NDSU

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North Dakota State University

NDSU

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Reservation of Rights

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

Disclaimer

The State Board of Higher Education requires that the following announcement be published in all catalogs and bulletins of information issued by the state educational institutions of North Dakota: "Catalogs and bulletins of educational institutions are usually prepared by faculty committees or administrative officers for the purpose of furnishing prospective students and other interested persons with information about the institutions that issue the same. Announcements contained in such printed materials are subject to change without notice, and may not be regarded in the nature of binding obligations on the institutions and the State. In times of changing conditions, it is especially necessary to have this definitely understood."

NDSU Overview

Mission

North Dakota State University affirms its heritage as the land-grant institution of North Dakota. NDSU provides instruction, research, and public service through its colleges, experiment station, and extension service. The people of North Dakota, the region, the nation, and the international community are educated and served by the discovery, communication, application, and preservation of knowledge. The personal growth of individuals is fostered by creating an environment that nurtures intellectual, social, and cultural development. Academic and professional programs are offered that lead to baccalaureate through the doctorate degrees. NDSU assumes a coordinating role in the North Dakota University System for academic computing and economic development. The University provides information systems necessary to accomplish its mission. Mission values include people, scholarship, the idea of a university, and the land-grant ideal.

People

NDSU derives its strength from the vitality and industry of the people of North Dakota. Individuals are treated with respect; the welfare of students, faculty, and staff is important; and the contributions of diverse cultures are recognized.

Scholarship

At NDSU scholarship is acknowledged and pursued in all of its forms including discovery, teaching, integration, and application.

The Idea of a University

At NDSU an environment of ideas and excellence is established where academic freedom is protected; where collegiality is practiced; and where regional, national, and international concerns are addressed.

Overall Vision

• We envision a university that leads and encourages scientific development and technology transfer; interactive information systems; economic development; and lifelong learning—with human, physical, and financial resources appropriate to its educational mission.
• We envision a university that seeks quality by empowering individuals to participate in decisions and by encouraging them to cooperate for the common good.
• We envision a university where people of all cultures and nations feel welcome and can participate fully in university life.

NDSU in Perspective

A Bit of History

NDSU celebrated its 100th birthday in 1990. North Dakota had been a state a little less than a year when Governor John Miller signed a bill on March 8, 1890, designating a square mile of land adjoining Fargo as the site of the new campus and demonstration farm under the name, North Dakota Agricultural College (NDAC). A commitment to the federal government was honored by establishing a college of agriculture and mechanic arts under the Morrill Act of 1862. The course of studies was to be a "harmonious blend of technical and academic subjects." Known as a "people's college," NDSU was part of a bold new experiment to provide access to a college education for the common person. That was how it started.

The Land-Grant Heritage

The University is a publicly supported comprehensive land-grant institution with principal responsibility in North Dakota for performing agricultural research. Extension Service offices are located in 52 of 53 North Dakota counties. To assist with its state-wide mission, the University occupies more than 18,000 acres state-wide, including the North Dakota Agricultural Experiment Station (NDAES) Main Research Station in Fargo and the following:

Agronomy Seed Farm at Casselton
Carrington Research Extension Center
Central Grasslands Research Center at Streeter
Dickinson Research Extension Center
Hettinger Research Extension Center
Langdon Research Extension Center
North Central Research Extension Center, Minot
Williston Research Extension Center

NDSU, the state's land-grant institution with a sound foundation in agriculture and applied science, is particularly well positioned for preparing graduates for the emerging global and technologically oriented economy. Through its state-wide network of agricultural experiment station research and extension centers and electronic technology, NDSU provides a growing capability for delivering education, cultural activities, and information to every school and to the homes of all the citizens of North Dakota.

Priorities for the Future

Priority areas for NDSU, as well as its responsibility to the North Dakota University System (NDUS), are identified in the current NDSU strategic plan. This plan dovetails with the NDUS Strategic Plan 1998-2004 and the North Dakota University System mission:
• To create an experience of educational excellence for students through quality instruction, including liberal arts as a foundation for life-long learning and personal development, broad use of technology, and expanded partnerships.
• To provide the public with increased access to higher education services which emphasize state economic development, work force needs, and maximum efficiency of public higher education investment.
• To create a positive work experience for University System employees that supports their efforts to meet the needs of North Dakota.

Strategic planning at NDSU is also an ongoing process. Identified in the NDSU updated strategic plan are three major areas of focus for the immediate future:

• The relationship between people on campus and their off-campus constituencies.
• The quality of student, faculty, and staff interaction.
• The new university with emphasis on technology and teaching.

NDSU Today

NDSU today promotes liberal and professional education, as well as agriculture; is accessible, responsive, and accountable to the people of the State; fosters their economic prosperity; and contributes to their overall quality of life. While agricultural research and Cooperative Extension services continue as major elements, today NDSU is a comprehensive University with numerous programs and services. NDSU is a part of the North Dakota University System, established in February 1990.

Accreditation

North Dakota State University is accredited as an institution by the North Central Association of Colleges and Secondary Schools. Inquiries may be directed to the North Central Association of Colleges and Schools Commission on Institutions of Higher Education, 30 North LaSalle St., Suite 2400, Chicago, IL 60602-2504. (tel. 1-800-621-7440). In addition, many programs are accredited or approved by their respective professional organizations and agencies. Program-specific accreditation or approval is listed in the college sections of this bulletin.

The Faculty

NDSU has about 500 resident faculty members. Because of the nature of a land-grant university, many faculty hold joint appointments with affiliated research organizations on the campus.

The Physical Plant

The NDSU main campus includes 88 buildings on nearly 30 square blocks or 258 total acres, 4.62 miles of streets, and 14.99 miles of sidewalks. In all, NDSU is located on 22,053 acres of North Dakota land. This includes the main Agricultural Experiment Station at Fargo and eight research centers, of which four are joint research-extension service centers, throughout the state.

There are 3,918 employees state-wide. Comparatively, with more than 9,700 students and 1,715 full-time faculty and staff on the NDSU main campus, NDSU is North Dakota's tenth largest city. The campus has its own newspaper, campus store, radio station, post office, and fast-food restaurants. The Reineke Fine Arts Center provides an elegant setting for music, theater, and other events. The nearby FargoDome brings a wide range of new attractions to the campus and the community.

The main campus is located in Fargo. With a combined population exceeding 153,000 the cities of Fargo, N.D., and Moorhead, Minn., and contiguous communities constitute the largest population, commercial, and service area in the region.

General Services

Information Technology Services

The mission of Information Technology Services (ITS) is to provide academic, research, and business solutions to the North Dakota University System and its constituents. The land-grant ideals are supported in an environment of collaboration, teamwork, and individual initiative. Offices for ITS are located in the Industrial Agriculture and Communications Center (IACC) building. For more information, visit the ITS Web page (www.ndsu.nodak.edu/its).

Network Infrastructure: The ITS network infrastructure provides access for all students, faculty, and staff to the Internet. ITS is dedicated to working cooperatively with departments to enhance research activitiy and to provide opportunities for both students and faculty to learn and apply the most advanced technologies. Classrooms, offices, and residence hall rooms have direct campus network connections.

On behalf of NDSU, ITS is an Internet^2 member. Member institutions are committed to having a campus infrastructure capable of delivering high speed network access to the desk tops of its users. Other high-speed network partnerships continue to emerge as ITS proceeds to develop a computer and network environment to help promote NDSU's goals.

Cluster and Classroom Support: Several hundred on-campus computers are available for student use, as well as for classroom instructional purposes. The diverse computing environment includes UNIX, Windows, and Macintosh machines, all having Internet access through a direct campus network connection. Specific support services offered through the Clusters and Classroom Service Center include color printing, plotting, equipment check-out (e.g., VCR, projection equipment, laptops, zip drives, digital cameras), cluster consulting, multimedia assistance, video editing, and cluster and equipment reservations and scheduling.

Help Desk: Students, faculty, and staff needing help with e-mail accounts, dial-up or Ethernet connections, and general computing questions may contact the ITS Help Desk. Faculty and staff may also purchase a variety of software programs through the Software Licensing Program.

Training: ITS provides a wide range of technology training for faculty and staff. Free technology training for NDSU students is provided through the Technology Learning Center (TLC). Funded by the student technology fee, the TLC is staffed by student trainers and a coordinator. Most classes are short sessions and offer hands-on experience on a variety of software programs and other current technologies. Classes range from introductory to advanced skills.

