Tour Abroad. 1-6 Credits.

UNIV 391. Seminar. 1-5 Credits.

UNIV 392. Study Abroad. 1-15 Credits.

UNIV 394. Individual Study. 1-5 Credits.

UNIV 397. Fe/Coop Ed/Internship. 1-15 Credits.

UNIV 399. Special Topics. 1-5 Credits.

UNIV 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. {Also offered for graduate credit - see UNIV 640}.

UNIV 489. Capstone Experience. 3 Credits.
This course includes: creating a job packet, an annotated bibliography, and a reflective paper, designed to help the student integrate, synthesize, and communicate the cumulative academic experience relating to the approved Statement of Goals. F,S.

UNIV 491. Seminar. 1-5 Credits.

UNIV 491H. Seminar. 1-3 Credits.

UNIV 492. Study Abroad. 1-15 Credits.

UNIV 494. Individual Study. 1-5 Credits.

UNIV 496. Field Experience. 1-15 Credits.

UNIV 499. Special Topics. 1-5 Credits.

UNIV 499H. Special Topics. 1-5 Credits.

UNIV 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. {Also offered for undergraduate credit - see UNIV 440}.

UNIV 692. Study Abroad. 1-15 Credits.

UNIV 695. Field Experience. 1-15 Credits.

UNIV 720. Scientific Integrity. 1 Credit.
A survey of contemporary issues relating to responsible conduct in research including academic integrity, mentoring, scientific record keeping, and genetic technology. Class sessions will involve student discussion of case studies that emphasizes a particular scientific ethical dilemma.

UNIV 790. Graduate Seminar. 1-5 Credits.

UNIV 791. Temporary/Trial Topics. 1-5 Credits.

UNIV 793. Individual Study/Tutorial. 1-5 Credits.

UNIV 795. Field Experience. 1-15 Credits.

Veterinary Science (VETS)

VETS 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 135. Anatomy and Physiology of Domestic Animals. 3 Credits.
Introduction to the anatomy and physiology of common domestic mammals. Emphasis on how the body's normal structures and functions contribute to health.

VETS 136. Anatomy and Physiology Laboratory. 1 Credit.
To accompany VETS 135.

VETS 150. Introduction to the Veterinary Profession. 1 Credit.
Exploration of the many educational and career opportunities in veterinary medicine available to both veterinarians and veterinary technicians.

VETS 194. Individual Study. 1-5 Credits.

VETS 196. Field Experience. 1-15 Credits.

VETS 199. Special Topics. 1-5 Credits.

VETS 255. Veterinary Diagnostic Imaging. 2 Credits.
The study of diagnostic radiograph production, including: x-ray machine operation, dark room procedures, radiographic positioning, and radiation safety. Ultrasound and other forms of alternative imaging will also be discussed. Prereq: VETS 125, VETS 135, VETS 136, VETS 256 and acceptance into the professional 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 professional portion of the Veterinary Technology program. Co-req: VETS 255.

VETS 256. Veterinary Clinical Techniques and Instruments. 4 Credits.
Clinical procedures and instrumentation used in the day-to-day operation of a veterinary practice.

VETS 259. Small Animal Diseases. 2 Credits.
Basic principles of common dog and cat diseases with emphasis on client education.

VETS 265L. Veterinary Nursing Lab I. 1 Credit.
Hands on practice of clinical procedures and instrumentation use common in the day-to-day operation of a veterinary practice. Co-req: VETS 265 and acceptance into the Veterinary Technology program.

VETS 267. Veterinary Nursing II. 2 Credits.
Introduction and knowledge expansion of the clinical procedures, instrumentation, animal behaviors, sample collection, and disinfection techniques used in the day-to-day operation of a veterinary facility. Co-req: VETS 267L. Prereq: VETS 265, VETS 265L.

VETS 267L. Veterinary Nursing Lab II. 1 Credit.
Introduction and knowledge expansion of the hands on clinical procedures, instrumentation, animal behaviors, sample collection, necropsy techniques, and disinfection techniques used in the day-to-day operation of a veterinary facility. Prereq: VETS 265, VETS 265L. Co-req: VETS 267.

VETS 291. Seminar. 1-5 Credits.

VETS 292. Study Abroad. 1-15 Credits.

VETS 294. Individual Study. 1-5 Credits.

VETS 296. Field Experience/Practicum. 1-15 Credits.

VETS 299. Special Topics. 1-5 Credits.

VETS 357. Veterinary Pharmacology. 3 Credits.
Study of drugs used in veterinary medicine with particular emphasis on commonly used drug groups.

VETS 358L. Veterinary Surgical Techniques Laboratory. 2 Credits.
Preparation for assistance with veterinary surgical procedures. Provisions of proper aftercare for veterinary surgical patients. Prereq: VETS 135, VETS 136, VETS 256, VETS 357, VETS 385 and VETS 386. Co-req: VETS 358.

VETS 358. Veterinary Surgical Nursing Techniques. 2 Credits.
Preparation for and assistance with veterinary surgical procedures. Provision of proper aftercare for veterinary surgical patients. Prereq: VETS 135, VETS 136, VETS 256, VETS 357, VETS 385 and VETS 386. Co-req: VETS 358L.

VETS 359. Veterinary Hospital Information and Procedures. 2 Credits.
Principles of veterinary hospital management and client relations/education.

VETS 367. Principles of Companion Animal Dentistry. 1 Credit.
Basic principles of veterinary dentistry. Including dental anatomy, physiology, pathophysiology, charting, and instrumentation. Techniques of routine dental prophylaxis, periodontal disease therapies, client education, and preventative oral care will be emphasized. Co-req: VETS 367L and must be a student in the professional portion of the Veterinary Technology program.

VETS 367L. Principles of Companion Animal Dentistry Lab. 1 Credit.
Basic principles of veterinary dentistry lab. Including dental anatomy, physiology, pathophysiology, charting, and instrumentation. Techniques of routine dental prophylaxis, periodontal disease therapies, client education, and preventative oral care will be emphasized. Co-req: VETS 367.

VETS 369. Companion Small Mammal and Exotic Animal Health and Husbandry. 2 Credits.
Students will be introduced to the biology, reproduction, and husbandry requirements of domestic small mammal and exotic species. The role these species play in the human animal bond will also be addressed. Prereq: VETS 135.

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.

VETS 379. Study Tour Abroad. 1-6 Credits.

VETS 385L. Veterinary Parasitology Lab. 1 Credit.
Study of parasitology procedures commonly utilized in veterinary medicine. Co-req: VETS 385 and admission to the professional portion of the Veterinary Technology program.

VETS 385. Veterinary Clinical Pathology I. 3 Credits.
Study of parasitology principles and procedures commonly utilized in veterinary medicine.

VETS 386. Veterinary Clinical Pathology II. 3 Credits.
Study of hematology principles and procedures commonly utilized in veterinary medicine.

VETS 386L. Veterinary Hematology Lab. 1 Credit.
Study of hematology procedures commonly utilized in veterinary medicine. Co-req: VETS 386 and admission to the professional portion of the Veterinary Technology program.

VETS 387. Veterinary Clinical Pathology III. 3 Credits.
Study of urine analysis and serum chemistry principles and procedures commonly utilized in veterinary medicine.

VETS 391. Seminar. 1-5 Credits.

VETS 392. Study Abroad. 1-15 Credits.

VETS 394. Individual Study. 1-5 Credits.

VETS 399. Special Topics. 1-5 Credits.

VETS 440. Zoonoses. 3 Credits.
Characteristics of diseases transmissible between animals and humans. Prereq: MICR 202 or MICR 350.

VETS 455. Veterinary Applied Pharmacy Practices. 1 Credit.
Practice of veterinary pharmacology including dose calculations, pharmacy terms, prescribing practices, drug dispensing, and regulations governing drug approval, prescribing and dispensing in veterinary practice. Co-req: VETS 457. Prereq: VETS 386 and admission to the professional portion of the Veterinary Technology program.

VETS 460. Veterinary Anesthesiology. 2 Credits.
Preparation for and assistance with veterinary surgical procedures. Provision of proper aftercare for veterinary surgical patients. Prereq: VETS 357, VETS 385, VETS 386 and students must be admitted to the professional portion of the Veterinary Technology program. Co-req: VETS 460L.

VETS 460L. Veterinary Anesthesiology Lab. 1 Credit.
Preparation for and assistance with veterinary surgical procedures. Provision of proper aftercare for veterinary surgical patients. Prereq: VETS 357, VETS 385, VETS 386 and students must be admitted to the professional portion of the Veterinary Technology program. Co-req: VETS 460.

VETS 481. Ward Care/Clinic Care. 1 Credit.
Supervised experience managing the care and feeding of Veterinary Technology Program animals and clinical veterinary facilities. May be repeated 4 times.

VETS 482. Large Animal Techniques. 2 Credits.
Handling, restraint, nursing, and management techniques used in large animal veterinary practice. Primarily focused on cattle and horses. Prereq: VETS 256.

VETS 482L. Large Animal Techniques Laboratory. 1 Credit.
A laboratory course designed to supplement material covered in VETS 482. Handling, restraint, nursing, and management techniques used in large animal veterinary practice. Primarily focused on cattle and horses. Prereq: VETS 256. Co-req: VETS 482.

VETS 483. Clinical Veterinary Practicum 1-3. 1-3 Credits.
Supervised experience applying veterinary diagnostic and therapeutic techniques and procedures in a clinical setting. May be repeated with instructor approval.

VETS 485. Veterinary Technology Externship 6-12. 6-12 Credits.
Capstone experience for veterinary technology students. Continued development of skills through supervised work in a veterinary practice or other appropriate clinical setting. Refer to Animal Sciences for information regarding Veterinary Technology program.

VETS 491. Seminar. 1-5 Credits.

VETS 492. Study Abroad. 1-15 Credits.

VETS 494. Individual Study. 1-5 Credits.

VETS 496. Field Experience. 1-15 Credits.

VETS 499. Special Topics. 1-5 Credits.

Women and Gender Studies (WGS)

WGS 110. Introduction to Women's Studies. 3 Credits.
Exploration of a range of social/domestic and global issues related to women; development of a feminist framework for thinking and writing about woman and gender.

WGS 112. Introduction to Masculinities. 3 Credits.
Exploration of the lives of men and boys and the diverse experiences and public discourses about masculinity; the role of men and boys in sports, family, work and other social relationships.

WGS 194. Individual Study. 1-5 Credits.

WGS 199. Special Topics. 1-5 Credits.

WGS 294. Individual Study. 1-5 Credits.

WGS 340. Perspectives in LGBTQ Studies. 3 Credits.
Exploration of sexual orientation, gender identity, and bodies from multiple contemporary feminist and queer perspectives. Course provides an opportunity to increase knowledge of the scholarship and writings in LGBTQ studies. Recommended prereq: WGS 110 or WGS 112.

WGS 350. Perspectives in Women's Studies. 3 Credits.
Exploration of women and gender from many perspectives. Course provides an opportunity to increase knowledge of the scholarship and writings in Women's Studies, including authors such as Friedan, Baumgardner and Richards, Wolf, and Roiphe. Prereq: WGS 110.

WGS 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 family and personal life. Cross-listed with HIST. {Also available for graduate credit - See WGS 626.}.

WGS 489. Internship/Capstone. 3 Credits.
Integrate coursework taken in Women's Studies major; apply knowledge to women's events and experiences; explore career and graduate options in the field of Women's Studies.

WGS 491. Seminar. 1-5 Credits.

WGS 494. Individual Study. 1-5 Credits.

WGS 496. Field Experience. 1-15 Credits.

WGS 499. Special Topics. 1-5 Credits.

WGS 626. Women in American History. 3 Credits.
A survey of political, social, economic, and cultural development of American women from colonial times to the present with a focus on the lived experiences of diverse groups of women. Central themes are: the incongruity of ideal and reality, the fluidity of gender expectations and the "public" sphere, women's ability to navigate different power structures successfully, work and sexual division of labor, and the role family and personal life. Cross-listed with HIST. {Also offered for undergraduate credit - See WGS 426.}.

WGS 790. Graduate Seminar. 1-5 Credits.

Zoology (ZOO)

ZOO 193. Undergraduate Research. 1-5 Credits.

ZOO 194. Individual Study. 1-5 Credits.

ZOO 196. Field Experience. 1-15 Credits.

ZOO 199. Special Topics. 1-5 Credits.

ZOO 291. Seminar. 1-5 Credits.

ZOO 292. Study Abroad. 1-15 Credits.

ZOO 293. Undergraduate Research. 1-5 Credits.

ZOO 294. Individual Study. 1-5 Credits.

ZOO 296. Field Experience. 1-15 Credits.

ZOO 299. Special Topics. 1-5 Credits.

ZOO 379. Study Tour Abroad. 1-6 Credits.

ZOO 391. Seminar. 1-3 Credits.

ZOO 392. Study Abroad. 1-15 Credits.

ZOO 393. Undergraduate Research. 1-5 Credits.

ZOO 394. Individual Study. 1-5 Credits.

ZOO 396. Field Experience. 1-15 Credits.

ZOO 397. Fe/Coop Ed/Internship. 1-4 Credits.

ZOO 399. Special Topics. 1-5 Credits.

ZOO 491. Seminar. 1-5 Credits.

ZOO 492. Study Abroad. 1-15 Credits.

ZOO 493. Undergraduate Research. 1-5 Credits.

ZOO 494. Individual Study. 1-5 Credits.

ZOO 496. Field Experience. 1-15 Credits.

ZOO 499. Special Topics. 1-5 Credits.

ZOO 690. Graduate Seminar. 1-3 Credits.

ZOO 695. Field Experience. 1-15 Credits.

ZOO 696. Special Topics. 1-5 Credits.

ZOO 790. Graduate Seminar. 1-3 Credits.

ZOO 791. Temporary/Trial Topics. 1-5 Credits.

ZOO 793. Individual Study/Tutorial. 1-5 Credits.

ZOO 795. Field Experience. 1-15 Credits.

ZOO 796. Special Topics. 1-5 Credits.

ZOO 797. Master's Paper. 1-3 Credits.

ZOO 798. Master's Thesis. 1-10 Credits.

ZOO 820. Advanced Cell Biology. 3 Credits.
Study of molecular biology of plant and animal cells including molecules, molecular organization, growth and development, nuclear function, cell cycle, and cellular communication. Prereq: BIOC 702.

ZOO 892. Graduate Teaching Experience. 1-6 Credits.

ZOO 895. Field Experience. 1-15 Credits.

ZOO 899. Doctoral Dissertation. 1-15 Credits.

Academic Policies

Academic Calendar

Academic Year

NDSU operates on a semester system consisting of two standard 15-week fall and spring semesters, plus a final examination week each semester. A 12-week summer session also is offered. Variable-length, short-session courses are available, and meet the same total contact (class) hours as in standard semesters. See definition of an academic credit (p. 1388).

Mid-Term

The mid-term point of a standard semester is approximately 40 class days after the standard semester start. See Examinations and Grading for mid-term grade information.

Dead Week

Only one exam or quiz per course may be given during the last two weeks of the semester (prorated accordingly for variable length courses), which includes finals week. Exceptions include summer classes, self-paced/correspondence courses, make-up exams, courses in which laboratory is incorporated with a lecture, one-credit courses, and quizzes that account for less than 5% of the students' overall grade. If a professor chooses to give an exam during the last week of classes, he/she is expected to make some instructional use of the final examination time.

Final Examinations

The schedule for final examinations is determined and published by the Office of Registration and Records.