Distance Education Services: NDSU has several distance education technologies available for courses, meetings, and seminars.

- *IVN*: The North Dakota Interactive Video Network is a broadcast quality, two-way audio and video system that links together 11 higher education campuses, the State Capitol, the State Hospital, five Tribal Colleges, a high school consortium, and other compatible systems world-wide. Desktop videoconferencing support is also available.
- *Online (Web)*: A WWW-based system is available for developing and delivering teaching and learning materials such as word processing, audio and video, spreadsheets, and presentation files over the WWW. Web site development is also available.
- *SENDIT*: NDSU cooperates with the ND Department of Public Instruction to operate SENDIT, which serves as an Internet support center for K-12 schools and libraries. SENDIT provides Internet-related services and support for students and educators across North Dakota.

Other Support Services:

- ITS and the Department of Statistics offer consulting services to help students, faculty, and staff with statistical aspects of their research.
- ALFI makes course registration, grade reporting, transcripts, and a variety of other functions easily available to students through on-line campus terminals or any Touchtone telephone.

NDSU Libraries

The North Dakota State University Libraries are comprised of the Main Library and three branch libraries: the Architecture Library, the H.J. Klosterman Chemistry Library, and the Pharmacy Library. They play an essential role in the educational and research activities of the University by making accessible informational materials necessary to carry out the academic and research programs. The librarians are specialists in their subject, and they provide a wide range of knowledge in aiding students and faculty in their research.

The collections include more than 490,000 bound volumes, 3,800 current serials, 85,000 maps, and a wide variety of audiovisual materials. As a Joint Regional U.S. Government Publications Depository, NDSU and the University of North Dakota share receipt of all deposited publications from the U.S. Government. More than 475,000 U.S. documents are in the NDSU Libraries. Archival and manuscript records, historical publications, photographs, and other documents concerning North Dakota and NDSU are housed in the North Dakota Institute for Regional Studies and University Archives.

Except for materials placed on closed reserves by faculty, all collections are located in open, well-lighted, and readily accessible stack areas. Reference assistance is available 78 hours per week to anyone wishing to use the collections. The Libraries also offer conference rooms, typing facilities, study carrels, a computer cluster, and telefacsimile service. The Main Library is open 96 hours per week during the academic year; departmental libraries are open 70 hours per week. Hours for holidays, summer sessions, and break periods are posted throughout the Libraries and announced in campus publications. Call 231-9456 for current information regarding hours, or check the online system using the command HRS.

Fast, efficient access to the Libraries' holdings is obtained via the online catalog. In addition to NDSU collections, the online catalog interfaces with other online catalogs of academic, public, and special libraries in North Dakota, South Dakota, and Minnesota. Several journal article and other databases are also available via the online catalog. The NDSU Libraries offer computer assisted search services to over 400 electronic databases, with many more databases available in CD-ROM format, or via the Web.

NDSU is a member of the Tri-College University and shares library resources with Minnesota State University Moorhead and Concordia College. The twice-daily shuttle service that operates among the three academic institutions, the medical libraries, and public libraries in Fargo-Moorhead is supplemented by a daily shuttle to the UND Libraries, making an expanded bibliographic resource and document delivery service readily available to NDSU library users. NDSU faculty, students, and staff have library cards that are valid at the

MSUM and Concordia Libraries. Books and periodical articles not available locally may be acquired through the Interlibrary Loan Service, which provides access to libraries throughout the region, the nation, and the world.

NDSU Libraries offer a full range of library education services including general tours and orientations, course-related instruction in specific subject areas, demonstrations of special services and information formats, plus several credit courses.

Memorial Union

The Memorial Union serves as a center of social, recreational, educational, and cultural activity for the NDSU campus community. Lounges and meeting rooms provide places where students, staff, faculty, and guests come together to exchange ideas and information and interact informally, thereby adding to their educational experience in a way not available in the classroom. The program of the Memorial Union includes an art gallery, several permanent art collections, a full season of performing arts events, outdoor adventure trips, bowling and billiards, a series of non-credit short courses in special interest and skill building topics, a community service program, a leadership and recognition program, and a wide variety of events planned by the student program board, Campus Attractions.

Memorial Union staff members assist students with the development of their leadership and management skills through leadership training, workshops and conferences, as well as involvement in student organizations, campus activities, community service projects, student government, and University governance committees.

Services available in the Union include information services, bookstore, dining services, barbershop, poster and sign making, graphic services, video bulletin board, room and contact table rental, outdoor recreation equipment rental, locker rentals, ticket office, notary public, photocopying, check cashing, FAX service, automatic teller banking services.

The Memorial Union was constructed and is operated with the use of non-appropriated funds. An advisory board comprised of students, faculty, staff, and alumni members serves in an advisory role in formation of policies and procedures. In addition to use by students, the Union is available for faculty meetings, departmental meetings, and for professional conventions and conferences. A summary of the Memorial Union facilities, services, and policies is available at the Memorial Union administrative offices.

Varsity Mart

The Varsity Mart (University Bookstore), owned and operated by NDSU, is located in the Memorial Union and is the official source of all required textbooks and supplies. Computer hardware, software, and supplies are available. The Korner Mart stocks many convenience items such as health and beauty aids, gift items, candy, snacks, and more. The Varsity Mart has a large selection of NDSU apparel for children and adults, as well as pennants, decals, glassware, books, and many other items just right for the student, parent, alumna, or alumnus.

Centers and Institutes

Center for Business and Consumer Research: Research on attitudes, market indicators, buying intentions, and other characteristics of consumers and business firms in North Dakota is provided periodically to chambers of commerce, businesses, and economic development agencies. Established in 1997, the center operates through various grants on a fee-for-service basis.

Center for Child Development: Created in 1955, the center is accredited by the National Academy of Early Childhood Programs. The center is a laboratory school for NDSU students to observe, do research, and to participate in a high quality program and developmentally appropriate environment for children ages 6 weeks to 6 years.

Center for Community Education: Information and technical assistance with the community education process is provided on a time-available basis. Community residents along with trained leadership are involved in program planning. Most programs are hosted by public schools. The center was originally established in 1974 under joint sponsorship of NDSU and the C.S. Mott Foundation. Grants from the Otto Bremer Foundation and other private sources have continued to support the work of the center.

Center for Main Group Chemistry: Fundamental problems that limit the understanding, growth, and impact of main group chemistry are addressed. The chemistry of main group elements, those in groups 1, 2, and 12-18, play a central role in many of the polymers, ceramics, catalysts, thin films, semiconductors, and bioactive materials. Research in main group chemistry has a direct impact on improving existing technologies and in creating new ones. The center was established in 1995.

Center for Science and Mathematics Education: The center was established in 1998 for the overall purpose of development and operation of K-16 educational projects. Examples of programs and projects facilitated by the center are the Eisenhower Science Teacher Professional Development program, the ND Science Teacher Enhancement project, the ND State Science Olympiad, and the NDSU Collaborative for Mathematics and Science Teacher Preparation program.

Computer Systems Institute: Created in 1983, the purpose of the institute is to promote and support multi-disciplinary research and development activities in computer systems, and especially in computer systems with applicability to commerce, farming, and industry in North Dakota. Computer systems are complex aggregates of digital computer hardware and software, designed to carry out specific tasks or purposes.

The institute serves as an organizational structure to seek research support, equipment, and projects aimed at the growth of computer systems design expertise in North Dakota. This includes the development of expertise at NDSU and nearby universities as well as collaboration with industry in research and development that promotes computer systems design expertise in the state.

Family Therapy Center: The center serves individuals, couples, and families who seek understanding and resolution of problems associated with their relationships. Problems treated include premarital and marital conflict, family violence, substance abuse, divorce, parent-child conflict, sex abuse/incest, depression, and anxiety. The center is operated as part of the graduate program in Marriage and Family Therapy, which is accredited by the Commission on Accreditation for Marriage and Family Therapy Education.

Group Decision Center: Established in 1998, the center is a network of 24 computers linked by GroupSystems software enabling concurrent and immediate sharing of ideas. Through the use of electronic discussion tools, the center maximizes the efficiency of a group by allowing users to enter ideas anonymously and simultaneously and to poll and prioritize their ideas easily. The center has a 50 percent time commitment to students and also serves administration, faculty, staff, and the general public.

Institute for Natural Resources and Economic Development (INRED): The grant-driven institute offers professional services in four major areas—economic feasibility analysis, economic and fiscal impact assessments, analyses of natural resources management, and investigation of population and labor force dynamics. In addition to institute personnel, unique expertise from both public and private sectors in the region, nation, and world are accessed as needed to meet research and training requests. Initially founded as the Northern Plains Natural Resources Institute in 1984, the name was changed in 1995.

NDSU Biotechnology Institute: The institute was established in 1989 as an independent, interdisciplinary organization for the purpose of coordinating all aspects of biotechnology at NDSU including education, research, and outreach. Scientific equipment and facilities of individual researchers are augmented through four service centers: Biopolymers Service Center, Cell Biology Center, Electron Microscopy Laboratory, and Monoclonal Antibody Service Center. The facilities are available to students and faculty of related academic programs and scientists at the USDA-ARS Red River Valley Agricultural Research Center at NDSU.

North Dakota Institute for Regional Studies: The institute, founded in 1950, stimulates and coordinates the activities of NDSU in regional scholarship. The mission of the institute is to foster understanding of regional life through research on, teaching about, and service to those regions with particular import to NDSU. These regions include the Red River Valley, the state of North Dakota, the plains of North America (including the Great Plains of the United States and the Prairies of Canada), and comparable regions of other continents. In keeping with the land-grant university tradition, both knowledge and application are pursued.

Institute activities include four categories: collections, publications, outreach, and the Center for Social Research. Institute research collections are housed in the NDSU Library under the curatorship of library staff. The publications programs are housed in the College of Arts, Humanities, and Social Sciences. Outreach activities involve various units of the university and include radio and television production, public programs, and oral history. The **Center for Social Research,** established in 1976, exists to facilitate such social-science research as conducting focus-group studies and computerized telephone and mail surveys.

North Dakota State Data Center: NDSU serves as the lead agency for the state data center in cooperation with the U.S. Bureau of the Census to receive and distribute economic and demographic information. Services include responding to requests, conducting research, compiling information, and disseminating research findings to meet the demographic and economic needs of North Dakota.

North Dakota Transportation Technology Transfer Center: Established in 1984, the center is administered by the civil engineering and construction department. It is tasked under the Federal Highway Administration Local Technical Assistance Program and networked with 57 other centers nationwide. The center is dedicated to exchanging transportation related technology, innovations, and research with local government and transportation units in North Dakota. Technical assistance, information services, and training are provided through videotape and publication libraries, newsletters, interactive distance communications, and on-site extension services.

North Dakota Water Resources Research Institute: This institute is one of 54 federally-sponsored entities known collectively as the National Institutes for Water Resources to conduct research, education, and information transfer on water resources. The primary goal is to coordinate research projects that address water problems of North Dakota and the region. The institute awards competitive graduate research fellowships.

Northern Crops Institute (NCI): Located on the NDSU campus, the NCI is a regional institute including North Dakota, Minnesota, South Dakota, and Montana. The mission of NCI is ultimately to benefit farmers and the regional economy by providing educational and technical service programs that support the promotion and market development of northern-grown crops into domestic and export markets. Programs are designed to serve producer commodity organizations, agricultural service groups and agencies, and others in agribusiness impacted by world trade.

Northern Plains Policy and Trade Research Center: The center was established in 1998 to analyze a wide range of agricultural trade and policy issues affecting the economic well-being of the northern plains. Economic research and outreach activities include (a) analyzing national agricultural policies, multilateral trade treaties, regional trade agreements, and cross-border trade issues for northern grown crops and processed products, and (b) developing strategies to improve export opportunities for northern grown crops and processed products. Outlooks for the North Dakota farm economy, the U.S. and world wheat industries, and the U.S. and world sugar industries are published annually.

Quentin N. Burdick Center for Cooperatives: Created in 1992, the center is endowed by cooperatives to provide education, research, and outreach to cooperatives, organizations, or other interested persons. Education includes teaching and preparing materials for university courses on cooperatives and conducting training programs for cooperatives. Research is conducted on general issues affecting cooperatives including specific, confidential research on marketing and feasibility studies. Outreach includes providing direct assistance to cooperatives and supporting professional co-op organizations.

Robert Perkins Engineering Computer Center: The center is designed to assist North Dakota industries with the use of a communication network of sophisticated industrial tools through Computer-Aided Design and Computer-Aided Manufacturing systems. All of the high-technology programs are currently directed toward the economic development of existing industries.

Statistical Consulting Center: Consulting assistance is provided for students, faculty, and staff with statistical aspects of research including planning a study, organizing and analyzing data, and communicating the results.

Upper Great Plains Transportation Institute: The institute was created in 1967 by the legislature to conduct and supervise transportation research, service, and education for the benefit of the state and region. Basic goals are to identify transportation issues, such as freight systems, which affect the people and economy of the area, and to provide alternatives and solutions to transportation and marketing issues. The institute also hosts the Mountain-Plains Consortium (MPC). The MPC theme is rural and non-metropolitan transportation.

General Policies

Student Behavior

Every student has the responsibility to observe and to help maintain a code of personal behavior and social relationships that will contribute to the educational effectiveness of the University. The conduct of a student at the University is expected to reflect a responsible attitude toward University regulations as well as the laws of the community, the state, and the nation. These standards apply to all students as long as they are enrolled in or associated with the University and to all visitors as long as they are on the campus. The complete document on University regulations and policies relevant to student life is entitled "Rights & Responsibilities of Community: A Code of Student Behavior" and is available from the Office of Student Affairs, 100 Old Main.

Privacy of Student Records

The disclosure of student educational records is governed by policies developed by North Dakota State University in compliance with state law and the Family Educational Rights and Privacy Act of 1974 as amended (FERPA). There are essentially two types of student records, public directory information and nonpublic information. Directory information may be released publicly except in cases where students have specifically requested that the information not be released. Nonpublic information which includes the academic transcript, is considered confidential and will not be released, other than to authorized personnel or as allowed by law, without the written authorization of the individual. University policies relative to student records are specified in the FERPA annual notice, the "NDSU Policy Manual," Section 600, and contained in the publication entitled "Rights & Responsibilities of Community: A Code of Student Behavior," which may be obtained from the Office of Student Affairs, 100 Old Main. Students may restrict the release of directory information no later than the tenth class day of the semester, at the Office of the Registrar, 110 Ceres.

Equal Opportunity

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 including appropriate affirmative action efforts, for all individuals without regard to race, color, national origin, religion, sex, disability, age, or Vietnam-era veteran status, sexual orientation, status with regard to marriage or public assistance, or participation in lawful activity off the employer's premises during non-working hours which is not in direct conflict with the essential business-related interests of the employer.

More specifically, the University abides by the requirements of Title VI and VII of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, Section 504 of the Rehabilitation Act of 1973 as well as the implementing regulations of the U.S. Department of Education (34 CFR Parts 100, 106 and 104, respectively), the Americans with Disabilities Act of 1990, and the North Dakota Human Rights Act of 1983.

Inquiries concerning compliance may be directed to the NDSU Director of Equal Opportunity (202 Old Main, 231-7703) 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.

Sexual Assault Student Policy

NDSU commits its resources to the following twofold process: 1) to provide crisis intervention and a judicial/disciplinary response for victims and alleged offenders, and 2) to educate and promote discussion on interpersonal abuse and violence.

Sexual assault is viewed as any sexual behavior between two or more people to which one person does not or cannot consent. NDSU relies upon North Dakota state law concerning sexual imposition which is much broader than the traditional concept of rape. NDSU prohibits sexual acts or contacts with others which can involve compelling a victim to submit to sexual acts or contacts by force or threat of force, use of intoxicants to substantially impair the victim's power to give consent, engaging in such acts when there is reasonable cause to believe the other person suffers from a mental state which renders him or her incapable of understanding the nature of the contact, or where the victim is a minor. A complete copy of the policy, reporting procedures, and related information is available at 100 Old Main.

Sexual Harassment

As part of its commitment to equal opportunity, North Dakota State University prohibits sexual harassment of its employees and students, including student-to-student and other peer sexual harassment.