Final examinations (https://www.ndsu.edu/fileadmin/policy/336.pdf) in one-credit or variable length short courses are usually given during the last regular class period. Final examinations for all other courses may not be rescheduled during the final examination period. According to State Board of Higher Education policy, the final examination period is instructional time and, if an examination is not given, some instructional use of this period is expected. Final examinations for summer school and distance and continuing education classes are arranged by the instructors.

No student shall be obligated to take more than three final examinations scheduled for the same calendar day. In the event that a student has four or more final examinations on the same calendar day, the student shall notify the instructor(s) from the highest numbered course(s) no later than two weeks before the last day of class to schedule a make-up examination to be administered at a mutually acceptable time.

Summer Session

The 12-week summer session is designed to provide coursework within various time intervals. Classes typically are offered in either the full 12-week session, the standard four-week session that begins in May, or the standard eight-week session that begins in June. There are many other short or variable length courses throughout the summer. While the time interval of the individual sessions is different than that of the standard semester, each course carries full credit because classes meet the same number of contact hours as in the standard semester.

Each college or department determines its summer offerings, based upon previous enrollments, programmatic needs, and special requests. Special effort is made to offer courses approved for fulfilling general education requirements. The summer session course offerings schedule (https://www.ndsu.edu/registrar/academics/schedule) is available online. For information on summer school, please call 231-8492 or 231-6133. Information concerning summer housing may be secured by contacting the Department of Residence Life (https://www.ndsu.edu/reslife), Dept. 5310, P.O. Box 6050, Fargo, ND 58108, or 231-7557 (toll-free 1-800-572-8840).

Academic Credit

Definition of a Credit Hour

In accordance with federal guidelines, academic credit hours for a course are determined by the amount of work represented in intended learning outcomes.

The NDSU established equivalency for courses bearing academic credit reasonably approximates and is not less than:

1. One semester hour of credit is awarded for 750 minutes of classroom or direct faculty instruction and a minimum of 1800 minutes of out-of-class student work; over a fifteen week semester this is equivalent to one 50 minute period of direct instruction and two hours of out-of-class work each week; or
2. At least an equivalent amount of work as required in paragraph (1) of this definition for other academic activities as established by the institution, including laboratory work, internships, practicum, studio work, and other academic work leading to the award of credit hours.
3. For laboratories, a minimum of 100 minutes per week for 15 weeks is equivalent to one credit.
4. One semester credit of field experience (courses numbered 196-496; 595-795) requires a minimum of 40 hours of direct experience. Students may earn up to 15 credits per semester with the number of credits to be determined in consultation with the student's academic adviser/department. Cooperative Education credits and limits are determined by the Career Center (https://www.ndsu.edu/career).
5. For undergraduate research experiences a minimum of 360 minutes per week for 15 weeks is equivalent to 1 credit.
6. For hybrid and online courses, which do not meet the faculty contact requirements, credit is awarded based on the equivalent face-to-face course or by assessing the amount of work required by the student.

Academic Honesty and Integrity

The primary responsibility of the students, faculty, and administration is to create an atmosphere where the honesty of individuals will not be questioned.

Faculty members are responsible for providing guidelines concerning academic honesty and expectations at the beginning of each course.

Students are responsible for submitting their own work. Students who cooperate on oral or written examinations or work without authorization share the responsibility for violation of academic principles, and are subject to disciplinary action even when one of the students is not enrolled in the course where the violation occurred. Students have the right to be informed when they are suspected of violating academic principles and have the right to a fair opportunity to refute them.

Faculty have the prerogative of determining the penalty regarding prohibited academic conduct in their classes. Faculty members may, among other sanctions, fail the student for the particular assignment, test, or course involved. Penalties may be varied with the gravity of the offense and the circumstances of the particular case. In this situation, the student may not drop the course in question without the permission of the instructor.

Faculty have the prerogative of determining the penalty regarding prohibited academic conduct in their classes. Faculty members may, among other sanctions, fail the student for the particular assignment, test, or course involved. Penalties may be varied with the gravity of the offense and the circumstances of the particular case. In this situation, the student may not drop the course in question without the permission of the instructor.

Faculty members will report the incident to the department chair, dean, and registrar. In the case of the graduate students, the graduate dean also will be notified. In cases of repeat offenses, higher sanctions, up to and including suspension or expulsion may be recommended to the Provost and Committee on Academic Standards.

For complete information regarding academic honesty and integrity, student expectations, disciplinary sanctions, appeal procedures, and hearing guidelines, refer to www.ndsu.edu/academichonesty

Class Attendance

Per the NDSU Policy Manual, Policy 333 (https://www.ndsu.edu/fileadmin/policy/333.pdf), the following applies:

Attendance in classes is expected and important. (The term “class” includes class, online class, laboratory, field trips, group exercises, or other activities.) However, there are instances in which students are unable to attend class and in which those absences must be excused. These instances are described in the following sections. Absences not covered by this policy are excusable at the discretion of the instructor. Class attendance policies may not have discriminatory effect (intentional or unintentional) on members of a protected class (see NDSU Policy 100 (https://www.ndsu.edu/fileadmin/policy/100.pdf)). Students and instructors should note that the NDSU Student Health Service (https://www.ndsu.edu/studenthealthservice/forms) does not provide students with excuses for class absences or tardiness due to illness or injury.

Review Policy 333 (https://www.ndsu.edu/fileadmin/policy/333.pdf) for specific student and instructor responsibilities, as well as details regarding absences related to University sanctioned events, pregnant students, religious accommodations, and other excused absences.

NOTE: Students are responsible for all registration activity and must follow published dates and deadlines (https://www.ndsu.edu/registrar/dates). Non-attendance does not absolve students from course responsibilities and does not automatically remove courses from a student's academic record.

Co-Curricular Activities

Student participation in co-curricular activities at NDSU is encouraged as an important aspect of college life and is viewed as helping fulfill social and general education needs as well as developing leadership ability. Students who are on academic or conduct probation may participate as members in campus co-curricular activities unless higher standards are set by the specific campus organization.

Students in Leadership Positions

Students holding elected or appointed leadership positions must meet the following academic and good conduct eligibility standards:

1. Students in leadership positions must have attained and must maintain during the term of participation a minimal cumulative grade average of 2.0.
2. Students in leadership positions must be enrolled for and maintain a minimum of nine (9) semester credits during the term of participation and have successfully completed nine (9) credits from the most previous semester.
3. Students in leadership positions must be in good conduct standing with the Office of the Vice President for Student Affairs.

Additional information on the eligibility for participation in co-curricular activities can be found on the Student Life (https://www.ndsu.edu/student_life/policies_and_forms/eligibility_for_participation_in_co_curricular_activities) website.

Commencement

Commencement exercises are held at the close of fall and spring semesters.

Students who complete graduation requirements during the summer are eligible to participate in either May or December commencement ceremonies within the calendar year of their graduation. To participate in the May commencement exercises, students must be registered in the remaining graduation requirements for the summer session of the same year.

A student may participate in commencement only once for a particular degree. The date of degree conferral will be printed on the academic transcript and diploma according to the academic calendar of the university.

Reservations for commencement must be made by the date specified by the Office of Registration and Records. Orders for caps, gowns, and hoods are made by the date specified by the NDSU Bookstore (http://www.ndsubookstore.com). Commencement information is available at www.ndsu.edu/commencement.

Degree Types and Diploma Information

Degrees Awarded at NDSU

A degree is the title of the credential that the university confers on a graduate who has completed all university requirements for graduation. Most undergraduate degree recipients at NDSU earn a Bachelor of Science (B.S.) degree, however, many programs of study result in a specialized degree. Students may also pursue a Bachelor of Arts (B.A.) degree, if available for their selected major, by completing the Bachelor of Arts Requirements Using a Second Language (p. 855) and/or requirements as specified by their academic college on the program curriculum guide.

NDSU confers the following degrees at the undergraduate level:

- Bachelor of Arts (B.A.)
- Bachelor of Fine Arts (B.F.A.)
- Bachelor of Landscape Architecture (B.L.A.)
- Bachelor of Music (B.Mus.)
- Bachelor of Science (B.S.)
- Bachelor of Science in Agricultural and Biosystems Engineering (B.S.A.B.En.)
- Bachelor of Science in Architecture (B.S.Arch.)
- Bachelor of Science in Civil Engineering (B.S.C.E.)
- Bachelor of Science in Computer Engineering (B.S.Cpr.E.)
- Bachelor of Science in Construction Engineering (B.S.Con.E.)
- Bachelor of Science in Construction Management (B.S.Cons.M.)
- Bachelor of Science in Electrical Engineering (B.S.E.E.)
- Bachelor of Science in Industrial Engineering and Management (B.S.I.E.Mgt.)
- Bachelor of Science in Manufacturing Engineering (B.S.Mfg.E.)
- Bachelor of Science in Mechanical Engineering (B.S.M.E.)
- Bachelor of Science in Nursing (B.S.N.)
- Bachelor of University Studies (B.U.S.)

In addition, NDSU awards graduate degrees at the following levels:

- Doctor of Education (Ed.D.)
- Education Specialist (Ed.S.)
- Master of Accountancy (M.Acc.)
- Master of Architecture (M.Arch.)
- Master of Arts (M.A.)
- Master of Athletic Training (M.A.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 Music (M.M.)
- Master of Managerial Logistics (M.M.L.)
- Master of Natural Resources Management (M.N.R.M.)
- Master of Public Health (M.P.H.)
- Master of Science (M.S.)
- Master of Software Engineering (M.S.E.)
- Master of Transportation & Urban Systems (M.T.U.S.)
- Doctor of Musical Arts (D.M.A.)
- Doctor of Nursing Practice (D.N.P.)
- Doctor of Pharmacy (Pharm.D.)
- Doctor of Philosophy (Ph.D.)

Degree Posting

Students must declare their intent to graduate, identifying all programs of study, with the Office of Registration and Records or the Graduate College. Degrees are posted to academic records three times per academic year - at the close of each term. Conferral date is the last day of finals week/the last instructional day of the term. Degrees are posted to the academic record approximately three weeks following the close of the semester in which degree requirements were successfully completed.

Diplomas

Diplomas are mailed approximately five weeks following the close of the academic term in which graduation requirements have been completed. Neither diplomas nor official transcripts will be released for students who have outstanding debts owed to the university or who have select other holds. Students are responsible for submitting name and address updates for diploma processing. Should a diploma be returned for an insufficient address, the Office of Registration and Records makes every attempt to obtain an updated address. When an updated address is not available, it is held in the Office of Registration and Records for one year, after which time a student will request a diploma replacement.

A diploma replacement (https://www.ndsu.edu/registrar/records/diplomas) service is provided by the Office of Registration and Records for those who have lost or damaged their original diploma.

Grades, Grading and Repeated Courses

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 (http://www.ndsu.edu/bisonconnection/finaid/sap) (SAP) used for financial aid eligibility.

Grade Point Average (GPA) Calculation

Semester (or term) GPA refers to the grade-point average for any given grading period. Cumulative or institutional GPA refers to the composite grade-point average for all courses and grading periods completed at NDSU.

Institutional cumulative grade-point average is calculated by dividing the total number of honor points earned at NDSU by the total number of credit hours in which honor points were recorded, including grades of 'F'. NDSU GPA calculations do not include developmental coursework, which does not count toward the graduation requirements. Coursework/grades accepted in transfer by NDSU are not included in the institutional cumulative GPA, and are not used in calculations for determining academic standing with the University. Refer also to Pass/Fail Grading and Repeated Courses.

Pass-Fail Grading

Pass-fail grading is available in any given course; however, the pass/fail option may not be used for courses taken to meet general education requirements, unless the course is only offered pass/fail. Students are advised to check degree-program restrictions regarding acceptance of pass/fail credits. Pass/Fail Option Request forms (https://www.ndsu.edu/registrar/forms/passfail) may be acquired online. Forms must be signed by the student's adviser. Pass/fail policies include the following:

1. Students are limited to a total of 16 credits under the pass/fail grading option. Courses that are offered only for pass/fail grading for all students who enroll are not included in the 16-credit limitation.
2. Approval for the pass/fail option must be filed in the Office of Registration and Records by the published pass/fail deadline of the semester (https://www.ndsu.edu/registrar/dates). Variable length and summer courses have prorated deadlines according to actual course length. Contact the Office of Registration and Records for specific information regarding variable length and summer course deadlines.
3. Once a pass/fail request has been approved and filed, it may not be changed back to a regular grade.
4. A grade of 'P' is without honor points and is not included in the grade-point computation; however, a grade of 'F' is included in the grade-point computation.
5. If a course is taken for a regular grade, it cannot be repeated on a pass/fail basis.

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 re-enrolling in it at NDSU, or via Tri-College, and completing the course satisfactorily. As with all repeated courses, the original grade will remain on the academic record, but only the latest attempt will be computed in grade-point average calculations (see Repeated Courses (p. 1397)).

Mid-Term Grading

As an early intervention effort to improve retention and academic progress of students, faculty are encouraged to enter deficient mid-term grades of D and F, at minimum, in undergraduate courses. Notifications are sent to students with reported deficient mid-term grades and to academic departments/advisers. For all courses, mid-term progress reports shall be made available to students upon request. Mid-term grades are not considered official grades and do not appear on student academic transcripts. Adviser holds may be placed on students who have one or more reported deficient mid-term grades.

Final Grades

Grades for all students in all degree-eligible courses are entered by the grade loading deadline each term so that important end-of-term academic and financial processes may run, and ensure timely notifications may be sent to students. Final grades entered into Campus Connection by instructors are posted to student records approximately three business days after the close of final examination week.

Grade Changes

With the exception of Incomplete grades, a course grade issued by an instructor and recorded on an academic record is considered final. For the student who has reason to believe the grade issued is incorrect, the student must initiate a request for a change of a grade with the instructor within fifteen (15) instructional days of the first day of the semester immediately following the semester in which the grade was assigned. For Spring Semester courses, the request may be made within fifteen (15) instructional days of the start of Fall Semester, if the student is not enrolled for a summer term. If deemed appropriate, the instructor may submit a change of grade to the Office of Registration and Records via a **Grade Reporting Form**. Grade changes may only be considered for students who have not yet earned a degree.

Grade Appeals

If resolution is not reached through a standard grade change inquiry, a student may pursue a grade appeal. The Grade Change Appeals Board may be utilized only after the student has exhausted possible appeal routes within the college offering the course. A grade appeal is deemed formally initiated when the student presents the Grade Appeal Form (https://www.ndsu.edu/fileadmin/registrar/forms/gradeappeal.pdf) to the instructor. If there is an unsatisfactory decision, the student must consult the department head/chair, and the dean or a designated college committee, proceeding from one level to the next only after an unsatisfactory decision of the conflict at that level. In the event that the instructor is also the department head or dean, he or she need only be consulted in the capacity of instructor. In the event of an unsatisfactory decision within the college, the student may submit the formal written appeal to the Grade Appeals Board Chair. Such an appeal shall be made within fifteen (15) instructional days after conclusion of the college proceedings as stated above.

The full Grade Appeals policy (section 337) (https://www.ndsu.edu/fileadmin/policy/337.pdf), which includes hearing procedures, is available on the NDSU Policy (https://www.ndsu.edu/policy) web site. Grade appeals only may be considered for students who have not yet earned a degree. If a student is in their final semester of enrollment pending a degree completion, the student has fifteen (15) instructional days to initiate a grade request.