This policy is in compliance with federal regulations implementing Title VII of the Civil Rights Act of 1964 and Title IX of the Education Amendments of 1972. Sexual harassment is defined as follows: "Unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature constitute sexual harassment when 1) submission to such conduct is made either explicitly or implicitly a term or condition of an individual's employment or academic achievement, 2) submission to or rejection of such conduct by an individual is used as the basis for employment decisions or academic decisions affecting such individual, or 3) such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive environment."

Individuals concerned about violations of this policy should request assistance from the University's Director of Equal Opportunity, the University General Counsel, the Counseling and Disability Services office, the Associate Director for Student Rights and Responsibilities, or an appropriate administrator. When administrators or supervisors become aware of occurrences of sexual harassment in their areas, they are responsible for stopping the behavior or reporting it to the Director of Equal Opportunity. In addition, the University's equal opportunity grievance procedure shall be available for any person who wishes to file a complaint alleging a violation of this policy.

Consensual Relationships

Consensual relationships that are of concern to North Dakota State University are romantic or sexual relationships in which both parties appear to have consented, but where there is a definite power differential within the University between the two parties.

Consenting romantic and sexual relationships between **instructor** (meaning all who teach at the University—faculty member, other instructional personnel, and graduate or undergraduate students with teaching, advising, or tutorial responsibilities) **and student** (meaning any person studying with or receiving advising from the instructor); between **supervisor** (meaning any person in a position of authority over another—to hire and fire, to grant raises and oversee task performance) **and employee** (meaning any person working for the supervisor); and between **employee and student** (where there is an instructional, advisory, or an employment relationship between them) have the potential for extremely serious consequences and ought to be avoided. This list is not all-inclusive, but gives examples of the types of relationships that are covered by this policy.

Because of the possible difficulties associated with the power differential and because of potential conflicts of interest, North Dakota State University discourages all such consensual relationships. However, if a romantic or sexual relationship develops between individuals having a power differential within the University, the person with the greater power shall report the matter immediately to the department chair; a teaching assistant shall report it to the professor in charge of the course; and an employee shall report it to his/her supervisor. In each case, the administrative supervisor shall make suitable arrangements for the objective evaluation of the student's, employee's, or prospective employee's academic or job performance and for the protection of individual and University interests.

Use of Alcohol and Other Drugs

The University prohibits the unlawful or unauthorized use, possession, storage, manufacture, distribution, or sale of alcoholic beverages and any illicit drugs or drug paraphernalia in University buildings or any public campus area, in University housing units, in University vehicles, or at any University sponsored events held on or off campus, which are sponsored by students, faculty and/or staff, and their respective campus organizations (including all fraternities and sororities). The State Board of Higher Education specifically prohibits the use or possession of alcohol in residence halls. State and federal laws and regulations will be regarded as the only bodies or rules governing the use of alcoholic beverages and other drugs in University faculty housing, married student housing, fraternities and sororities, and the president's house. For further details, refer to the complete text of the "North Dakota State University Policy Statement and Regulations on the Use of Alcohol and Other Drugs by Students, Faculty, and Staff" as printed in the "Registration Schedule" published for each term.

Campus Security

NDSU complies with the Student Right-to-Know and Campus Security Act of 1990 as amended. Policies, prevention, services, and crime statistics are available at 100 Old Main and are published each term as part of the "Registration Schedule."

Areas of Study

Course work is available in the areas listed by major within each college according to the categories indicated. Consult the index for page numbers.

Key:
M Undergraduate major
o Option (area of emphasis, concentration, or specialization within a major)
T Teacher certification available
m Available as an undergraduate minor

College of Agriculture

m Agribusiness
M, m **Agricultural Economics**
o Agribusiness
o Agrifinance
o Commodity Marketing
o Custom Option
o Production and Farm Management
M, m **Agricultural Systems Management**
o Agribusiness
o Applied Technology
o Production Agriculture
M, m **Animal and Range Sciences**
o Production/Business
o Range Science
o Science
M, m **Biotechnology**
M, m **Crop and Weed Sciences**
o Biotechnology
o Production
o Science
o Weed Science
M Food Science
M, m **General Agriculture**
M, m **Horticulture**
o Horticulture Biotechnology
o Horticulture Science
o Landscape
o Production Business
o Urban Forestry and Parks

M, m **Microbiology**
M **Natural Resources Management**
o Biotic Resources Science
o Physical/Earth Resources Sciences
o Social Sciences
M, m **Plant Protection**
o Agronomic (Field Crops)
o Horticulture
M, m **Soil Science**
M **Veterinary Technology**

College of Arts, Humanities, and Social Sciences

M, m **Art**
M, m **Classical Languages**
M,T, m **English**
M,T, m **French**
M,T, m **German**
M,T, m **History**
o Public History
M, m **Humanities**
M, m **Mass Communication**
M,T, m **Music**
M **Philosophy and Humanities**
M, m **Political Science**
o Public Service
m Religious Studies
M,T Social Science
M,T, m **Sociology**
o Anthropology
m Community Development
o Criminal Justice
M,T, m **Spanish**
M,T, m **Speech Communication**
M, m **Theatre Arts**
Interdisciplinary:
m Gerontology
m Women's Studies

College of Business Administration

M **Accountancy** (five year)
M, m **Accounting** (four year)
M, m **Business Administration**
m Corporate Agribusiness
M, m **Economics**
M **Management Information Systems**

College of Engineering and Architecture

m Aerospace Studies—Air Force ROTC
M **Agricultural and Biosystems Engineering**
M **Architecture**
M **Civil Engineering**
M **Construction Engineering**
M **Construction Management**
M **Construction Technology**
M **Electrical Engineering**
o Biomedical Engineering
o Communication and Signal Processing
o Computer Engineering
o Control Engineering
o Electromagnetics
o Electronics and Microelectronics
o Power Systems
M **Environmental Design**
M, m **Industrial Engineering and Management**
o Automation and Robotics
o Health Care Management
o Industrial Management
o Integrated Information Systems
o Manufacturing and Process
o Operations Research and Simulation
o Production and Inventory Control
o Reliability and Quality Assurance
o Systems Engineering and Project Management
M **Landscape Architecture**
o Land Reclamation
o Landscape Construction and Technology
o Natural Resources Management
o Rural Community Development
M **Manufacturing Engineering**
o Aero Manufacturing Engineering
M **Mechanical Engineering**
o Injection Molding
o Polymers and Coatings
o Power
m Military Science—Army ROTC
M **Natural Resources Management**

College of Human Development and Education

M **Apparel and Textiles**
o Apparel Studies
o Retail Merchandising
M **Athletic Training**
M **Child Development and Family Science**
o Child Development
o Family Science
m Extension Education
M **Facility Management**
M **Food and Nutrition**
o Coordinated Program in Dietetics (CP)
o Didactic Program in Dietetics
m Nutrition
M **Food Science**
M **Hotel, Motel, Restaurant Management**
M **Human Performance and Fitness**
m Individual and Family Wellness
M **Interior Design**
M **Recreation Management**
Secondary Education:
M,T Agricultural Education
T Biological Sciences
T Chemistry
M,T Comprehensive Science Education
T English
M,T Family and Consumer Sciences Education
T French
T German
T History
T Mathematics
T Music (K-12)
o Instrumental Music
o Vocal Music
M,T Physical Education (K-12)
m Health Education
T Physics
T Social Science
T Sociology
T Soils (Earth Science)
T Spanish
T Speech Communication
Interdisciplinary:
m Gerontology
m Women's Studies
Via Valley City State University:
Elementary Education

College of Pharmacy

M **Nursing**
M **Pharm. D.**

College of Science and Mathematics

M,T, m **Biological Sciences**
o Environmental Science
M, m **Biotechnology**
M, m **Botany**
M,T, m **Chemistry**
o Biochemistry
o Chemistry Education Geochemistry
o Polymers and Coatings
o Pre-Professional Chemistry
M **Clinical Laboratory Science**
M, m **Computer Science**
T, m Geography
m Geology
M,T, m **Mathematics**
o Pre-Actuarial Science
M **Natural Resources Management**
M,T, m **Physics**
o Engineering Physics
M, m **Psychology**
M **Respiratory Care**
M,T Soils (Earth Science)
M, m **Statistics**
M, m **Zoology**
o General Zoology
o Physiology, Cell Biology, or Health Sciences
o Fisheries, Wildlife, Ecology, and Behavior
Pre-Professional programs:
o Chiropractic
o Dentistry
o Medicine
o Mortuary Science
o Optometry
o Osteopathy

College of University Studies

Programs in the college of University Studies are designed for students with general needs or unique goals. These programs involve general studies for the deciding students or the Bachelor of University Studies degree (a tailored degree program) for students with distinctive educational goals.