Grades of Incomplete

Under extraordinary circumstances and at the discretion of the instructor, a student may be assigned a grade of Incomplete (I). The following policies apply to Incomplete grades:

1. The grade of Incomplete is assigned to indicate that satisfactory work has been completed up to within five weeks of the semester end, and that circumstances beyond the student's control prevented completion of the work. The time period is proportional for variable length courses and summer session.
2. The grade of Incomplete is not to be given in any instance where the student has a deficiency of more than five weeks (or equivalent) of work including final exam week.
3. Grades of Incomplete are initiated by student request. The student must contact the instructor, request an Incomplete grade, and, upon instructor approval, make arrangements to complete the work.
4. The grade of Incomplete (I) is an administrative grade that may only be entered by the Office of Registration and Records, except in courses designated as practicum, internship, individual study, field experience, or study abroad.
5. An **Incomplete Grade Reporting Form** (form available from Registration and Records, 110 Ceres Hall; provided to faculty and staff only) detailing the work to be completed, expected completion date, and grading standard is to be signed and dated by both the instructor and the student. The form is to be submitted to the Office of Registration and Records by the grade submission deadline for the semester in which the course was taken. It is advisable that the instructor, student and adviser retain copies of this form for their records.
6. Grades of Incomplete, including those for most course types identified in #4, must be removed no later than the end of the seventh week of the next full semester (fall or spring). The time period is proportional for variable length courses and summer session.

7. Grades of Incomplete are removed when the student has completed all course requirements and the instructor of the course files a **Grade Reporting Form** (form available from Registration and Records, 110 Ceres Hall; provided to faculty and staff only)with the Office of Registration and Records.
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 seventh week of the next full semester require approval by both the instructor and the chair of the department offering the course. The extended deadline must be indicated on the **Incomplete Grade Reporting Form** and may not exceed two Incomplete conversion/deadline cycles. If a grade is not submitted by the specified deadline, the Incomplete grade will convert to a grade of 'F'.
11. Grades of Incomplete, which convert to grades of 'F', earned in the last semester of attendance by a student who leaves the university for two or more years may be changed to Withdrawn ('W') upon re-enrollment. Requests for this privilege must be filed with the Office of Registration and Records during the first term of re-entry.
12. An Incomplete grade may be converted to a letter grade (or P/F, S/U) according to the above guidelines, but may not be expunged from the record.
13. Students may not register in courses in which they currently hold grades of Incomplete, except for courses that are repeatable for credit.
14. Students are not allowed to graduate with Incomplete grades on their academic records. Upon graduation, unconverted Incomplete grades will convert to grades of 'F'. If a course in which an Incomplete grade was assigned is required for graduation, the instructor may extend the deadline according to the above procedures and timelines, and graduation will be postponed.
15. Students who receive grades of Incomplete or converted grades of F may appeal disputed grades in accordance with NDSU Policy, Section 337: Grade Appeals Board (https://www.ndsu.edu/fileadmin/policy/337.pdf).

Repeated Courses

At NDSU, repeating a course is defined as retaking the same course on a student's NDSU academic record in an attempt to improve a grade. The course repeat option to improve one's academic record is available to students who have not graduated. Repeats are processed at the end of a semester after grades have been posted to academic records. The following applies to repeated courses:

1. Credit earned in any given course (or equivalent course) is applicable to a degree requirement only once.
2. If a course is completed at NDSU and an attempt is made to repeat that course at another institution, the credit is considered duplicate and is not eligible for transfer back to NDSU.
3. An NDSU student may register for a Tri-College course to repeat a course previously taken at NDSU (see Tri-College rules and restrictions (p. 832)).
4. All grade entries remain on the student's academic record, but only the credits, grades and related honor points for the most recent attempt will be calculated in the cumulative grade point average and credits for graduation. Previous attempts are excluded from cumulative totals and marked as '*Repeat Excluded*'.
5. Students forfeit the previous letter grade no matter what letter grade is earned when the course is repeated and the most recent course is marked '*Repeat Included*'.
6. There is no limit to the number of different courses that may be repeated unless otherwise restricted by an academic department.
7. A student is limited to a maximum of three attempts in any course at NDSU. An "attempt" includes any instance in which the student earns a letter grade for the course (A - F). The three-attempt limit does not apply to courses identified as "May be repeated" in the course description. A student can petition for exception to this limitation through established university procedures.
8. Courses taken for A-F grading may not be repeated under the pass-fail grading option.
9. Repeat attempts made in semesters following a degree posting will remain on the academic record along with the new grade, but will be excluded from GPA and credit calculations. The repeated course will be marked "Repeated: Post Degree-Not Included in Cum Totals."

NOTE: Repeating courses has impacts to financial aid eligibility and can effect a student's completion rate. For more information contact NDSU One Stop.

Project 65

People aged 65 or over may audit one course per semester free of tuition and related fees, with the exception of a one-time $35 application fee. Courses not eligible for Project 65 include those not covered by the tuition cap. Contact Registration and Records for questions regarding course eligibility.

Project 65 students are encouraged to purchase the textbooks for their courses. The transcript of a student auditing a course will show a grade of 'Audit' for the course, which will not count as credit toward a degree. By definition, an auditor may attend class only as a listener. Students wishing to earn credit toward a degree must be admitted and pay all tuition and fees and complete all assignments and tests.

Students are responsible for course selection and need to obtain a class permit from the academic department of the course the student would like to enroll in. The instructor/department staff will issue the permit with the audit authorization. Students should bring the permit and identify themselves as participants in the Project 65 program at the time of registration to the Office of Registration and Records (https://www.ndsu.edu/registrar), 110 Ceres (701-231-7981).

Registration

Students must be properly admitted and fully enrolled to attend classes. Students ultimately are responsible for all course registration activity and they are expected to monitor their schedule of classes and drop courses that they do not intend to complete by the published deadlines. Dates and deadlines for advising and registration are made available in the Academic Dates and Deadlines Calendar (https://www.ndsu.edu/registrar/dates) posted online. Students are encouraged to visit with an academic adviser before registering for classes *(see Academic Advising* (p. 834)*)*.

Schedule of Classes: The most current and complete listing of classes is made available on Campus Connection, NDSU's official student information system, approximately one month prior to the start of registration for a subsequent term. A course listing (https://www.ndsu.edu/registrar/academics/schedule) is also available online.

Online Registration: Enrolled students may register online via Campus Connection (https://studentadmin.connectnd.us/psp/NDCSPRD/EMPLOYEE/HRMS/h/?tab=GUEST), NDSU's student information system. Registration instructions (https://www.ndsu.edu/registrar/registration) are posted online.

On-site Registration: On-site registration is provided for new students and for those who are unable to or who choose not to register online.

- **Summer Registration:** Registration for summer session occurs during the previous spring at the same time as registration for fall semester.

For registration purposes, students are grouped into the following three general categories:

- **Currently enrolled students:** Currently enrolled students or those who had registration in a prior standard semester (fall or spring) are assigned registration appointment times according to total credits earned. Registration appointments may be viewed on Campus Connection.
- **Returning students:** Returning students are those who have previously attended NDSU, but who have not been in attendance for at least one full semester (fall or spring). Returning students are assigned registration appointment times according to total credits earned after the *Reactivation/Petition for Readmission* is received and processed in the Office of Registration and Records. Registration appointment times may be viewed on Campus Connection.
- **New students:** Detailed information regarding orientation and registration options is sent to all new students from Student Success Programs (https://www.ndsu.edu/studentsuccess). Incoming freshmen, including first year students with transfer credit, are expected to attend a new student orientation and registration session. Admitted transfer students may register on Campus Connection along with NDSU students, or may attend a transfer orientation and registration program. Transfer student registration appointment times are based on the total number of credits accepted in transfer to NDSU.

Instructor Drop Procedure

Instructors or departments have the option to administratively drop students who have not attended the first week (and in some cases, the first meeting) of a lecture or laboratory, or who do not meet all course requisites. Administrative course drop requests made by instructors/departments should be submitted to the Office of Registration and Records within the first week of a class meeting for processing.

Students are responsible for all course registration activity and should drop courses that they do not intend to complete. Students should not rely on instructors or departments administratively dropping them. Student failure to drop courses by posted deadlines will result in failing grades and debt owed the university.

Financial Obligation Agreement

The North Dakota University System Financial Obligation Agreement (https://www.ndsu.edu/bisonconnection/accounts/financial_obligation_agreement_foa) (FOA) is used to verify that a student has acknowledged their financial responsibility to the University when they register for courses. Students must access, review and accept the FOA prior to registration for each term of enrollment in Campus Connection.

Changes in Registration

Registration deadlines for standard fall and spring semester courses are posted in the online Dates and Deadlines calendar (https://www.ndsu.edu/registrar/dates). Deadlines for variable length and summer session courses are adjusted proportionately and are also available online. Students are responsible for making changes to their registration according to published procedures and deadlines.

Adding Courses/Sections

Students may add courses to their schedules via Campus Connection until the published deadline to add online. After the deadline to add online, an authorized "Class Permit" for each course to be added must be acquired from the department offering the course and submitted to the Office of Registration and Records (https://www.ndsu.edu/registrar) or NDSU One Stop (https://www.ndsu.edu/bisonconnection).

Enrollment Add Deadline

All undergraduate and graduate students are expected to have added their courses via Campus Connection one week from the start of the semester. After one week, departments/instructors must provide student(s) with a course permit to add course(s). Class permits are accepted through the fourth week of a semester. Full semester course additions will not be processed after fourth week enrollment census, unless approved by the

Graduate School Dean or the Registrar, as well as approval by the Provost's Office. Contact the Office of Registration and Records for course add deadline (https://www.ndsu.edu/registrar/dates/course_add_deadline) information.

Dropping Courses/Sections

No-record drops: Students may drop a course from their schedule without it appearing on their academic record until the published No Record Drop deadline for standard and variable length courses.

Record (W) drops: Students may continue to drop courses after the no-record drop period until the published Drop deadline for standard and variable length courses. However, such drops are recorded on student transcripts with 'W'. Grades of W do not count as attempted credit for grade-point averages, but are counted in attempted credits for financial aid satisfactory academic progress (https://www.ndsu.edu/bisonconnection/finaid/sap).

Auditing Courses

An auditor may attend classes only as a listener, without participation in regular class exercises, and may be admitted to classes only with a class permit and official registration as an auditor. No credit is received for audited courses, and 'AU' appears on the transcript. A student cannot fail an audit; however, an instructor may assign a 'WAU' (withdrawn) for non-attendance.

A student may drop a regularly registered course and add it as an audit course by submitting a Class Permit by the published deadline. Once the audit registration is processed, the decision cannot be reversed. An audit fee of one-half of the regular tuition rate, based on the student's residency, will be charged and included in the tuition cap. No student fees will be assessed.

Wait Listed Classes

NDSU utilizes a wait list feature in Campus Connection for most classes. Students attempting to register for a class that has reached its enrollment capacity may add themselves to a wait list. Wait list processes run daily until the No Record Drop deadline for a class. Students should monitor their position on a wait list and may be automatically enrolled if a seat becomes available and no holds or course restrictions prevent enrollment. Students are notified via official NDSU email if enrolled in a class via the wait list process, but are ultimately responsible for any registration activity. Students no longer wishing to be enrolled in a wait listed class must drop it from their study list on Campus Connection. Students wishing to enroll in a class that does not utilize the wait list process should contact the academic department offering the course for options.

Cancellation of Registration

Students who register and then decide not to attend NDSU before the semester start date must cancel their registration by submitting a Cancellation of Registration/Withdraw to Zero Credits form. Forms must be submitted to NDSU One Stop. Cancellations are not accepted by telephone, and it is not possible to cancel registration or to drop an only or last course online. Cancellations completed ***prior to the semester start date*** result in a full refund and no academic transcript.

Withdrawal to Zero Credits

Students who have registered and then wish to drop all courses ***after the semester start date*** must officially withdraw from the university. Failure to initiate the withdrawal process may result in 'F' grades and financial obligations that otherwise might be avoided. Refer to the section on financial information (http://www.ndsu.edu/bisonconnection/accounts/refunds/#c166637) for prorated refund deadlines for withdrawals. Steps to withdraw from all courses include the following:

1. Read and complete the Cancellation of Registration/Withdraw to Zero Credits Form (https://www.ndsu.edu/registrar/forms/withdraw). Submit to NDSU One Stop.
2. Students are responsible for any unpaid bills at the time of withdrawal.
3. Withdrawal forms must be submitted by the published deadline of the semester. Withdrawals after this date will not be processed without evidence of a compelling reason or circumstance beyond the student's control. Courses already completed at the time of withdrawal from a term will be withdrawn as well.
4. Students should not attempt to drop all of their courses, their last course, or their only course on Campus Connection.
5. Unlike refunds for individual course drops, withdrawal refunds (https://www.ndsu.edu/onestop/accounts/dropping_withdrawing) are prorated and are based on complete withdrawals from all courses, course lengths, and withdrawal dates.
6. Contact the Counseling Center (https://www.ndsu.edu/counseling) or Disability Services (https://www.ndsu.edu/disabilityservices) if assistance is needed in addressing academic, personal, financial, or other concerns.

Retroactive Withdrawals

Students seeking to withdraw after final grades have been posted may appeal for a retroactive withdrawal; selective course drops are not allowed. Appeals must include documented evidence of a circumstance beyond the student's control which prevented the student from withdrawing on or before the published deadline for the term. The formal appeal request must be submitted prior to three years after the term of the last date of attendance at NDSU.

Dual Career/Level Registration

Students are permitted to register for classes according to their classification level with the university.

1. **Graduate students who wish to enroll in undergraduate coursework must follow the procedure below that most closely matches their academic intent:**
   - If undergraduate coursework is a prerequisite or condition of admission to a graduate program of study, obtain approval from the Graduate College (https://www.ndsu.edu/gradschool). This coursework will be billed at the undergraduate rate and will be recorded on an undergraduate academic record.
   - If undergraduate coursework is to be applied to an undergraduate program in which the student plans to enroll concurrent with a graduate program of study, submit either an Undergraduate Application for Admission (https://www.ndsu.edu/admission/admission_information/application) (if never enrolled as an undergraduate at NDSU) or a Reactivation Form (https://www.ndsu.edu/registrar/forms/reactivation) (if previously enrolled as an undergraduate at NDSU). This coursework will appear on an undergraduate academic record and be billed at the undergraduate rate. Graduate tuition waivers may not cover undergraduate coursework.
   - If undergraduate coursework is to be applied to a graduate program of study (select programs only), obtain approval from the Graduate College. This coursework will appear on a graduate academic record and be billed at the graduate rate.
2. **Undergraduate students who wish to enroll in graduate coursework must follow the procedure below that most closely matches their academic intent:**
   - If graduate coursework is to be applied to a graduate program of study, the student must be admitted to the Graduate College (https://www.ndsu.edu/gradschool). This coursework will appear on a graduate academic record and be billed at the graduate rate.
   - If graduate coursework is to be applied to an undergraduate program of study (such as in substitution for a degree requirement), departmental permission is required. This coursework will appear on an undergraduate record and will be charged at the undergraduate rate. Such credit may not be applied to a graduate degree program of study at NDSU.

Dual Career Registration forms (https://www.ndsu.edu/registrar/forms) and instructions for ensuring that undergraduate and graduate coursework are applied to the appropriate academic career records are available online.

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 degree seeking undergraduate students in good academic standing (GPA of 2.0 or higher) are allowed to enroll collaboratively.
3. The collaborative process allows NDSU to combine credit from more than one NDUS institution for the purpose of financial aid (for courses added through the seventh business day from the start of the term).
4. Collaborative courses are not subject to the NDSU tuition cap.
5. The student pays provider campus tuition/fees for collaborative course(s). This additional amount is included in the student's accounts receivable balance at NDSU.
6. Not all scholarships/tuition waivers cover collaborative tuition and fees. Please check with your funding agency.
7. Students must be in good financial standing to be eligible for collaborative coursework registration.
8. The student cannot exceed a total of 20 credits between NDSU and the provider institution(s) without special permission from the Registrar at home and provider campuses.
9. The student must follow NDSU's academic dates and deadlines for adding/dropping collaborative courses.
10. Drop/adds must be administered by submitting an updated collaborative registration form to the home institution. NDSU students may submit the form to the Office of Registration and Records, 110 Ceres Hall.
11. Courses will be posted to the NDSU academic record as transfer credit once NDSU receives an official transcript from the provider institution. ***Note:*** *Grades earned in collaborative courses may be used in determining financial aid satisfactory progress.*
12. A student's last 30 credits of a degree program must be earned in residence at NDSU. Any student taking credits within the last 30 must submit an Appeal for Exception to Academic Regulations (https://www.ndsu.edu/registrar/forms/acadappeal) to the Office of Registration and Records. Exempt from this requirement are students in the Elementary Education, Social Work, and Bismarck Nursing programs.
13. Completion of the Collaborative Student Contract and Registration Form (https://www.ndsu.edu/registrar/forms/collaborative) does not guarantee registration into the requested course(s). However, if the request(s) cannot be processed, the student will be notified via their NDSU e-mail address.
14. Collaborative registration is not an option for repeating courses previously taken at NDSU. If students wish to take advantage of the repeated course opportunity to improve a grade, that course must be repeated at NDSU.

15. Due to federal compliance, course repeats via collaborative registration will be prohibited to prevent significant federal financial aid impacts which could result in overpayment of federal financial aid funds.

Summer Registration

The 12-week summer session is designed to provide coursework within various time intervals. Classes typically are offered in either the full 12-week session, a standard four-week session that begins in May, or a standard eight-week session that begins in June. There are many other short or variable length courses throughout the summer. While the time interval of the individual sessions is different than that of the standard semester, each course carries full credit because classes meet the same number of contact hours as in the standard semester. In addition, deadlines for variable length and summer session courses are adjusted proportionately. Students are responsible for making changes to their registration according to published deadlines.

Each college or department determines its summer offerings, based upon previous enrollments, programmatic needs, and special requests. Special effort is made to offer courses approved for fulfilling general education requirements. The summer session course offerings schedule (https://www.ndsu.edu/provost/administrative_units/academicaffairs/summerschool/students) is available online.

Fees and Housing

Student, course, and program fees (http://www.ndsu.edu/bisonconnection/accounts/tuition) are available online. Information concerning summer housing may be secured by contacting the Department of Residence Life (https://www.ndsu.edu/reslife), Dept. 5310, P.O. Box 6050, Fargo, ND 58108, or 231-7557 (toll-free 1-800-572-8840).

Graduate Work

A range of opportunities is available for graduate work during the summer session as evidenced by the traditionally high enrollment of graduate students. A considerable number of graduate courses are offered, but generally the summer serves as an important term for students to work on their research requirements, especially if field work is involved. Work on disquisitions and individual study arrangements frequently are facilitated during summers. Courses scheduled to begin at different times and for varying periods provide a high level of flexibility. Thus, those who may have only a portion of a given summer available are likely to find courses that meet their scheduling limitations. In addition, workshops, internships, and other special programs are offered. Teachers generally find the summer school designed to offer attractive selections as components of a degree program, as well as courses directed toward improvement of professional skills. Persons interested in graduate programs of study are encouraged to contact the Graduate College (https://www.ndsu.edu/gradschool) for further information.

Student Credit Load

The recommended credit load for undergraduate students is 15-18 hours per semester during a standard academic term (fall/spring). Undergraduate and professional student full time status is 12 or more credits per semester (9 credits in the summer*). Half time is 6 credits per semester (5 credits in the summer*).

Students are limited to 20 credits per semester (15 credits in the summer). Students who find it necessary to exceed this credit limit must have an NDSU minimum institutional grade-point average of 3.0 to be eligible to petition for an overload. The Over 20 Credits Petition Form (https://www.ndsu.edu/fileadmin/registrar/forms/overtwenty.pdf) is available online.

Graduate student full time status is 9 or more credits per semester (6 credits in the summer*). Half time is 5 credits per semester (3 credits in the summer*). Graduate students may enroll in up to 15 credits per semester and must obtain approval from the Graduate College (https://www.ndsu.edu/gradschool) to exceed this maximum.

*Please be aware that the credit requirements for financial aid purposes (https://www.ndsu.edu/onestop/finaid/application/summer) are different from those set by the Office of Registration and Records, Customer Account Services and the College of Graduate and Interdisciplinary Studies.

Student Records

Transcripts

Official transcripts may be requested online through Campus Connection (https://studentadmin.connectnd.us/psp/NDCSPRD/EMPLOYEE/HRMS/h/?tab=GUEST) (current students) (Self Service>Academic Records>Official Transcript Request) or through www.getmytranscript.com (http://www.getmytranscript.com) (former students). Online ordering provides 24/7 access and additional tracking information. According to federal law, telephone requests and requests from others on behalf of the student cannot be honored. There is a charge for an official transcript. See Official Transcript Requests (https://www.ndsu.edu/registrar/records/transcripts) for detailed transcript fee information. An official transcript request by a student who is in debt to the university will not be honored until the indebtedness has been paid. The transcript only includes detailed work completed at NDSU. Requests for transcripts of work completed elsewhere must be made directly with the respective institution.

Current students may obtain unofficial transcripts (https://www.ndsu.edu/bisonconnection/connect/unofficial), any time, free of charge, on Campus Connection.

Correction of Transcript Errors

If a student believes there is an error in the recording of a course grade on the transcript, the student should first contact the instructor to verify the grade. Other transcript questions or concerns should be directed to the Office of Registration and Records (https://www.ndsu.edu/registrar). See also the sections on Grade Changes and Appeals.

Undergraduate Policies

Academic Planning

Students are advised to prepare short- and long-range plans according to curricular guidelines for the degree program selected. Attention to such details as semester credit loads and course sequences are recommended for optimum experiences.

Academic Advising

The academic advising program at NDSU is designed to facilitate the student's intellectual and personal growth, to assist students in using university resources, and to guide students in making informed choices regarding academic and career plans. Following admission to NDSU, each student is assigned an adviser from the college or department in which the student is majoring. If a major has not been declared, an assignment is made with an adviser in the Advising Resource Center (https://www.ndsu.edu/advising_resource_center). Advisers assist students in selecting courses to ensure a balanced education and they help interpret university and college policies and requirements. However, students are responsible for their academic decisions including the selection of courses, meeting course requisites (co-requisites/prerequisites), and adhering to policies, procedures,

and deadlines. Students are encouraged to see their adviser prior to registration. Students with adviser holds are required to meet with their advisers before the hold is lifted. Adviser assignments and holds can be viewed on Campus Connection.

At any time, students and their advisers may track their degree progress using the Academic Requirements Report (https://www.ndsu.edu/registrar/academics/advising/advisement) (degree audit) feature on Campus Connection. This functionality is interactive and allows students to plan and track their degree progress. Instructions and information on how to access and utilize these reports are available to both students and advisers.

Advisers also assist students with campus resources, referrals, career planning, and campus policies and procedures. NDSU delivers services to support student academics and meet special needs. Refer to the Advising Resource Center for additional information and services.

Each of the academic colleges has a Degree and Records Analyst (https://www.ndsu.edu/registrar/office/liaisons) within the Office of Registration and Records who serves as a central point of contact to support and facilitate academic advising activities for faculty and professional advisers working with undergraduate (including pharmacy programs) student degree progress.

Credit By Examination

Students may demonstrate evidence of college-level achievement through the use of nationally standardized tests. Competency to write these examinations may have been gained through intensive preparation in high school, extensive reading in a particular field, or other types of formal or informal preparation. A student may not repeat by proficiency testing a course that has been previously taken or failed at NDSU or another accredited institution. Score reports must be sent directly to NDSU from the awarding agency/board. High school transcripts and student-issued grade reports are not considered official for purposes of awarding credit by examination. Credit by examination is not considered NDSU residential credit.

Advanced Placement Examination (AP)

Students from high schools that participate in the Advanced Placement Program may earn credit through examinations provided by the College Entrance Examination Board (CEEB). The examinations are administered at the conclusion of a college-level course taught in participating high schools. AP Score Reports are sent to the colleges or universities designated on your exam answer sheet. Students who do not designate NDSU on their answer sheet may contact AP Services (see below) to have scores sent to NDSU. The code for NDSU is **6474**.

In accordance with North Dakota University System policy, a minimum score of three is required to receive credit for Advanced Placement (AP) examinations. If NDSU does not have an equivalent course, free elective credit may be awarded. Credit earned through AP is not residence credit and may not be used to satisfy residence-credit requirements for graduation. A listing of AP exams and current NDSU equivalent courses are listed below.

Examination	Score	Equivalent NDSU Course	Credit Hours	Gen Ed Category
Art-History	3	ART 210 & ART 211	6	A & A
Biology	3	BIOL 111 & BIOL 111L	4	S/L & S/L
Biology	4-5	BIOL 150, BIOL 150L, BIOL 151, & BIOL 151L	8	S/L, S/L, S/L, & S/L
Calculus AB	3	MATH 165	4	R
Calculus BC	3	MATH 165 & MATH 166	8	R & R
Chemistry	3	Free Elective (CHEM 1XX)*	4	S/L
Chemistry	4-5	CHEM 121, CHEM 121L, CHEM 122, & CHEM 122L	8	S/L, S/L, S/L, & S/L
Chinese Language & Culture	3	Free Elective (TRNSFR 1XX)*	3	A/G
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	4-5	CSCI 159	3	R
English Language & Composition	3	ENGL 110 (or ENGL 112)	4	C
English Literature & Composition	3	ENGL 220	3	A
English Literature & Composition	4-5	ENGL 110 & ENGL 220	7	C & A
Environmental Science	3	BIOL 124 & BIOL 124L	4	S/G & S/L
European History	3	HIST 101 & HIST 102	6	A & A
French Language & Culture	3	FREN 101 & FREN 102	8	A/G & A/G
German Language	3	GERM 101 & GERM 102	8	A/G & A/G
Human Geography	3	GEOG 151	3	B/G

Italian Language & Culture	3	Free Elective (TRNSFR 1XX)*	3	A/G
Japanese Language & Culture	3	Free Elective (TRNSFR 1XX)*	3	A/G
Latin	3	Free Elective (TRNSFR 1XX)*	3	A
Latin Literature	3	CLAS 101 & CLAS 102	8	A & A
Macroeconomics	3	ECON 202	3	B/G
Microeconomics	3	ECON 201	3	B/G
Music Theory	3	Free Elective (MUSC 1XX)*	6	A
Physics I: Algebra-Based	3	Free Elective (PHYS 1XX)*	4	S/L
Physics I: Algebra-Based	4	PHYS 211 & PHYS 211L	4	S/L & S/L
Physics II: Algebra-Based	4	PHYS 212 & PHYS 212L	4	S/L & S/L
Physics C - Electricity & Magnetism	3	PHYS 212 & PHYS 212L	4	S/L & S/L
Physics C - Electricity & Magnetism	4	PHYS 252 & PHYS 252L	4	S/L & S/L
Physics C - Mechanics	3	PHYS 211 & PHYS 211L	4	S/L & S/L
Physics C - Mechanics	4	PHYS 251 & PHYS 251L	4	S/L & S/L
Psychology	3	PSYC 111	3	B
Spanish Language	3	SPAN 101 & SPAN 102	8	A/G & A/G
Spanish Literature & Culture	3	Free Elective (SPAN 1XX)*	3	A
Statistics	3	Free Elective (STAT 1XX)*	3	R
Studio Art-2D Design Portfolio	3	ART 122	3	A
Studio Art-3D Design Portfolio	3	ART 124	3	A
Studio Art-Drawing Portfolio	3	ART 130 & ART 230	6	A & A
U.S. Government & Politics	3	POLS 115	3	B
U.S. History	3	HIST 103 & HIST 104	6	A & A
World History	3	Free Elective (HIST 1XX)*	6	A

* Credit received applies toward degree elective credit

General Education Categories:

A	Humanities & Fine Arts
B	Social & Behavioral Science
C	Communication
D	Cultural Diversity
F	First Year Experience
G	Global Perspectives
L	Laboratory Experience
R	Quantitative Reasoning
S	Science & Technology
W	Wellness

See General Education Requirements (https://www.ndsu.edu/registrar/academics/gened) *for more information on core NDSU courses*.

For general information or to order AP score reports contact:

Phone: (609) 771-7300 or (888) 225-5427 (toll-free in the U.S. and Canada)
Automated score report request line: (888) 308-0013 (toll-free in the U.S. and Canada)
Email: apexams@info.collegeboard.org
Web site: www.collegeboard.org (https://www.collegeboard.org)

Questions? Contact the NDSU Office of Registration and Records (https://www.ndsu.edu/registrar/contact) at 701-231-7981

College Level Examination Program (CLEP)

CLEP is a national testing program sponsored by the College Entrance Examination Board (CEEB).

According to North Dakota University System policy, a minimum score of 50 is required to receive credit for CLEP subject examinations. If NDSU does not have an equivalent course, free elective credit may be awarded.

The following CLEP policies apply at NDSU

1. The examination should be taken prior to enrollment in the equivalent or more advanced college-level course.
2. Scores from an examination may not be used to establish credit for a course previously taken and failed or for a course in which the student is currently enrolled.
3. Three months must elapse before an examination may be repeated.
4. Credit earned through CLEP is not residence credit and may not be used to satisfy residence-credit requirements for graduation.

CLEP Examinations

A listing of CLEP exams and current NDSU equivalent courses are listed below.

Examination	Score	Equivalent NDSU Course	Credit Hours	Gen Ed Category
American Government	50	POLS 115	3	B
American Literature	50	ENGL 317 & ENGL 318	6	A & A
Analyzing & Interpreting Literature	50	ENGL 271 & Free Elective (ENGL 1XX)*	6	
Biology	50	BIOL 150 & BIOL 150L	4	S/L & S/L
Calculus	50	MATH 146	4	R
Chemistry	50	CHEM 121 & CHEM 121L	4	S/L & S/L
College Algebra	50	MATH 103	3	R
College Composition	50	ENGL 110	4	C
College Composition Modular	50	ENGL 110	4	C
College Mathematics	50	Free Elective (MATH 1XX)*	3	
English Literature	50	ENGL 315 & ENGL 316	6	A & A
Financial Accounting	50	ACCT 200	3	
French Language Level I	50	FREN 101	4	A/G
French Language Level II	59	FREN 101 & FREN 102	8	A/G & A/G
German Language Level I	50	GERM 101	4	A/G
German Language Level II	60	GERM 101 & GERM 102	8	A/G & A/G
History of the United States I	50	HIST 103	3	A
History of the United States II	50	HIST 104	3	A
Human Growth & Development	50	PSYC 250	3	B
Humanities	50	Free Elective (HUM 1XX)*	3	
Information Systems	50	Free Elective (CSCI 1XX)*	2	S
Introduction to Educational Psychology	50	Free Elective (TRNSFR 1XX)*	3	B
Introduction to Business Law	50	Free Elective (TRNSFR 1XX)*	3	
Introduction to Psychology	50	PSYC 111	3	B
Introduction to Sociology	50	SOC 110	3	B
Natural Sciences	50	Free Elective (TRNSFR 1XX)*	3	
Pre-Calculus	50	MATH 107	3	R
Principles of Macroeconomics	50	ECON 202	3	B/G
Principles of Management	50	Free Elective (TRNSFR 1XX)*	3	
Principles of Marketing	50	Free Elective (TRNSFR 1XX)*	3	

Principles of Microeconomics	50	ECON 201	3	B/G
Social Sciences & History	50	Free Elective (TRNSFR 1XX)*	3	
Spanish Language Level I	50	SPAN 101	4	A/G
Spanish Language Level II	63	SPAN 101 & SPAN 102	8	A/G & A/G
Western Civilization I: Ancient Near East to 1648	50	HIST 101	3	A
Western Civilization II: 1648 to the Present	50	HIST 102	3	A

* Credit received applies toward degree elective credit

General Education Categories:

A	Humanities & Fine Arts
B	Social & Behavioral Science
C	Communication
D	Cultural Diversity
F	First Year Experience
G	Global Perspectives
L	Laboratory Experience
R	Quantitative Reasoning
S	Science & Technology
W	Wellness

See General Education Requirements (https://www.ndsu.edu/registrar/academics/gened) *for more information on core NDSU courses*.