International Studies

The International Studies major at NDSU is offered concurrently with the primary undergraduate major in all college departments participating in the program.

Majors and Degrees Available

Major	Degree
A	
Accountancy	*B.Acc.*
Accounting	*B.A., B.S.*
Agricultural and Biosystems Engineering	*B.S., M.S.*
Agricultural Economics	*B.S., M.S.*
Agricultural Education	*B.S., M.Ed., M.S.*
Agricultural Systems Management	*B.S.*
Agriculture, General	*B.S.*
Animal and Range Sciences	*B.S., M.S., Ph.D.*
Apparel and Textiles	*B.A., B.S.*
Architecture	*B.Arch.*
Art	*B.A., B.S.*
Athletic Training	*B.A., B.S.*
B	
Biochemistry	*M.S., Ph.D.*
Biological Sciences	*B.A., B.S.*
Biological Sciences Education	*B.A., B.S.*
Biotechnology	*B.A.*[1], *B.S.*
Botany	*B.A., B.S., M.S., Ph.D.*
Business Administration	*B.A., B.S., M.B.A.*
C	
Cellular and Molecular Biology	*Ph.D.*
Cereal Science	*M.S., Ph.D.*
Chemistry	*B.A., B.S., M.S., Ph.D.*
Chemistry Education	*B.A., B.S.*
Child Development and Family Science	*B.A., B.S., M.S.*
Civil Engineering	*B.S., M.S.*
Classical Languages	*B.A., B.S.*
Clinical Laboratory Science	*B.A., B.S.*
Comprehensive Science Education	*B.A., B.S.*
Computer Science	*B.A., B.S., M.S., Ph.D.*
Construction Engineering	*B.S.*
Construction Management	*B.S.*
Construction Technology	*B.S.*
Counseling and Guidance	*M.Ed., M.S.*
Crop and Weed Sciences	*B.S.*
E	
Economics	*B.A., B.S.*
Educational Administration	*M.Ed., M.S., Ed.S.*
Electrical Engineering	*B.S., M.S.*
Engineering	*Ph.D.*
English	*B.A., B.S., M.A.*
English Education	*B.A., B.S.*
Entomology	*M.S., Ph.D.*
Environmental Design	*B.S.*
Environmental Engineering	*M.S.*
F	
Facility Management	*B.A., B.S.*
Family and Consumer Sciences Education	*B.S., M.Ed., M.S.*
Food and Nutrition	*B.A., B.S., M.S.*
Food Science	*B.S.*
French	*B.A., B.S.*
French Education	*B.A., B.S.*
G-H	
German	*B.A., B.S.*
German Education	*B.A., B.S.*
History	*B.A., B.S., M.A., M.S.*
History Education	*B.A., B.S.*
Horticulture	*B.S., M.S.*
Hotel, Motel, Restaurant Management	*B.A., B.S.*
Human Performance and Fitness	*B.A., B.S.*
Humanities	*B.A., B.S.*
I-L	
Industrial Engineering and Management	*B.S., M.S.*
Interior Design	*B.A., B.S.*
International Studies[2]	*B.A., B.S.*
Landscape Architecture	*B.L.A.*
M	
Management Information Systems	*B.S.*
Manufacturing Engineering	*B.S.*
Mass Communication	B.A., B.S., M.A., M.S.
Mathematics	B.A., B.S., M.S., Ph.D.
Mathematics Education	B.A., B.S.
Mechanical Engineering	B.S., M.S.
Microbiology	B.S., M.S.
Music	B.A., B.S.
Music Education	B.S.
N-P	
Natural Resources Management	*B.S., M.S.*
Nursing	*B.S.N.*
Pharmaceutical Sciences	*B.S., M.S., Ph.D.*
Pharmacy	*Pharm.D.*
Philosophy and Humanities	*B.A., B.S.*
Physical Education	*B.A., B.S.*
Physics	*B.A., B.S., M.S., Ph.D.*
Physics Education	B.A., B.S.
Plant Pathology	*M.S., Ph.D.*
Plant Protection	*B.S.*
Plant Sciences	*M.S., Ph.D.*
Political Science	*B.A., B.S.*
Polymers and Coatings Science	*M.S., Ph.D.*
Psychology	*B.A., B.S., M.S.*
R-S	
Recreation Management	*B.A., B.S.*
Respiratory Care	*B.A., B.S.*
Secondary Education	*M.Ed., M.S.*
Social Science	*B.A., B.S., M.S.*
Social Science Education	*B.A., B.S.*
Sociology	*B.A., B.S.*
Sociology Education	*B.A., B.S.*
Soil Science	*B.S., M.S., Ph.D.*
Soils (Earth Science)	*B.S.*
Soils (Earth Science) Education	*B.A., B.S.*
Spanish	*B.A., B.S.*
Spanish Education	*B.A., B.S.*
Speech Communication	*B.A., B.S., M.A., M.S.*
Speech Communication Education	*B.A., B.S.*
Statistics	*B.S., Ph.D.*
Statistics, Applied	*M.S.*
T-Z	
Theatre Arts	*B.A., B.F.A., B.S.*
University Studies	*B.U.S.*
Veterinary Technology	*B.S.*
Zoology	*B.A., B.S., M.S., Ph.D.*

[1] B.A. degree with this major only available through the College of Science and Mathematics, NOT the College of Agriculture.

[2] Offered only when taken concurrently with another major.

Admission

Campus Visits

Anyone interested in attending NDSU as an undergraduate student should contact the Office of Admission, 124 Ceres Hall, for application procedures and information. Office of Admission staff at North Dakota State University welcome and encourage inquiries about NDSU student life and academic programs.

Campus visits are scheduled weekdays for prospective students and parents. Such visits include a campus tour, appointment with a faculty member in the student's area of interest, and an interview with an admission representative. Simply call the NDSU Campus Visit Coordinator at 1-800-488-NDSU or 701-231-8643. Visits to our web site are also encouraged: www.ndsu.nodak.edu.

Admission Policies

Admission policies and practices reflect the University's commitment to equal opportunity.

Admission of Freshmen

In compliance with State Board of Higher Education policy, students are selected on the basis of high school core course requirements, ACT scores, and grades.

Academic Eligibility

A prospective student must have completed the following high school core curriculum unit requirements (one unit equals one full year of study):

1. Four (4) units of English

2. Three (3) units of mathematics (at the level of algebra I and above)

3. Three (3) units of laboratory science

4. Three (3) units of social studies

Application Requirements

To be considered for freshman admission, submit the following:

1. A completed application for admission and a $25 nonrefundable application fee.

2. A completed college preparatory course report form (included in the application booklet) indicating completion of the core curriculum requirements.

3. An official final transcript of all high school credits sent by the high school; official transcript(s) of any subsequent postsecondary course work.

4. Scores from the American College Test (ACT) as well as the Student Profile Report (NDSU's code number is 3202) or from the Scholastic Aptitude Test (SAT) (code number is 6474), if applicant is under 25 years of age.

Admission decisions are based on the total high school record. Completion of the core curriculum requirements previously listed does not automatically guarantee admission to NDSU. In addition to fulfilling the core requirements, grade-point average in the core courses, class rank, and ACT scores are considered in evaluating an application. The general guidelines used in making admission decisions include a cumulative high school grade-point average of 2.5 (4.0 scale) and an ACT composite score of 21 or higher. Students who do not meet these guidelines will be considered if other supporting factors show potential for success.

Note: Prior to enrollment, proof of immunization for measles, mumps, and rubella is required by the State Board of Higher Education.

Admission of Transfer Students

Refer to the section on Academic Policies for information on evaluation of transfer credits.

Students who have previously attended NDSU should refer to the section on readmission of returning students.

Application Procedures

Students interested in transferring to NDSU must present the following to be considered for admission:

1. Completed application for admission and a $25 nonrefundable application fee.

2. Official high school transcript, complete with graduation date, if fewer than 60 semester credits (90 quarter credits) of college work have been completed.