For general information, additional test center locations, or to order transcripts contact:

Phone: (800) 257-9558
Email: clep@collegeboard.org
Web site: www.collegeboard.org (https://www.collegeboard.org)

*Please contact the NDSU Office Registration and Records (https://www.ndsu.edu/registrar/contact) at 701-231-7981 for more information on credit awarded for these tests.

DSST Examinations

NDSU recognizes the DSST (Dantes) examination, which was originally designed for the military as a way to provide individuals an opportunity to obtain college level credit for what they have learned in nontraditional ways. Now available for civilian use, the DSST Test Control Officer (TCO) administers the exams on more than 560 military installations and official DSST test centers. The main users of the exams include adult education programs, U.S. Department of Defense, and two- and four-year colleges and universities. NDSU's DSST location site code is: DSST-9366.

In accordance with North Dakota University System policy, students must receive a minimum score on the examinations to qualify for possible awarding of credit and advanced placement, which is determined by the appropriate academic department on campus. If NDSU does not have an equivalent course, free elective credit may be awarded. Credit earned through DSST may not be used to satisfy residence-credit requirements for graduation. A listing of DSST exams and current NDSU equivalent courses are listed below.

Examination	Score	Equivalent NDSU Course	Credit Hours	Gen Ed Category
A History of the Vietnam War	44	Free Elective (HIST 1XX)*	3.00	
Art of the Western World	48	ART 111	3	A
Astronomy	48	PHYS 110	3	S
Business Law	44	Free Elective (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	
Ethics in America	400	PHIL 210	3	

Foundations of Education	46	Free Elective (TRNSFR 1XX)*	3	
Fundamentals of College Algebra	400	MATH 103	3	
Fundamentals of Counseling	45	Free Elective (TRNSFR 1XX)*	3	
General Anthropology	47	ANTH 111	3	B/D
Here's to Your Health	400	HNES 217	3	W
Human Resource Mangement	46	Free Elective (TRNSFR 1XX)*	3	
Human/Cultural Geography	47	GEOG 151	3	B/G
Intro to the Modern Middle East	47	Free Elective (TRNSFR 1XX)*	3	
Intro to Business	400	Free Elective (TRNSFR 1XX)*	3	
Intro to Computing	400	Free Elective (TRNSFR 1XX)*	3	
Intro to Law Enforcement	45	Free Elective (TRNSFR 1XX)*	3	
Lifespan Development Psychology	46	PSYC 250	3	B
Management Information Systems	400	Free Elective (TRNSFR 1XX)*	3	
Money & Banking	48	Free Elective (TRNSFR 1XX)*	3	
Organizational Behavior	48	Free Elective (TRNSFR 1XX)*	3	
Personal Finance	400	Free Elective (TRNSFR 1XX)*	3	
Physical Geology	46	Free Elective (GEOL 1XX)*	3	S/G
Principles of Finance	400	Free Elective (TRNSFR 1XX)*	3	
Principles of Financial Accounting	49	ACCT 200	3	
Principles of Statistics	48/400	Free Elective (STAT 1XX)*	3	
Principles of Supervison	400	Free Elective (TRNSFR 1XX)*	3	
Rise and Fall of Soviet Union	45	Free Elective (HIST 1XX)*	3	
Substance Abuse	400	PSYC 212	3	B

* Credit received applies toward degree elective credit

General Education Categories:

A	Humanities & Fine Arts
B	Social & Behavioral Science
C	Communication
D	Cultural Diversity
F	First Year Experience
G	Global Perspectives
L	Laboratory Experience
R	Quantitative Reasoning
S	Science & Technology
W	Wellness

See General Education Requirements (https://www.ndsu.edu/registrar/academics/gened) *for more information on core NDSU courses*.

Additional Information:
For more information on DSST exams and to locate a test center, go to www.getcollegecredit.com (http://www.getcollegecredit.com)

International Baccalaureate (IB)

NDSU recognizes the International Baccalaureate program, offered at many high schools in the United States and abroad, which allows students to take examinations for credit. The examinations are offered at the standard (SL) and higher (HL) levels. **However, according to state policy, NDSU will only grant credit for applicable HL examinations.**

In accordance with North Dakota University System policy, students must receive a predetermined minimum score on higher-level (HL) examinations to qualify for possible awarding of credit and advanced placement, which is determined by the appropriate academic department on campus. Credit

earned through IB may not be used to satisfy residence-credit requirements for graduation. Scores received in IB examinations not included in the table below may be considered for credits. Contact the Office of Registration and Records (https://www.ndsu.edu/registrar/contact) for information.

Examination	Score	Equivalent NDSU Course	Credit Hours	Gen Ed Category
HL Biology	4	BIOL 150, BIOL 150L, BIOL 151, BIOL 151L	8	S/L, S/L, S/L, S/L
HL Chemistry	4	CHEM 121, CHEM 121L, CHEM 122, CHEM 122L	8	S/L, S/L, S/L, S/L
HL English	4	ENGL 220	3	A
HL French B	5	FREN 101, FREN 102, FREN 201	11	A/G, A/G, A/D
HL Geography	4	GEOG 161	3	G
HL German B	5	GERM 101, GERM 102, GERM 201	11	A/G, A/G, A/D
HL History (Africa)	4	Free Elective (HIST 1XX)*	3	
HL History (Americas)	4	HIST 103, HIST 104	6	A, A
HL History (Asia)	4	Free Elective (HIST 1XX)*	3	
HL History (Europe)	4	HIST 102	3	A
HL History (Islamic)	4	Free Elective (HIST 1XX)*	3	
HL History (Middle East)	4	Free Elective (HIST 1XX)*	3	
HL Literature & Performance	4	COMM 312	3	
HL Mathematics	4	MATH 103, MATH 105	6	
HL Physics	5	Free Elective (PHYS 1XX)*	4	
HL Psychology	4	PSYC 111	3	B
HL Spanish B	5	SPAN 101, SPAN 102, SPAN 201	11	A/G, A/G, A/D

* Credit received applies toward degree elective credit

General Education Categories:

A	Humanities & Fine Arts
B	Social & Behavioral Science
C	Communication
D	Cultural Diversity
F	First Year Experience
G	Global Perspectives
L	Laboratory Experience
R	Quantitative Reasoning
S	Science & Technology
W	Wellness

See General Education Requirements (https://www.ndsu.edu/registrar/academics/gened) *for more information on core NDSU courses*.

To order official transcripts, please contact:

Web site: www.ibo.org/iba/transcripts (http://www.ibo.org/iba/transcripts)
Phone: (301) 202-3025
Email: ibid@ibo.org

Course Challenge

A student who is currently registered may seek credit by challenging a course. A course challenge usually consists of a special comprehensive examination; however, additional types of performance may be required for some courses. A course challenge is only permitted for courses in which the student has no previous record (prior registrations allowable if course was dropped by the No Record Drop deadline in a given term). Further, credits earned by course challenge may not satisfy requirements toward a graduate degree.

Procedures for pursuing a course challenge include the following

1. Obtain a Petition for Course Challenge Form (https://www.ndsu.edu/registrar/forms/challenge), available online.
2. Obtain approval from the academic adviser, the instructor of the course, and the chair of the department offering the course. Clarify expectations of the challenge, e.g., examination only or examination plus other performance. Based on the nature of the course and content area, some courses may not be approved for challenge by the department.
3. Pay the course challenge fee at the Customer Account Services (https://www.ndsu.edu/bisonconnection/accounts), 302 Ceres Hall, after receiving approval for the challenge (50% of the regular credit tuition charge; not subject to tuition cap).
4. Arrange a mutually convenient date and time for the challenge with the instructor or department.
5. Upon receipt of the signed Petition for Course Challenge form from the department, courses and credits successfully challenged are listed on the student's academic transcript with a passing (P) grade. Unsuccessful challenges are not recorded.

Project Lead the Way (PLTW) Eligibility:

Secondary school students successfully completing Project Lead the Way (PLTW) courses may apply for transcripted college credit from North Dakota State University. The student will receive 3 semester credits per course, subject to the following conditions:

- The high school must be certified by PLTW.
- All requirements for the PLTW course must be satisfied, and the student must achieve an average of 85% or better for the course
- The PLTW End of Course Assessment must be taken and passed with a stanine* score of 6.
- Correct payment amount and completed application must be post marked by the deadline. Any application post marked after the deadline will not be processed and will be returned.

*This assessment (Administered by PLTW) is based on a norm-reference stanine scores which ranges from one (1) to nine (9) with one (1) being the lowest possible score and nine (9) being the highest possible score.

NDSU will accept transcripted credit for PLTW courses from other affiliate universities with equivalent credit requirements. Up to 6 credits may be used as general electives towards a degree at the NDSU. Possible substitution of PLTW credits for meeting specific programmatic requirements at the University is at the discretion of the individual academic programs. Currently, at NDSU, PLTW courses do not have specific program equivalents.

The PLTW courses for which NDSU credit may be received are the following:

- ENGR: 120 PLTW IED: Introduction to Engineering Design
- ENGR: 121 PLTW POE: Principles of Engineering
- ENGR: 122 PLTW DE: Digital Electronics
- ENGR: 123 PLTW CEA: Overview of Civil Engineering and Architecture
- ENGR: 124 PLTW ES: Biotechnical Engineering or Environmental Engineering
- ENGR: 125 PLTW CIM: Computer Integrated Manufacturing
- ENGR: 126 PLTW AE: Aerospace Engineering
- ENGR: 128 PLTW CSE: Computer Science and Software Engineering

Once approved students see a Pass (P) appear on the NDSU transcript.

For additional information on PLTW, contact NDSU's College of Engineering (https://www.ndsu.edu/coe) or Office of Admission (https://www.ndsu.edu/admission).

Project Lead The Way is a United States 501 non-profit organization that develops STEM curricula for use by elementary, middle, and high schools.

English and Mathematics Placement

In accordance with North Dakota University System Policy and Procedure 402.1.2 (http://www.ndus.nodak.edu/makers/procedures/sbhe/default.asp?PID=217&SID=5) students are placed into Math and English courses based on qualifying exam scores. The intent is to appropriately place students into courses that are both challenging and for which they are adequately prepared.

English Placement for U.S. Students, Canadian Students, and U.S. Permanent Residents

- All students are required to successfully earn credit for ENGL 110 and 120 or equivalent as part of the NDSU general education requirements.
- For students who have multiple placement exam scores, the highest placement may be used.
- Eligible students with disabilities may seek reasonable accommodations to take the placement test. Please submit disability documentation to NDSU Disability Services at least two weeks prior to the time in which the accommodations are needed. Documentation will be reviewed and students will be notified if additional documentation is needed to make an eligibility decision. Please submit the request and documentation to: **NDSU Disability Services** (https://www.ndsu.edu/disabilityservices)**;** Dept. 2860; P.O. Box 6050; Fargo, ND 58108-6050; (701) 231-8463.

- Students who have not taken the ACT or SAT are required to enroll in a developmental English course, ASC 087, prior to enrolling in ENGL 110. ASC 087 will be delivered by North Dakota State College of Science (http://www.ndscs.edu) (NDSCS) on the NDSU campus. Students must register through the collaborative student registration (p. 1401) process. Course textbooks for ASC 087 may be purchased through the NDSU bookstore (http://www.ndsubookstore.com).
- Students who are required to begin in ASC 087 must successfully complete the course with a grade of 'S' (satisfactory) before they may enroll in ENGL 110 or equivalent.
- Upon completion of ENGL 120 with a 'C' grade or higher, students will be awarded placement credit (4) for ENGL 110.
- Students who transfer ENGL 120 to NDSU will be awarded placement credit (4) for ENGL 110 after successfully completing their upper division writing course with a grade of 'C' or higher.
- Students with a MELAB score should contact the IELP coordinator (http://www.ndsu.edu/modernlanguages/department_directory) for information on English placement.

The table below lists exam scores and corresponding English course placement at NDSU:

English ACT Subtest Score	SAT Writing	ACT Aspire	Smarter Balanced 11/12 Grade(ELA)	Accuplacer WritePlacer Test Score	MyFoundationsLab Pearson (CREAM CLEM & Others)	NDSU Course Placement
13 or lower	Evidence Based Reading & Writing: 400 or lower	425 or lower	2 or lower	3-4	69.9% or less	ASC 087: College Writing Prep II (NDSCS Collaborative)
-	350 or lower (Prior to March 5, 2016)	-	-	-	-	ASC 087: College Writing Prep II (NDSCS Collaborative)
14-17	Evidence-Based Reading & Writing: 410-470	426 or higher	3 or higher	5	70% or higher	ENGL 110: College Composition I
-	360-420 (Prior to March 5, 2016)	-	-	-	-	ENGL 110: College Composition I
18 or higher	Evidence-Based Writing & Reading: 480	-	-	6-8	-	ENGL 120: College Composition II
-	430 (Prior to March 5, 2016)	-	-	-	-	ENGL 120: College Composition II

English Placement for International Students

- All students are required to successfully earn credit for ENGL 112 and 122 (or 110 and 120 for native English speakers) or equivalent as part of the NDSU general education requirements.
- Students who are required to begin in LANG 109 must successfully complete the course with a 'C' grade or higher before they may enroll in ENGL 112 or equivalent.
- For students who have multiple exam scores, the highest placement may be used.
- Students with qualifying exam scores, who are advised to enroll in ENGL 122, will be awarded placement credit (4) for ENGL 112 upon completion of ENGL 122 with a 'C' grade or higher.

The table below lists ACT and SAT exam scores and corresponding course Placement:

Exam Type	LANG 109: Language Use in Writing ESL II	ENGL 112: ESL College Composition I	ENGL 122: ESL College Composition II
ACT English sub-test	13 or lower	14-17	18 or higher
SAT Writing	350 or lower	360-420	430

The table below lists placement exams for International students and corresponding course placement:

Exam Type	LANG 109: Language Use in Writing ESL II	ENGL 112: ESL College Composition I
IELTS (Overall)	5.5 or lower	6.0 or higher
TOEFL (Composite)	70 or lower	71 or higher

Pearson (Overall)	49 or lower	50 or higher
ELS Center	ELS 109 or lower	ELS 112 Certificate/Completion

NDSU Math Placement Procedures

A variety of approved placement examinations are used (see table below) to determine placement of students into entry-level math courses. The following guidelines apply to math placement practices:

- For students who have scores from multiple exams, the highest placement will be used.
- Eligible students with disabilities may seek reasonable accommodations to take the placement test. Please submit disability documentation to NDSU Disability Services at least two weeks prior to the time in which the accommodations are needed. Documentation will be reviewed and students will be notified if additional documentation is needed to make an eligibility decision. Please submit the request and documentation to: **NDSU Disability Services** (https://www.ndsu.edu/disabilityservices)**;** Dept. 5160; P.O. Box 6050; Fargo, ND 58108-6050; (701) 231-8463.
- Current, incoming or returning NDSU students who do not have prior college-level mathematics *OR* have not taken an approved placement examination must take the NDSU Pearson Placement exam to determine course placement.
- Students who meet the minimum score requirement of any approved placement examination may elect to take the NDSU Pearson Placement exam to attempt to place into a course above MATH 103 or MATH 104.
- Students that do not meet the minimum score requirement on any approved placement examination will place into Math 98, however, students may elect to take the NDSU Pearson Placement exam offered through NDSU to attempt to place into a course above MATH 98.
- Students who begin in Math 98 must successfully complete the course with a 'C' grade or higher before they may continue to Math 103 or 104.
- Students have the option to retake the NDSU Pearson Placement exam one time and must be completed before the last day to add classes in Campus Connection.
- Questions about the NDSU Pearson Placement exam can be directed to NDSU One Stop (https://www.ndsu.edu/onestop).

Exam scores and corresponding course placement possibilities are listed in the table below:

The table below lists NDSU approved placement examinations and minimum exam scores for placement into MATH 103 or Math 104:

Test	Test Component	Minimum Score
ACT	Math Subtest	21
SAT	MATH	530
SAT (prior to 2/05/2016)	Math + Reading	990
Accuplacer	Elementary Algebra	76
Accuplacer	College Level Math	50
ACT Aspire	Math Subtest	431
ALEKS	Mathematics PPL	46
MyFoundationsLab Pearson (CREAM, CLEM & Others)	Math	70%
EdReady (NROC)	Math Placement	75
MAA Maplesoft	Algebra	12
Smarter Balanced	Grade 11-12 Math	3

The Table below lists NDSU Pearson Placement exam scores and corresponding Math course placement at NDSU:

Pearson	Course Placement
Intermediate Algebra < 70%	Math 098
Intermediate Algebra ≥ 70%	Math 103 or Math 104
Algebra < 60%	Math 103 or Math 104
Algebra 45%-59.9% AND Trigonometry ≥ 30%	Math 107
Algebra ≥ 60% AND Trigonometry < 50%	Math 105 or Math 144* or Math 146
Algebra ≥ 65% AND Trigonometry 40%-64.9%	Math 165 with Math 105
Algebra ≥ 65% AND Trigonometry ≥ 65%	Math 165

**MATH 144, "Mathematics for Business", is only available for College of Business majors.*

Students with College Transfer Coursework or Credit by Examination Placement

Students with prior college coursework, Advance Placement (AP) or other credit-by-examination (CLEP, IB, DSST) will follow NDSU's Credit by Examination (https://bulletin.ndsu.edu/academic-policies/undergraduate-policies/credit-by-examination) guidelines for placement into mathematics and English coursework.

Sequence of NDSU math courses as a reference or guide:

START: MATH 98 > MATH 103 > MATH 105 > MATH 165 > MATH 166 or

MATH 98 > MATH 103 > MATH 146 > Math 147 or

MATH 98 > MATH 104

START: Math Placement Test > MATH 107 > MATH 165 > MATH 166

General Education

The purpose of general education at NDSU is to ensure that students acquire knowledge, perspectives, and skills basic to a university education. The program is designed so that students will be able to adapt to and anticipate changes in their profession and in society. Students also will be able to integrate and use the knowledge and perspectives they have gained to live productive, intellectually rewarding and meaningful lives.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing †		
Quantitative Reasoning (R) †		3
Science and Technology (S) †		10
Humanities and Fine Arts (A) †		6
Social and Behavioral Sciences (B) †		6
Wellness (W) †		2
Cultural Diversity (D) *†		
Global Perspectives (G) *†		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 823).

General Education Category Descriptions

The following descriptions are elaborations of the general education categories approved by the Faculty Senate.

- **Communication (C)** is the clear, precise, and purposeful exchange of information in a variety of contexts, using either written or oral means.
- **Cultural diversity (D)** focuses on the social, personal, and interpersonal effects of variety and differences among cultures.
- **Fine arts (A)**, as an integral component of the humanities, promote the appreciation of aesthetics and the expression of creativity.
- **Global perspectives (G)** focus on analysis of worldwide issues illustrating the interdependence of the world and its people.
- **Humanities (A)** systematically explore cultural and intellectual forces shaping events, individual expression, and social values.
- **Quantitative reasoning (R)** is an organized set of quantitative methods used to solve problems or extend knowledge. Quantitative methods are a set of principles and procedures that could be used to manipulate numerical data.
- **Science (S)** is an organized body of knowledge, including principles and procedures based on scientific methods, used to explain physical or biological phenomena.
- **Social and behavioral sciences (B)** use scientific methods to analyze the behaviors, structures, and processes of individuals and groups.

- **Wellness (W)** is a dynamic and integrative process of becoming aware of healthy lifestyles, of learning to make informed choices, and of developing a balanced approach to living.

General Education Program Assessment

General education assessment has three basic purposes:

1. To improve student learning and development by identifying the intended student outcomes for the program.
2. To provide feedback on the progress toward the intended student outcomes.
3. To use the feedback to modify aspects of the program to ensure that the outcomes are being achieved and that student learning is improved.

Assessment activities are valued at NDSU and include the participation of students. Results will not be used to penalize students or faculty. Student performance on assessment of the general education program will not become part of the transcript.

General Education Transfer

Students transferring lower-division general education credits within the North Dakota University System need to consult with advisers in their academic programs at NDSU for two reasons. First, degree requirements of individual programs and colleges at NDSU may exceed the university-wide general education requirements. Second, meeting the university-wide lower-division general education requirements by transfer credits may not necessarily prepare students for advanced, upper-division study in an academic major at NDSU. See also the NDUS GERTA Agreement.

Using NDSU Study Abroad and Study Tour Experiences for General Education Cultural Diversity or Global Perspectives

UNIV 492: Study Abroad – A student who studies abroad for one or more semesters and who successfully completes a minimum of three credits may qualify for either Cultural Diversity or Global Perspectives. 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. In addition, a student must complete a Student Appeal for Exception to General Education Requirements (https://www.ndsu.edu/fileadmin/registrar/forms/genedappeal.pdf) for consideration.

(Prefix) 379: Study Tour – Study Tour experiences do not automatically qualify for NDSU general education. An NDSU study tour instructor must apply for general education course approval in the appropriate category that pertains to the course content (including cultural diversity and global perspectives). Approval requires the instructor to submit a course syllabus and a one-page rationale addressing how the tour experience will meet the outcome being sought. Syllabus and rationale are to be submitted to the University Curriculum Committee well in advance of the tour departure.

Core Undergraduate Learning Outcomes

The intended learning outcomes resulting from the various general education categories include the following:

Communication (C)

1. Communication Learning Outcome - students will use a variety of modes, particularly written, oral, artistic, and visual to
   a. effectively communicate analysis, knowledge, understanding, expression and/or conclusions
   b. skillfully use high-quality, credible, relevant sources
   c. demonstrate appropriate conventions in a variety of communication situations
   d. demonstrate the ability to communicate effectively with diverse audiences in a variety of contexts

Quantitative Reasoning (R)

1. Critical Thinking, Creative Thinking, and Problem Solving Learning Outcome - students will
   a. explain the nature of evidence used for analysis
   b. apply quantitative and qualitative methods to collect and analyze data
   c. apply creativity and divergent thinking
   d. evaluate the assumptions, evidence, and logic of competing views and explanations
   e. identify methods of inquiry, approaches to knowledge, and their assumptions and limitations in multiple disciplines
   f. evaluate, synthesize, and apply evidence to understand and address complex, real world problems
   g. generate creative, reasoned, approaches or solutions to unscripted, real world problems

Science & Technology (S)

1. Technology Learning Outcome- students will
   a. apply technology to demonstrate creativity and solve problems
   b. use technology to enhance understanding

c. identify the social, aesthetic, and ethical implications of technological decisions
d. analyze how technology shapes, limits, and augments our experiences and understandings

2. Natural and Physical Sciences Learning Outcome - students will
   a. analyze components and dynamics of natural and physical worlds
   b. develop models to explain phenomena within the natural and physical worlds
   c. identify the role of scientific methods in the study of natural and physical worlds

Humanities & Fine Arts (A) and Social & Behavioral Sciences (B)

1. Human Societies Learning Outcomes - students will
   a. identify the nature and impact of aesthetic and creative activities in human experience
   b. analyze the interplay of self and society, particularly how social structures shape human experiences and how humans shape social structures
   c. analyze the components and dynamics of human societies in their artistic, cultural, and historical contexts
   d. apply theories or research methods to understand human events, identities, artifacts, or social structures
   e. engage in a creative, aesthetic, or artistic activity

Social & Behavioral Sciences - Wellness (W)

1. Person & Social Responsibility Learning Outcomes - students will
   a. examine their own values, biases, and conclusions
   b. analyze the ethical basis for and implications of personal, professional, and civic decisions
   c. comprehend and demonstrate appropriate standard of professional behavior
   d. identify stewardship of the land and its people as integral to a land-grant university
   e. analyze human impacts on the world and the importance of sustaining its resources for future generations

Cultural Diversity (D)

1. Diversity Learning Outcomes - students will
   a. identify how values and contributions of diverse societies provide contexts for individual experiences, values, ideas, artistic expressions, and identities
   b. identify the role diversity plays in the ability of biological organisms to adapt to a changing environment
   c. evaluate how diverse systems (both natural and human-made), technologies, or innovations emerge from, interact with, and affect various communities
   d. collaborate with others in diverse interpersonal, intercultural, or international settings

Global Perspectives (G)

1. Global Perspectives Learning Outcomes - students will
   a. apply theories or research methods to develop strategies and solutions that address global challenges
   b. identify potential benefits and explore the opportunities of being a global citizen
   c. analyze how communities are impacted by and/or contribute to globalization from various perspectives
   d. analyze the process and/or develop models of global trends
   e. evaluate global phenomena using perspectives, attitudes and beliefs of communities with cultural backgrounds different from their own

General Education Administrative Policies

1. General education courses may be used to satisfy requirements for both general education requirements and the major, minor, and program emphases, where applicable.
2. Departments or colleges may preclude their students from double counting general education courses with major courses.
3. Except for courses that meet the cultural diversity or global perspectives requirements, no course can fulfill the requirements for more than one general education category.
4. General education requirements can be met through credit by exam, departmental examinations, or equivalents.
5. General education requirements can be met by successful completion of a course for which an approved general education course in the same department is a prerequisite or by successful completion of an advanced course in the same department with comparable course content.
6. Except for courses offered only on a pass/fail basis, no courses taken to meet the general education requirements may be taken for pass/fail grades.
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/gened/syllabi))
13. Students who have completed basic military training (which is the commitment for enlistment) will receive a waiver for the Wellness category. Military record documentation is required for the waiver; documentation is to be submitted to the Office of Registration and Records with a completed Appeal for Exception to General Education Requirements form. The waiver for the training will not lead to course credit, and all other minimum graduation requirements apply.

General Education Courses

The following is representative of the courses approved in each general education category for the specific catalog year. The general education component requires a minimum of 39 total credits with a minimum credit requirement in each of the seven categories. Cultural diversity and global perspectives may be satisfied by completing courses in another category.

Category C: Communications - 12 credits

Nine Credits must be in Writing, three at the Upper-Level*:

Code	Title	Credits
ENGL 110	College Composition I	4
or ENGL 112	ESL College Composition I	
ENGL 120	College Composition II	3-4
or ENGL 121	Honors Composition II	
or ENGL 122	ESL College Composition II	
COMM 110	Fundamentals of Public Speaking	3
ENGL 320	Business and Professional Writing	3
ENGL 321	Writing in the Technical Professions	3
ENGL 322	Writing and the Creative Process	3
ENGL 324	Writing in the Sciences	3
ENGL 325	Writing in the Health Professions	3
ENGL 326	Writing in the Design Professions	3
ENGL 357	Visual Culture and Language	3
ENGL 358	Writing in the Humanities and Social Sciences	3
ENGL 459	Researching and Writing Grants and Proposal	3
FREN 360	Studies in Language and Style	3
HIST 390	Historical Research and Writing	3
MICR 354	Scientific Writing	3
PHIL 450	Metaphysics	3
PHIL 451	Epistemology	3
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 146	Applied Calculus I	4
MATH 165	Calculus I	4
PHIL 257	Traditional Logic	3
STAT 330	Introductory Statistics	3

CATEGORY S: Science & Technology - 10 Credits

- At least four credits must be in natural or physical sciences.
- A one-credit lab must be taken as a co-requisite with a general education science/technology course unless the course includes an embedded lab experience equivalent to a one-credit course.

Natural Science (Sn):

Code	Title	Credits
AGRI 115	Wonders of Weather	3
BIOL 111	Concepts of Biology	3
BIOL 111L	Concepts of Biology Lab	1
BIOL 124	Environmental Science	3
BIOL 124L	Environmental Science Laboratory	1
BIOL 126	Human Biology	3
BIOL 126L	Human Biology Laboratory	1
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	
ENT 210	Insects, Humans and the Environment	3
GEOL 201	The Geology of Climate Change and Energy	3
HON 342	Colloquium in the Sciences	3
MICR 202	Introductory Microbiology	2
MICR 202L	Introductory Microbiology Lab	1
NRM/RNG 225	Natural Resources & Agrosystems	3
PLSC 110	World Food Crops	3
PLSC 111	Genetics and You	2
PLSC 210	Horticulture Science	3
PLSC 211	Horticulture Science Lab	1
SOIL 217	Introduction to Meteorology & Climatology	3

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	Eastern North Dakota Field Course May be taken as a co-requisite lab if taken with GEOL 105 or GEOL 106.	1

HNES 250	Nutrition Science May be used for Category 5b: Wellness if taken in addition to the 10 credits required in Science & Technology. It may not be counted in more than one category.	3
PHYS 110	Introductory Astronomy	3
PHYS 110L	Introductory Astronomy Lab	1
PHYS 120	Fundamentals of Physics	3
PHYS 120L	Fundamentals of Physics Laboratory	1
PHYS 211	College Physics I	3
PHYS 211L	College Physics I Laboratory	1
PHYS 212	College Physics II	3
PHYS 212L	College Physics II Laboratory	1
PHYS 220	Physics for Designers	3
UNIV 150	Foundations of Science	3
UNIV 151	Science and Society	3

Technology (St):

Code	Title	Credits
CSCI 114	Microcomputer Packages	3
or MIS 116	Business Use of Computers	

CATEGORY A: Humanities & Fine Arts - 6 Credits

- No more than 3 of the 6 credits may be in fine arts performance.