3. Minimum cumulative college grade-point average of 2.00 on a 4.00 scale.

4. Official transcripts from all colleges previously attended. Transfer students are not at liberty to disregard any part of their previous college record. Failure to report all college and university work may result in dismissal or loss of credit or both.

The Office of the Registrar administers the NDSU policies governing the acceptance of credit from outside institutions. Before credits may be evaluated for specific NDSU course equivalence or application to a departmental program, transfer courses must be accepted for University credit. Transfer credits are evaluated as soon as possible after final and official transcripts from each institution have been received. Refer to the section on Academic Policies for evaluation of transfer credits.

Note: Students who have been suspended from another institution will not be considered for admission to NDSU until the suspension has been lifted by that institution or until one year has elapsed. Students who have outstanding debts at other institutions will not be offered admission to NDSU.

Supplemental Applications

In addition to completing the preceding procedures, supplemental applications must be requested and submitted by students seeking admission to the following professional programs:

• **Coordinated program in dietetics:** Send requests to the Department of Food and Nutrition. Application deadline is the third Monday in March.

• **Nursing:** Send requests to the College of Pharmacy. Application deadline is October 1.

• **Pharmacy:** Send requests to the College of Pharmacy. Application deadline is January 15.

• **Respiratory care:** Send requests to the Department of Zoology. Internship application deadline is March 1.

• **Veterinary technology:** Send requests to the Department of Veterinary and Microbiological Sciences. Application deadline is March 1.

Admission of Early-Entry Students

High school juniors and seniors wishing to take course work at NDSU prior to high school graduation may enroll as an early-entry student. Submit all of the following:

1. Completed application for admission and a $25 nonrefundable application fee.

2. High school transcript.

3. Early-entry permission form signed by a parent or guardian and by a high school counselor or principal.

4. Students seeking early-entry status must show evidence of strong academic ability and adequate progress toward meeting the core curriculum requirements. Credit earned will be made official upon receipt of the final high school transcript.

5. College credit may apply toward high school graduation requirements. Students should consult their high school policy regarding this issue and must initiate the Dual Credit Enrollment Application with the high school counselor.

Note: A cumulative grade-point average of 3.5 is recommended; however, each application will be reviewed on an individual basis.

Admission of Special Status Students

Special student status is reserved for non-degree-seeking students who wish to enroll in a limited number of courses at NDSU. Special students are permitted to register for up to 15 credits without submitting official transcripts (unless college course work was attempted within one year prior to application). Interested students should request and submit a Special Student Status Application from the Office of Admission and a $25 nonrefundable application fee. If students wish to take additional courses or become degree-seeking, appropriate high school and/or college transcripts must be submitted to be considered for admission.

Students currently enrolled at another college or university and planning to take limited course work at NDSU with the intention of transferring NDSU credits to their home institution should follow the application procedures for special student status.

Admission by Examination

Persons 19 years of age or older may substitute satisfactory scores on the General Education Development (GED) tests in place of a high school diploma. North Dakota residents may take these tests by appointment at the Counseling and Disability Services Office or at high schools throughout the state. Others should consult with schools in their home state for details about testing centers.

Students who present an overall average score of 45 on the GED with no subject score lower than 40 will be considered for admission to the University. ACT/SAT scores are required if applicant is under 25 years of age.

Admission of International Students

Admission of undergraduate international students is determined by a selective admission process that includes consideration of English language proficiency, academic achievement, and financial resources. For information specific to graduate students, refer to the Graduate Bulletin or contact the Graduate School.

International Student Deadlines

Deadlines for international applications are May 1 for Fall Semester and October 1 for Spring Semester. For an application to be processed, it must be accompanied by a nonrefundable application fee of $25 U.S. submitted in the form of a check (postal or money order) drawn on a U.S. bank and payable to North Dakota State University.

English Language Proficiency

Scores from the Test of English as a Foreign Language (TOEFL) must be submitted by prospective international students at the time of application. The minimum required TOEFL score for unconditional acceptance is 525 (paper test); 193 (computer test). Undergraduate students receiving scores between 470-524 (paper test); 140-190 (computer test) and graduate students with scores between 500-524 (paper test); 173-190 (computer test) may receive conditional acceptance with attendance at NDSU's Intensive English Language Program required (see section on Intensive English Program). Arrangements to take the TOEFL may be made by writing to the Educational Testing Service (ETS), Princeton, New Jersey, U.S.A. or by inquiring at the nearest U.S. Consulate or binational center. Applicants should have their scores sent directly from ETS to the Office of International Programs, North Dakota State University, P.O. Box 5582, Fargo, North Dakota 58105, U.S.A. Test results that are more than two years old will not be considered.

Academic Achievement

Applicants are required to furnish an original or certified copy of an official academic record from all secondary schools and all colleges, universities, and professional schools attended. The academic record must show all marks or grades received in each subject for each school year and any certificates, diplomas, or degrees awarded, including all subjects passed and grades or marks earned on government or university examinations. If the academic record is not in English, a certified literal translation must be sent in addition to the official record.

Students applying directly from their home countries who have not completed any course work in the U.S. should rank in the upper third of their class or have the equivalent to a B average in the U.S. Other factors, such as personal recommendations and test results, for example, scores on the Scholastic Aptitude Test (SAT) will also be considered, but are not required. Additional requirements for selective admission programs are outlined in the appropriate college section in this bulletin.

Financial Resources

Certification of adequate financial support is required from all international undergraduate applicants other than permanent residents of the U.S., parolees, refugees, U.S. trust territory applicants, or immigrants. Admission will not be granted until proof of funds for the duration of study has been submitted. A special North Dakota State University International Student Financial Certification Form must be completed for this purpose. Failure to complete this certification and submit supporting documents will delay admission decisions and the issuance of the appropriate immigration forms. Applicants must be prepared to pay tuition and fees, as well as costs for living expenses, for their entire stay at the University. A detailed summary of expenses is included in the international application packet. Each student should become familiar with his/her financial needs based on that summary.

Health Insurance

All international students are required to purchase the health insurance policy specified by the state of North Dakota. No other policy may be substituted. The fee for health insurance for one year must be paid upon arrival and at the beginning of each subsequent year. In addition, the state of North Dakota requires proof of immunity to measles, mumps, and rubella prior to registration for courses.

Transfer of Funds

Before departing for the United States, students should become thoroughly familiar with their home government's regulation for exchanging and forwarding money.

Transfer International Students

Undergraduate students transferring from U.S. colleges or universities should have a cumulative grade-point average of 2.5 or higher on a 4.0 scale, except for applicants to selective programs, such as engineering, which require higher minimum grade-point averages. Admission decisions are based on academic course work, as well as on the capability of the University to accommodate additional international students. Applications from students already studying in the U.S. are considered if their file is complete by June 15 for Fall Semester and November 1 for Spring Semester.

Any academic course work accepted for transfer by the University is subject to departmental approval. Evaluation of transfer credits normally will not be completed until the applicant has arrived on campus and enrolled. Applicants seeking transfer credits for higher education work completed outside the United States should bring with them a detailed syllabus for each course. A student must be able to provide a full description of prior course work to his/her academic adviser to facilitate the evaluation of transfer credits. All international students currently studying in the United States must submit the Supplemental Information Form as part of the application. This form is to be completed by the applicant and the applicant's present or most recent international student adviser.

Certification of Credentials from Abroad

The appropriate school authority who issued the original academic record should make a photocopy of the applicants' papers and certify that it is a true copy by placing the institution's stamp or seal and the official's signature on the photocopy. Copies of transcripts issued by one institution but certified by another institution will not be accepted from abroad.

Students presently attending a college or university in the United States may have the admissions officer at their current institution send certified copies of their foreign academic records to North Dakota State University if the records were originally certified by the appropriate institutions. University work

completed at one institution but listed on the record of a second institution will not be considered without a separate record from the institution where the work was originally completed.

Intensive English Program

An Intensive English Language Program is offered year round and is open to international visitors and graduate and undergraduate applicants who plan to enroll at North Dakota State University. The course is designed for individuals whose scores on the Test of English as a Foreign Language (TOEFL) do not meet minimum standards and who are required to participate as a condition of admission to the University or as a condition of being awarded a teaching assistantship. The full-time, intensive course is offered every summer for five weeks and fall and spring for 15 weeks. No college credit is given and students attend at their own expense.

For more information contact the Office of International Programs, P.O. Box 5582, Fargo, North Dakota 58105-5582 U.S.A., telephone: 701-231-7895, fax: 701-231-1014, e-mail: nuin@plains.nodak.edu.

Admission of Graduate Students

For admission requirements to the Graduate School, refer to the special section on the Graduate School.

Readmission of Returning Students

Returning students are those who have previously attended NDSU and are returning after an absence of at least one full term, exclusive of the summer session. Students who left in good standing should contact the Office of the Registrar (not the Office of Admission) at least 30 days prior to their expected return so that records might be updated to permit further registration.

Students who have been enrolled in courses at another institution since leaving NDSU must arrange for an official transcript to be sent to the Registrar's Office, P.O. Box 5196, Fargo, ND 58105.

Students who left following academic suspension must petition for readmission. Forms may be acquired from and are to be submitted to the Office of the Registrar, 110 Ceres Hall, at least 30 days prior to the semester start date.

Selective Admission Programs

Admission to a number of programs is selective, and admission to the University does not guarantee entrance to a specific major. Contact the Office of Admission for further admission criteria for the following programs:

Accounting
Architecture
Athletic Training
Business Administration
Clinical Laboratory Science
Dietetics
Electrical Engineering
Interior Design
International Studies
Landscape Architecture
Management Information Systems
Manufacturing Engineering
Mechanical Engineering
Music
Nursing
Pharmacy
Respiratory Care
Teacher Education
Veterinary Technology

Limited Enrollment Programs

Enrollment is limited in a number of programs at NDSU. Those with current specific limitations include the following.

Coordinated Program in Dietetics

The Coordinated Program in Dietetics, which is an option in the Food and Nutrition major, is limited to approximately 20 students beginning in the third year. Transfer applicants must have a minimum grade-point average of 3.0 to be considered for admission to the professional level.

Nursing

Nursing is a cooperative program shared with Concordia College coordinated through Tri-College University. Enrollment is limited at the professional level. Transfer applicants are required to have a minimum grade-point average of 2.5 to be considered for admission to the professional level. Admission to the first two years of nursing is not limited.

Pharmacy

Enrollment of all students to the professional pharmacy courses is limited beginning in the third year. Transfer applicants must have a minimum grade-point average of 2.8 to be considered for admission to the professional level. Admission to pre-pharmacy is not limited.

Respiratory Care

Admission to the first two years of respiratory care is not limited. Enrollment is limited to 12 students in the professional courses of their junior-year internship. Transfer applicants must have a minimum grade-point average of 2.5 to be considered for admission into an internship. Upper-division transfer students need to successfully complete a minimum of 20 approved nonrespiratory credits at NDSU prior to starting an internship. Also, NDSU degree requirements include 36 residence credits (see Graduation Requirements).

Veterinary Technology

The veterinary technology program is limited to approximately 20 students beginning in the second year. Transfer applicants are encouraged to contact the department for information if they intend to apply for admission to the professional program.

Recommended Preparation

Certain preparation in addition to the minimum core curriculum requirements, previously listed, is advisable if a student is to enter easily and progress smoothly through a particular University curriculum. Additional high school preparation for prospective majors in two colleges is recommended as follows.

College of Engineering and Architecture

Prospective majors in engineering should present four units of high school mathematics including two units of algebra, one unit of geometry, and one-half unit of trigonometry. Science courses should include one unit of physics and one unit of chemistry. Students whose high school credentials or entrance examinations show deficiencies in these subjects will be required to enroll in courses designed to remove such deficiencies and cannot expect to complete a program of study in the number of semesters indicated in the printed curricula.

College of Pharmacy

Prospective pharmacy majors should present strong preparation in mathematics, in the physical/biological sciences, and in communication skills.

Financial Information

Tuition and Fees

Tuition and required fees shown in the related table were in effect for the 1999-00 academic year. All fees are subject to change without notice. Payment instructions are printed in the "Registration Schedule" each semester.

In addition to the estimates shown, students should also plan for books and personal expenses. Individual habits and needs vary, but about $2,000 may be anticipated.

Students must contact the Office of the Registrar to confirm their resident status for tuition reciprocity rates. Returning students who have previously filed for tuition reciprocity but have not been enrolled for the preceding year or more need to re-file.

In addition to the required fees listed, the following fees are assessed when and as they apply:

Application Fee $25

The application fee is non-refundable and must accompany the admission application.

Matriculation Fee $45

The matriculation fee is a non-refundable fee for all new students to provide orientation programs, tutoring, and retention-related activities.

Student Fees

The following student fees have been approved by the student body and are mandatory fees charged each term. The maximum charge for 12 or more credits is $203.

Activity fee	$5.00/credit hour
Career services	$1.08/credit hour
Health/wellness	$5.42/credit hour
Technology fee	$4.17/credit hour
Union bond	$1.25/credit hour

Other Fees

Additional fees are applied to special services. Most common are the following:

Course Audit

The course audit (not for credit) fee is 50% of the regular credit tuition charge.

Course Challenge

Course challenge fee is 50% of the regular credit tuition charge. The fee is paid after approval of the petition to challenge, but before the special examination is administered.

Diploma Replacement $24

A replacement service is provided by the Office of the Registrar for those who have lost or damaged their diploma.

Inspection Trip Fee $15

An inspection trip fee is assessed per course to students taking courses involving inspection trips to various localities.

Laboratory/Special Instructional Fees

Unique services and supplies related to special instructional and laboratory courses incur additional fees. Where applicable, these fees are listed in the "Registration Schedule" each term.

Late Registration $5-$15

A late registration fee is charged at the rate of $5 per day to a maximum of $15 (not charged to new students their first semester).

Parking Permits

All NDSU employees and students are assessed fees to park in University lots. For further information contact the Campus Police (701-231-8998).

Photo ID $10

All students must have an NDSU photo identification card. Replacement of lost cards is also $10.

Student Housing Deposit (Family): $100

The family student housing deposit is refundable, less breakage or damage, upon official withdrawal from the University.

Student Housing Deposit (Single): $50

Residence hall and single student apartment deposits are refundable, less breakage or damage, upon withdrawal from the University.

Special Examinations As required

NDSU serves as a national testing center. Fees vary for different placement and proficiency testing programs. For specific fee information contact the Center for Student Counseling and Personal Growth (701-231-7671).

Student Health Service Fees

Payment of student registration fees entitles a student to the basic services of the Student Health Service. Additional fees are charged for medications, certain studies, and additional services according to rates maintained and available at the clinic.

Refund of Tuition and Required Fees

Refund calculations for withdrawal or course drops are in accordance with the North Dakota Board of Higher Education policy 830.2. A copy of the University policy is available in the Financial Aid Office.

Withdrawals

Tuition and fees will be refunded at 100 percent for students who withdraw on or before the end of the seventh instructional class day of a regular term. Nonregular terms will provide for a proportionate refund schedule based on the length of the term. Students who withdraw after the end of the seventh instructional day or proportionate period of a term will have tuition and fee refunds calculated based upon a declining percentage extending through the 60 percent point of the term. Specific dates and refund percentages are published in the "Registration Schedule" each term.

Course Drops

Refunds, where applicable, will be made at 100% for course drops during the first seven instructional class days of a regular term. Nonregular terms will provide for a proportionate refund schedule based on the length of the term. After the seventh day or proportionate period of a term there are no refunds for students who drop a class or classes and continue to be enrolled.

Residency and Tuition Reciprocity

The North Dakota Century Code, Section 15-10-19.1, governs determination of residency for tuition purposes.

Resident Guidelines

A North Dakota resident student, for tuition purposes, is defined as follows:

1. A person less than 18 years of age whose custodial parent or guardian has been a legal resident of North Dakota for 12 months immediately prior to the beginning of the academic term.

2. A person 18 years of age or older who has been a legal resident of North Dakota for 12 months immediately prior to the beginning of the academic term.

3. A dependent child whose parent or guardian has been a legal resident of North Dakota for 12 months immediately prior to the beginning of the academic term or resides in the state with the intent to establish residency in the state for a period of years.

4. A person who graduated from a North Dakota high school within six years prior to the beginning of the academic term.

5. A full-time active duty member of the armed forces assigned to a military installation in North Dakota.

6. A spouse or a dependent of a full-time active duty member of the armed forces assigned to a military installation in North Dakota.

7. A dependent or spouse of an instructor who lives in North Dakota and teaches at an institution of higher education in the state.