Code	Title	Credits
ADHM 310	History of Fashion	3
ADHM 315	History of Interiors I	3
ADHM 316	History of Interiors II	3
ADHM 410	Dress in World Cultures	3
ADHM 411	Food and World Cultures	3
ARB 101	First-Year Arabic I	4
ARB 102	First-Year Arabic II	4
ARB 201	Second-Year Arabic I	3
ARCH 321	History and Theory of Architecture I	3
ARCH 322	History of Architecture II	3
ART 110	Introduction to the Visual Arts	3
ART 111	Introduction to Art History	3
ART 153	Design Thinking and Creative Strategy	3
ART 210	Art History I	3
ART 211	Art History II	3
CLAS 101	First-Year Latin I	4
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 330	British and American Women Writers	3
ENGL 331	Contemporary Women Writers	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	20th Century American Fiction	3
ENGL 345	Themes in American Culture	3
ENGL 375	The Bible as Literature	3
ENGL 380	Shakespeare	3

ENGR 311	History of Technology in America	3
ENVD 101	Introduction to Environmental Design	3
FREN 101	First-Year French I	4
FREN 102	First-Year French II	4
FREN 201	Second-Year French I	3
FREN 345	Women in French Literature	3
GERM 101	First-Year German I	4
GERM 102	First-Year German II	4
GERM 201	Second-Year German I	3
GERM 220	German Culture & Society	3
HIST 101	Western Civilization I	3
HIST 102	Western Civilization II	3
HIST 103	U.S. to 1877	3
HIST 104	U.S. Since 1877	3
HIST 135	Race in U.S. History	3
HIST 261	American Indian History	3
HIST 270	American Religious History	3
HIST 271	Introduction to Latin American History	3
HIST 355	History of Global Islam	3
HIST 381	Australia & New Zealand	3
HIST 431	The North American Plains	3
HON 340	Colloquium in the Humanities	3
HON 386	World Literature: Imaginary Homelands	3
LA 321		4
MUSC 100	Music Appreciation	3
MUSC 103	Introduction to Music History	3
MUSC 108	Roots of American Popular Music	3
PHIL 101	Introduction to Philosophy	3
PHIL 111	Professional Responsibility and Ethics	3
PHIL 215	Contemporary Moral Issues	3
PHIL 216	Business Ethics	3
RELS 100	World Religions	3
RELS 220	Old Testament	3
RELS 270	American Religious History	3
RELS 340	New Religious Movements	3
RELS 345	Religion and Politics	3
RELS 355	History of Global Islam	3
SPAN 101	First-Year Spanish I	4
SPAN 102	First-Year Spanish II	4
SPAN 201	Second-Year Spanish I	3
THEA 110	Introduction to Theatre Arts	3
THEA 115	World Film	3
THEA 160	Storytelling	3
THEA 280	World Theatre	3
WGS 110	Introduction to Women's Studies	3
WGS 112	Introduction to Masculinities	3

Fine Arts Performance:

- Any performance courses must be in addition to those required for the student's major.

Code	Title	Credits
ART 130	Drawing I	3
THEA 161	Acting I	3

CATEGORY B: Social & Behavioral Sciences - 6 Credits

Code	Title	Credits
ADHM 486	Dress and Human Behavior	3
ANTH 111	Introduction to Anthropology	3
COMM 112	Understanding Media and Social Change	3
COMM 114	Human Communication	3
COMM 212	Interpersonal Communication	3
COMM 216	Intercultural Communication	3
ECON 105	Elements of Economics	3
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
EMGT 101	Emergencies, Disasters, and Catastrophes	3
ENGR 312	Impact of Technology on Society	3
GEOG 151	Human Geography	3
GEOG 161	World Regional Geography	3
HDFS 135	Family Science	3
HDFS 186	Consumer and Society	3
HDFS 230	Life Span Development	3
HDFS 475	Children and Families Across Cultures	3
HON 341	Colloquium in the Social Sciences	3
INTL 110	Introduction to International Studies	3
POLS 110	Introduction to Political Science	3
POLS 115	American Government	3
POLS 120	Terrorism	3
POLS 220	International Politics	3
PSYC 111	Introduction to Psychology	3
PSYC 210	Human Sexuality	3
PSYC 211	Introduction To Behavior Modification	3
PSYC 212	Psychological Aspects of Drug Use and Abuse	3
PSYC/SOC 214	Social Interaction	3
PSYC 221	Psychology Applied to Work	3
PSYC 250	Developmental Psychology	3
PSYC 270	Abnormal Psychology	3
SOC 110	Introduction to Sociology	3
SOC 116	Global Social Problems	3
SOC 235	Cultural Diversity	3
SOC 412	Sociology of Gender	3

CATEGORY W: Wellness - 2 Credits

- At least two credits must be taken from the following list
- Required is a social/behavioral science course that integrates at least two areas of lifelong wellness: emotional well-being, nutrition, physical activity, and psychological development.

Code	Title	Credits
HDFS 242	Couples, Marriages and Families	3
HNES 100	Concepts of Fitness & Wellness	2
HNES 111	Wellness	3
HNES 200	Principles of Nutrition	3
HNES 217	Personal and Community Health	3

HNES 250	Nutrition Science	3
PH 101	Introduction to Public Health	3

CATEGORY D: Cultural Diversity

- This requirement may be met by 3 credits taken in any department as part of the 40 credits required for general education in a course approved for cultural diversity.

Code	Title	Credits
ADHM 410	Dress in World Cultures	3
ADHM 411	Food and World Cultures	3
ANTH 111	Introduction to Anthropology	3
ARB 201	Second-Year Arabic I	3
ART 110	Introduction to the Visual Arts	3
COMM 216	Intercultural Communication	3
ENGL 150	Being Human	3
ENGL 330	British and American Women Writers	3
ENGL 335	Multicultural Writers	3
ENGL 340	19th Century American Fiction	3
ENGL 341	20th Century American Fiction	3
ENGL 345	Themes in American Culture	3
FREN 201	Second-Year French I	3
FREN 345	Women in French Literature	3
GERM 201	Second-Year German I	3
HDFS 475	Children and Families Across Cultures	3
HIST 135	Race in U.S. History	3
HIST 261	American Indian History	3
HIST 271	Introduction to Latin American History	3
HIST 431	The North American Plains	3
HON 386	World Literature: Imaginary Homelands	3
MUSC 108	Roots of American Popular Music	3
PH 101	Introduction to Public Health	3
PHIL 215	Contemporary Moral Issues	3
SOC 235	Cultural Diversity	3
SOC 412	Sociology of Gender	3
SPAN 201	Second-Year Spanish I	3
THEA 115	World Film	3
THEA 280	World Theatre	3
WGS 110	Introduction to Women's Studies	3
WGS 112	Introduction to Masculinities	3

CATEGORY G: Global Perspectives

- This requirement may be met by 3 credits taken in any department as part of the 40 credits required for general education in a course approved for global perspectives.

Code	Title	Credits
ARB 101	First-Year Arabic I	4
ARB 102	First-Year Arabic II	4
ARCH 321	History and Theory of Architecture I	3
ART 111	Introduction to Art History	3
BIOL 124	Environmental Science	3
BIOL 124L	Environmental Science Laboratory	1
ECON 105	Elements of Economics	3
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3

ENGL 336	Literature and The Environment	3
ENGL 375	The Bible as Literature	3
ENGR 312	Impact of Technology on Society	3
FREN 101	First-Year French I	4
FREN 102	First-Year French II	4
GEOG 151	Human Geography	3
GEOG 161	World Regional Geography	3
GEOL 105L	Physical Geology Lab	1
GEOL 105	Physical Geology	3
GEOL 106	The Earth Through Time	3
GEOL 106L	The Earth Through Time Lab	1
GEOL 201	The Geology of Climate Change and Energy	3
GERM 101	First-Year German I	4
GERM 102	First-Year German II	4
GERM 220	German Culture & Society	3
HIST 355	History of Global Islam	3
HIST 381	Australia & New Zealand	3
INTL 110	Introduction to International Studies	3
NRM/RNG 225	Natural Resources & Agrosystems	3
PLSC 110	World Food Crops	3
POLS 120	Terrorism	3
POLS 220	International Politics	3
RELS 220	Old Testament	3
RELS 340	New Religious Movements	3
RELS 345	Religion and Politics	3
RELS 355	History of Global Islam	3
SOC 116	Global Social Problems	3
SPAN 101	First-Year Spanish I	4
SPAN 102	First-Year Spanish II	4
UNIV 151	Science and Society	3

North Dakota University System General Education Requirements Transfer Agreement

The North Dakota University System (NDUS) General Education Requirements Transfer Agreement (GERTA (https://www.ndus.edu/employees/articulation-transfer/gerta-guides-request-form)) was established by the State Board of Higher Education to ease student transfers within the system. Although subject to revision by the board, the policies at the time of this printing were as follows:

- If students have completed the lower-division general education course requirements (36 credits or more) at one NDUS institution and transfer to another NDUS institution, then the lower-division general education requirements will have been met.

If the lower-division general education requirements have not been completed before transferring, the general education courses from the indicated areas are applicable to an appropriate general education requirement of the institution to which they are transferred. In these cases, the number of credits required to complete the general education requirement in each area is determined by the policies of the institution to which the courses are transferred.

Students transferring lower-division general education credits within the North Dakota University System need to consult with advisers in their academic programs at NDSU for two reasons. First, degree requirements of individual programs and colleges at NDSU may exceed the university-wide general education requirements. Second, meeting the university-wide lower-division general education requirements by transfer credits may not necessarily prepare students for advanced, upper-division study in an academic major at NDSU.

Students transferring from non-ND University System institutions will have their general education requirements evaluated on a course-by-course basis when they enter NDSU.

Undergraduate Classification

Undergraduate degree-seeking students are classified according to the total number of credits earned. Classification or standing in a declared plan of study may vary from the classification used by the university in determining academic standing, financial aid award levels, etc.

Classification	Completed Credits
Freshman	0 - 26
Sophomore	27 - 59
Junior	60 - 89
Senior	90 or more

Credit limitations may be placed on students who have not been fully admitted to a degree program at NDSU.

Undergraduate non-degree student: One who is not seeking a degree or who has not completed the formal application process for admission. A maximum of 15 undergraduate credits may be completed in a non-degree student status. Non-degree students are not eligible for financial aid.

Undergraduate Degree and Graduation Information

Baccalaureate Degrees

To receive a baccalaureate degree from NDSU, students must complete all of the requirements listed in this section as well as those specified for the particular degree program by a college within the university. Students should consult the curriculum guide (https://www.ndsu.edu/registrar/academics/curricula) or contact the academic department for further information on degree requirements. Degree candidates must satisfactorily complete one of the degree curricula offered at NDSU in accordance with the requirements listed below.

Degree and Graduation Requirements

Students must satisfactorily complete two sets of requirements: a) university-wide requirements including general education and b) college- or department-level requirements, which include requirements for completing majors and minors. Official college- and department-level requirements for majors and minors are available in the curriculum section (p. 463) of this bulletin and in curriculum guides (https://www.ndsu.edu/registrar/academics/curricula) available online. Minimum degree/graduation requirements are as follows:

1. **Academic major requirements:** Satisfactory completion of all requirements of the curriculum in which one is enrolled. Requirements for some academic majors exceed this minimum.
   a. Because curricula are subject to change, intended degrees and majors, as well as second majors and minors, must be declared to be official. This may be done at the point of admission or readmission to the University or by submission of a Major Change form (https://www.ndsu.edu/registrar/forms/majorchange) to the Office of Registration and Records.
   b. Students follow the published curricula in place when a major/minor is declared or from the year of admission to a limited- or selective-enrollment program, whichever applies, to graduation provided enrollment at NDSU has not been discontinued for more than one calendar year.
   c. Students who advance into limited- or selective-enrollment programs will have their academic degree/plan status changed accordingly based on information provided to Registration and Records by the respective academic department.
   d. Students who discontinue enrollment at NDSU for more than one calendar year are subject to meet the curricular requirements in effect during the term of readmission.
   e. Each program of study presented by a candidate for the baccalaureate degree is audited for meeting the degree requirements by the Office of Registration and Records.
2. **Total degree credits:** Earn a minimum total of 120 credits in approved coursework. Requirements for some academic programs may exceed this minimum.
3. **General education requirements:** Satisfactory completion of the general education requirements as specified by the University.
4. **Scholastic standing requirement:** A minimum institutional grade-point average of 2.00 based on work taken at NDSU is required for graduation. When a course is taken and repeated at NDSU, only the most recent grade and credits earned will be used in computing the cumulative grade-point average. Some academic programs require higher minimum grade-point requirements.
5. **Upper-level credit requirements:** At least 36 of the credits presented for graduation must be in courses taken at the 300 and 400 level.
6. **Transfer Students:** Students with transfer credit from another institution must earn a minimum of 60 semester credits from a baccalaureate-degree granting or professional institution. Of these, at least 36 must be NDSU residence credits as defined below. Within these 36 resident credits, minimum requirements include 15 semester credits in courses numbered 300 or above (36 upper-level credits must still be earned in total) and 15 semester credits in the major field of study.
7. **Residence requirements:** Residence credits include credits registered and paid for at NDSU. These may include courses offered on the NDSU campus or Tri-College (p. 832). At least 36 credits must be NDSU resident credits.
8. **Financial obligations:** Satisfy all financial obligations owed to the university.
9. **Application for degree:** All candidates for a baccalaureate or Pharmacy Doctorate degree must indicate their intent to graduate when registering for their last semester. The application form (https://www.ndsu.edu/registrar/forms/degreeapp) is available online. Failure to apply by the published graduation application deadline of the planned semester of graduation may delay the awarding of the degree until the following semester. If a student fails to complete the required courses by the intended graduation term, the student must reapply for graduation in a following term.

Majors and Minors

Majors and minors are integral parts of baccalaureate degree curricula. Specific curriculum requirements for majors may be acquired from the appropriate departmental office or from Registration and Records. Minimum credit requirements for degrees are outlined in NDUS SBHE Policy 409 (https://www.ndus.edu/makers/procedures/sbhe/default.asp?PID=102&SID=5). Students are responsible for following the requirements in place at the time a major or minor is officially declared with the university.

Major: A major is a planned grouping of related courses that totals a minimum of 32 credits.

Minor: A minor is a similar grouping of courses that totals a minimum of 16 credits. A minimum of eight credits must be earned in residence at NDSU.

Second or Multiple Majors: A second (or multiple) major may be earned by completing the requirements of both (or all) majors offered under the same baccalaureate degree. At least 15 unique credits must exist between the majors.

Multiple majors or minors may be completed and recorded on the student's academic record after the degree for the first major has been awarded. When majors under different degrees are involved, the requirements for a second degree apply (See next section).

Second Degree

A second baccalaureate degree may be earned at NDSU with all of the following provisions:

1. All curriculum requirements are satisfactorily completed.
2. Each baccalaureate degree must be different. However, students may complete requirements for more than one major within a given degree, if available (see second /multiple majors).

Certificates

A certificate program is a specialized course of study requiring at least 9 credit hours at the undergraduate level or eight credit hours at the graduate level, per NDUS SBHE policy 409. Certificates may be earned while in pursuit of a degree or as standalone programs of study. Prospective students interested in certificate programs, but not seeking a degree, must be accepted to the university. Contact the Office of Admission (https://www.ndsu.edu/admission) or the Graduate College (https://www.ndsu.edu/gradschool) for further information. Curricular requirements and verification forms are available in academic departments offering certificates. Completed forms must be signed by the appropriate department chair (and Graduate College, if applicable) and submitted to Registration and Records in order for the certificate to be posted to a student's academic record and official documentation issued.

Exceptions to Academic Program Requirements

Academic policies and curricular requirements are designed to ensure that programs at NDSU are consistently of high quality. Students are expected to complete all curricular requirements, which includes the overall University requirements (includes general education), any college or department requirements if applicable, and major program of study requirements. Students may request substitutions or waivers for college or departmental requirements when extenuating circumstances prevail. Depending on the nature of the requested exception, departmental or college level approval is required.

Bachelor of Arts Requirement Using a Second Language

The Bachelor of Arts (B.A.) degree may be conferred upon students who complete the major requirements for their chosen field of study and have functional proficiency in at least one language other than English. The B.A. degree recognizes these students as having acquired the foundation for enhancing their ability to communicate, work, and study in an internationalized world. The B.A. signifies that these students have chosen to develop, through the equivalent of at least four semesters of coursework, both practical language skills and a comparative perspective on their own language and culture. The B.A. second language requirement fosters an awareness of the culturally conditioned nature of the students' assumptions about the world, and it better equips them with the mental agility needed to understand ways of thinking different from their own as they encounter the diversity of professional and personal relationships, as well as the intellectual and practical challenges of their future careers.

The second language requirement of the B.A. degree involves student demonstration of functional language proficiency over a sustained period of time, typically 14 credits of coursework. Given the sequential nature of language courses, the assessment of their abilities across the range of skills in speaking, reading, writing and listening comprehension is continuous and demanding. For this reason, NDSU requires that those students who have prior language-learning experience or who present language examination scores (CLEP, etc.) take, at minimum, the exit-level (202) course in order to verify their broad functional ability and basic cultural competence. It is important to note that the language requirement is not defined in credits but in terms of proficiency or communicative competence in all four skills of speaking, reading, writing and listening comprehension.

To fulfill the B.A. language requirement a student must demonstrate competence equivalent to that normally attained after four semesters of college study (NDSU level 202). Competency may be demonstrated in the following ways:

1. Completion in any second language of coursework at the NDSU 202 level or its equivalent with a grade of 'C' or better. Note that this requirement cannot be fulfilled by coursework taken pass/fail.

2. Successful completion of any second language course with a grade of 'C' or better that has the equivalent of NDSU 202 or higher as a prerequisite.
3. For students having previously passed the CLEP Examination (p. 836) 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. 835) with a minimum score of 4 in French, German or Spanish, taking one additional college-level language class at the 202 level or higher in order to demonstrate competency in all four skill levels. Students must complete this course with a 'C' or better.
4. English satisfies the B.A. language requirement for students whose official, certified transcripts demonstrate that their secondary or higher education was completed in a language other than English. It is the responsibility of the student to provide all necessary untranslated, official documentation to the Department of Modern Languages (https://www.ndsu.edu/modernlanguages) for verification. No credit will be awarded.
5. Students who are unable to provide the above mentioned certified documentation but who are native speakers of languages other than English may fulfill the second language requirement through proficiency in English by successful completion of the three-semester General Education English composition sequence and by passing an additional English (ENGL) course with a 'C' or better. Students having completed this sequence may apply to the Department of Modern Languages (https://www.ndsu.edu/modernlanguages) for a waiver of the Second Language requirement.
6. Requests for determination of proficiency in languages not taught at NDSU are considered by the Department of Modern Languages (https://www.ndsu.edu/modernlanguages). If a student would like to demonstrate proficiency through testing in a language that is not taught at NDSU, it is his/her responsibility to arrange for such testing. The proficiency test must be completed by a faculty or staff member at a college or university; the evaluator must hold at least a master's degree (in any discipline). The test must evaluate reading, writing, listening and speaking through the fourth semester (intermediate NDSU 202) college level. The student must provide documentation from the evaluator which includes a copy of the test, a letter from the evaluator assessing the level of proficiency, and a statement of the evaluator's credentials, including an explanation of his/her expertise in the language being tested, if the evaluator does not teach that language at the college level. No credit is awarded but proficiency requirement is fulfilled.

Graduation with Honor

Graduation with honor applies only to baccalaureate degrees. Candidates who have earned a minimum of 60 credits in residence at NDSU and a minimum institutional grade point average of 3.50 will graduate with honor. All final grades on the NDSU academic record will be included in grade point average calculations for graduating with honor. Students who meet these academic criteria will graduate according to one of the following honor levels:

Honor	Criteria
Summa Cum Laude	equal to or greater than 3.90
Magna Cum Laude	equal to or greater than 3.70 and less than 3.90
Cum Laude	equal to or greater than 3.50 and less than 3.70

Degree Audits

Each program of study presented by a candidate for the baccalaureate degree is audited for meeting the degree requirements by the Office of Registration and Records. Degree candidates are certified by the Office of Registration and Records according to total credits earned, institutional grade-point average, and other university requirements (See Degree and Graduation Requirements).

A degree audit is an official review of graduation requirements to determine a student's graduation eligibility. Undergraduate students who have completed a minimum of 75 credits are notified and asked to complete the degree audit request (https://www.ndsu.edu/registrar/forms/degreeaudit). Degree audits are not automatically completed as student educational and degree goals vary (multiple degree, majors, minors, etc.). An official degree audit is completed by the Office of Registration and Records typically two semesters prior to the student's reported graduation on the audit request.

At any time, however, undergraduate students and their advisers may track degree progress using the Academic Requirements Report (https://www.ndsu.edu/registrar/academics/advising/advisement) (automated degree audit) feature on Campus Connection. This functionality is interactive and also allows the student to plan for upcoming semesters within the advisement report. Instructions and information on how to access and read an Academic Requirements Report are available to students and advisers.

Scholastic Standing

Academic progress is measured by grades and credits earned. Students receive acknowledgment for high academic achievement and are given warning at the end of each semester via NDSU email when they become academically deficient.

To be eligible to register continuously without conditions, an undergraduate or professional student must maintain good academic standing, which is defined as a minimum cumulative institutional grade point average of 2.00 (4.00 scale).

Some programs of study have academic standards higher than the University minimum. Students should consult with their adviser or academic department for program specific requirements.

Records of all students are examined at the end of each grading period. Academic standing relates to the following:

Good Standing

Good standing reflects when a student's term GPA and cumulative GPA are both at or above 2.00.

Academic Warning

An academic warning is to alert a student that his/her term GPA is below the minimum required for good standing, even though the institutional cumulative GPA is at or above 2.00. An academic warning does not appear on the official academic transcript but does appear on the unofficial transcript. Students are notified of their academic warning status via official NDSU email.

Academic Probation

An academic probation is issued when a student who entered the grading period on good standing or academic warning earns an institutional cumulative GPA below the minimum 2.00 for good standing. An academic probation does not appear on the student's official academic transcript, but does appear on the unofficial transcript. Students are notified of their academic probation status via official NDSU email.

Continued Probation

Continued probation is a formal extension of the academic probation status. It is issued when a student enters the grading period on academic probation or continued probation, shows adequate progress by attaining a minimum term GPA of 2.00, but his/her cumulative institutional GPA is still below the minimum 2.00 for good standing. Continued probation does not appear on the student's official academic transcript, but does appear on the unofficial transcript. Students are notified of their continued probation status via official NDSU email.

Academic Suspension

Academic suspension is issued when a student enters the term on either probation or continued probation and earns both a term GPA and institutional cumulative GPA below the minimum 2.00 for good standing. This includes students admitted on probation for their first semester at NDSU or readmitted on probation following an academic suspension. A student may not be considered for readmission for two grading periods following an academic suspension (includes summer). An academic suspension appears on the student's official academic transcript. A suspension hold is placed on the student's record by the Office of Registration and Record which prevents all future registration. If a student has pre-registered for classes in a future semester, these courses will be administratively removed by the Office of Registration and Records. Students who are suspended are notified of their suspension status via official NDSU email.

Filing a Suspension Appeal Based on Extenuating Circumstances

A student who has been suspended may appeal the suspension ***but only if there are extraordinary circumstances beyond the student's control that can be supported with documentation.*** An Appeal Academic Suspension (https://www.ndsu.edu/fileadmin/registrar/forms/suspappeal.pdf) form is available online and must be submitted to the Office of Registration and Records no later than the deadline published on the appeal form. If approved, the student must make satisfactory academic progress in the subsequent term according to the published academic standards of the University (see above).

Readmission After Serving an Academic Suspension

To be considered for readmission after serving an academic suspension, students must sit out a minimum of two semesters (includes summer) and file a Reactivation/Petition for Readmission Form (https://www.ndsu.edu/pubweb/rr/forms/reactivation) to the Office of Registration and Records a minimum of 30 business days prior to the beginning of the semester in which the student is eligible for readmission or for when readmission is sought. The petition is reviewed by a college committee and if approved, the student will be readmitted on academic probation and may register for classes. Students who enrolled in courses at another institution while serving the terms of an NDSU academic suspension must arrange for an official transcript to be sent to the Office of Registration and Records **before** readmission will be considered. Students re-entering NDSU from an academic suspension who attended courses elsewhere must earn a minimum cumulative GPA of 2.00 in those classes. NDSU reserves the right to revoke readmission if official transcripts are not received or the final cumulative GPA from a sending institution is below 2.00.

An Academic Suspension from Another Institution

NDSU honors suspensions of other institutions. Transfer and returning students who have been suspended from another institution may not be considered for admission or readmission until one year has lapsed or the suspension has been lifted. Students who fail to report all previous college work are subject to dismissal or loss of credit or both. Courses previously completed at NDSU may only be repeated at NDSU for grade and GPA improvement on the NDSU academic record, with the exception of Tri-College courses (see Repeated Courses (p. 1397) section for more details).

Dean's List

To be eligible for inclusion on the Dean's List for any given semester, a student must have earned a minimum grade-point average of 3.50 during that term while completing at least 12 semester hours (nine semester hours during the summer) in graded coursework. Graded coursework includes the developmental course MATH 098. MATH 098 does not satisfy graduation requirements and does not calculate into the cumulative grade-point average on the academic record, but it is factored into the overall attempted credits and honor points for Dean's List consideration.

The Dean's List is only maintained for undergraduate students and professional (Pharm.D.) students. Credits taken simultaneously via transfer, 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).

Notification: The Office of Registration and Record notifies University News of Dean's List honorees.

Academic Forgiveness

A former NDSU student who has not completed a baccalaureate degree and has not been in attendance at NDSU for six (6) or more years, but who is presently enrolled at NDSU, may request to exclude from grade-point-average calculations all grades earned in selected full terms (quarters or semesters) completed at NDSU prior to the six-year interval.

The courses and grades for the terms selected will remain on the student's academic record, but credits, honor points, and grades will be excluded from grade-point average calculations. Excluded courses cannot be used to satisfy any academic requirements. A student may exercise this option only once by submitting a written request to the Office of Registration and Records (https://www.ndsu.edu/registrar).

Transfer and Test Credit

Transfer credit evaluations are conducted in the Office of Registration and Records (https://www.ndsu.edu/registrar). The evaluation process begins after a student is admitted to the university by the Office of Admission (https://www.ndsu.edu/admission), or has completed the reactivation process with the Office of Registration and Records, if a returning NDSU student. The evaluation process takes 6-8 weeks on average.

Evaluation of Transfer Credit from U.S. Institutions

The Office of Registration and Records administers the NDSU policies governing the acceptance of college credit from outside institutions. These requirements apply to returning students who have attended other institutions, as well as new NDSU students. Before credits may be evaluated for specific NDSU course equivalency or application to programs of study, transfer courses must be accepted for university credit according to the following criteria:

1. Credit by examination (p. 835), College-level coursework from regionally accredited colleges or universities (or equivalent for international institutions), and Joint Services transcripts are eligible for acceptance in transfer.
2. Course repeats
   a. Courses repeated elsewhere prior to attending NDSU will be accepted in transfer as indicated on the transferring institution's official transcript. Transfer courses taken from multiple institutions that have the same NDSU equivalent will be considered as a repeated course, and only the most recent attempted course will be accepted for transfer.
   b. Courses will not be accepted in transfer to replace any grades or credits earned at NDSU. If a course is completed at NDSU and an attempt is made to repeat that course elsewhere, the course is considered duplication and is not eligible for transfer. (See also Repeated Courses (p. 1397) policy)
3. Credit for a remedial course is not accepted for transfer if the course is remedial by definition of the transferring institution or if it is equivalent to a remedial course at NDSU. Remedial courses may, however, fulfill prerequisite requirements, if applicable.
4. Any credit by examination, such as AP or CLEP, credit awarded via placement, or life experience credit awarded by another institution is not accepted in transfer.
5. The Office of Registration and Records determines the applicability of transfer credit toward NDSU general education requirements (p. 820) according to institutional and North Dakota University System guidelines.
6. College-level credits that do not have course equivalents at NDSU will be accepted as free electives and may count only toward total credits. An academic department may determine whether these transfer electives may satisfy specific curricular requirements through a course substitution process. (See also General Education Administrative Policies (p. 823).)
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. 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.
9. The name of transfer institutions and total credits accepted by NDSU will be indicated on the official NDSU transcript. Individual transfer courses are not detailed on the academic transcript, but are provided in an official transfer evaluation and academic requirements report (https://www.ndsu.edu/registrar/academics/advising/advisement) after admission to the university.
10. Total transfer credits are converted to semester credits, if applicable.
11. Transfer grades are recorded but not computed in the institutional cumulative GPA. Transfer grades are used only for purposes of admission to the University, admission to certain programs, and for some scholarships and financial aid.

Evaluation of Transfer Credit from International Institutions

According to North Dakota University System policy effective January 2013, international transcripts must be submitted to an approved external evaluation service. Obtaining an evaluation is the sole responsibility of the student. Evaluations must be submitted according to the guidelines listed below. The guidelines for the evaluation of transfer credit listed for Domestic/US Institutions also apply to international transfer credit. NDSU students participating in an approved study-abroad program are not required to submit transcripts from study abroad experiences to an evaluation service. International students transferring from a North Dakota State University partnership institution are exempt from submitting an external international evaluation.

- Students must submit official transcripts to an evaluator that has been approved by the National Association of Credential Evaluation Services (NACES) (http://www.naces.org/members.htm) or the Association of International Credential Evaluators (AICE) (http://www.aice-eval.org).
- Official transcript(s) issued in English must be submitted to NDSU in addition to the evaluation unless the evaluation service provides certification of student documents and sends copies of transcript(s) to NDSU. Currently World Education Services (WES) (https://www.wes.org) is the only organization that provides NDSU with the required, certified documentation.
- New transfer students who have completed coursework at an institution outside the United States must submit transcripts to an approved evaluation service for a **course by course** evaluation.
- New international students should send evaluations directly to the NDSU Office of Admission (https://www.ndsu.edu/admission).
- New domestic students or United States permanent resident students should send evaluations directly to the NDSU Office of Admission (https://www.ndsu.edu/admission).
- Students must submit course descriptions for all completed coursework directly from the international institution to the NDSU Office of Registration and Records (https://www.ndsu.edu/registrar) .
- Effective January 2015, all international transfer English coursework from non-native English speaking countries will not be accepted. English Coursework will transfer as remedial credit, and will be listed as equivalent to ENGL DEV at NDSU.

Common Course Numbers

Institutions in the North Dakota University System have established common course numbers (CCN) (https://www.ndus.edu/employees/articulation-transfer/courses-with-common-transferrable-content) to facilitate transfer within the University System. Under the CCN agreement, transfer students who have successfully completed CCN courses will not be required to retake them at NDSU unless their degree program requires a higher grade. However, CCN courses will not fulfill residence requirements nor will 100- and 200-level courses fulfill upper-division requirements for graduation.

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 a transfer elective with the credit going towards the General Education Category: Wellness.
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 transfer 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

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