8. The spouse of any person who is a resident for tuition purposes.

9. Any other person who was a legal resident of this state for at least three consecutive years within six years prior to the beginning of the academic term.

Note: "Dependent" means only a person claimed as a dependent on the most recent federal tax return.

Minnesota Tuition Reciprocity

Effective September 1975, the states of Minnesota and North Dakota enacted a tuition reciprocity agreement. This means that legal residents of the State of Minnesota may qualify for reduced tuition at North Dakota State University.

Minnesota residents who enroll at NDSU within 12 months of their graduation from a high school in Minnesota do not have to fill out the standard paper application. All other Minnesota residents should write for application papers for reciprocity to the following address:

Higher Education Coordinating Board
400 Capitol Square Building
550 Cedar Street
St. Paul, MN 55101-2292

Once reciprocity has been granted by the State of Minnesota, the student will receive a letter to that effect, which the student should copy and submit to the NDSU Office of the Registrar. The Registrar will also be notified of this award, and the Minnesota resident's tuition at NDSU will be reduced accordingly.

Residency issues must be resolved by the last day of classes of the first session the student attends. Refunds will not be processed retroactively.

Note: Returning students who have previously filed for tuition reciprocity but have not enrolled in a course or earned credit at NDSU during the past year will need to re-file.

Program Fees

Fees for specific programs, which have been approved by the North Dakota Board of Higher Education, include the following. (Total credit hours include transfer credits.)

Program	When the Fee Will Be Assessed	Amount of Fee
Architecture & Landscape Architecture	Full-time students who have been accepted into the second-year design studio	$150/semester
	Part-time students who have been accepted into the second-year design studio	$ 10/credit hr
Engineering	Full-time students who have completed fewer than 60 total credit hours	$ 25/semester
	Full-time students who have completed 60 or more total credit hours	$150/semester
	Part-time students	$12.50/credit hr
Food & Nutrition	Full-time and part-time students who have completed 60 or more total credit hours in the Coordinated Undergraduate Program in Dietetics (CPD)	$250/semester
	Full-time and part-time students who are enrolled in the Didactic Program in Dietetics (DPD) and who are taking the field experience courses	$12.50/credit hr
Interior Design	Full-time students who have passed their sophomore review	$150/semester
	Part-time students who have passed their sophomore review	$ 10/credit hr
Nursing	All who have been formally accepted into the professional program after completion of the pre-nursing curriculum	$150/semester
Pharmacy	All who have been formally accepted into the professional Pharm.D. program	$500/semester

Approximate Undergraduate Costs to Attend NDSU, 1999-2000

Expenditures	ND resident per semester/ per year	MN resident per semester/ per year	Contiguous states WICHE/WUE NDUS Alumni[1] per semester/ per year	Other non-residents per semester/ per year
Tuition (12 or more credits per semester) [2]	$1,240/ $2,480	$1,298/ $2,596	$1,860/ $3,720	$3,311/ $6,622
Student fees [2]	$203/$406	$203/$406	$203/$406	$203/$406
Room and board [3]	$1,754/ $3,508	$1,754/ $3,508	$1,754/ $3,508	$1,754/ $3,508
Books and supplies	$300/$600	$300/$600	$300/$600	$300/$600
Total semester Total year	$3,497 $6,994	$3,565 $7,130	$4,117 $8,234	$5,568 $11,136

[1]Contiguous provinces: Manitoba, Saskatchewan. WICHE/WUE States: Alaska, Colorado, Hawaii, Idaho, Montana, New Mexico, Nevada, Oregon, South Dakota, Utah, Wyoming. Also Arizona, California, and Washington for students who enter on or after Fall 1998. N.D. University System alumni include dependents and spouse as of Fall 1999.

[2]Students carrying fewer than 12 credits per semester will pay their tuition and required fees on a prorated basis.

[3]Average cost per semester based on double room and 20-meal plan. A student taking the 15-meal plan and staying in a double room would pay $1,697 average cost per semester and $3,394 per year.

Residence Life

NDSU student living facilities and dining services are designed to extend the student's educational experience beyond the classroom.

Residence Halls

The residence halls are an integral part of the college experience. In this environment students have opportunities to enhance their academic, social, and personal growth. Also, students who live on campus have been found to be more likely to persist in their education and earn higher grade-point averages than their off-campus peers.

Residence hall programs. Through the leadership of full-time residence hall directors and resident assistants, students are encouraged to get involved and enjoy a variety of educational, cultural, social, and recreational activities. Programs specifically designed to supplement classroom work include Faculty in Residence and SuperTutor.

Accommodations. NDSU has 12 residence halls that accommodate a total of 2,675 students. A smoke-free environment is provided in nine residence halls where smoking is prohibited in all parts of each building. In the remaining three residence halls, smoking is permitted only in student rooms.

Licenses. Only enrolled NDSU students may live in the residence halls. Licenses for residence hall accommodations are for the academic year. Special consideration will be given to the needs of students with a physical or health condition. Assignment priority is established according to the date the application and $50 deposit are received.

New student policy. All new students under 19 years of age as of the semester start date who will not be living with their families are required to live in a University residence hall during their first academic year. Students requesting release from this policy must contact the Department of Residence Life, Auxiliary Enterprises Bldg., P.O. Box 5481, Fargo, ND 58105.

Single Student Apartments

Single student apartments provide additional personal freedom, more privacy, fewer interruptions, and an opportunity to live in a community environment with common academic interests and goals. Forty-eight two-bedroom furnished apartments are designed to accommodate two to four students per apartment. Students who have completed a minimum of 27 semester credit hours are eligible to apply. Assignment priority is established according to the date the application and $50 deposit are received.

University Apartments

The advantages of living on campus in the University environment are available for eligible families. Family and graduate student housing is located on or near the University and is close to both private and public elementary schools. City parks, recreation areas, and shopping centers are conveniently located nearby. One- and two-bedroom apartments are available to accommodate 300 families at moderate rental costs. Assignment priority is established according to the date the application and $100 deposit are received.

Housing Application

Students wishing to apply for campus housing should contact the Department of Residence Life. Assignment priority is established according to the date that the application and deposit are received. The demand for on-campus housing usually exceeds available space, so apply early. For current rates or more information contact the Department of Residence Life, North Dakota State University, P.O. Box 5481, Fargo, ND 58105-5481.

Dining Services

Dining rooms are warm and conducive to socializing. The staff is energetic and caring.

The staff's sincere intent is to make living and dining pleasant and to provide students with a variety of food products and services.

The dining facilities for the majority of students residing on campus are interconnected with adjacent residence halls, while students living near the center of the campus will find food facilities easily accessible within the Memorial Union.

The noon meal will be the last meal served prior to the beginning of all holidays or recess periods.

Sack lunches will be prepared for those students unable to eat during the scheduled serving hours. A validated meal card orcash is required upon entering dining areas offering board meal plans.

To make residence hall dining more desirable, minimum standards of dress are required. Shoes and shirts must be worn at all times.

Room and Board Rates

Room rates average $632 per semester for most double rooms. Meal plan rates for 1999 are listed.

Meal Plans for First Year, Upperclass, and Graduate Students

The 20-Meal Plan, $1,072 per semester: Includes any 20 meals per week plus $20 Bison Bucks per semester. This plan offers the best value as it has the lowest per meal price.

The 15-Meal Plan, $1,015 per semester: Includes any 15 meals per week plus $25 Bison Bucks per semester. This plan is designed for active students who may miss occasional meals due to extracurricular activities or employment off campus.

The 15-Meal Plan offers 15 of the 20 meals served during the week in the Residence Dining Center, West Dining Center, and Memorial Union contract dining rooms.

The 12-Meal Plan, $979 per semester: Includes any 12 meals per week plus $30 Bison Bucks per semester. This plan is designed to offer a dining option to the off-campus students and to students who are not on campus most weekends.

Choose any 12 of the 20 meals served during the week in the dining halls.

Note: The 20/15/12-Meal Plans are non-transferable.

Meal Plan for All Students Living Off Campus

The 10-Pack Meal Deal, $48 for 10 meals: The 10-pack meal deal is great for flexibility. Meals are purchased in 10 meal increments (10, 20, 30). Older than average, graduate, sorority, fraternity members, or students living off campus preferring not to cook every meal at home will enjoy this convenience. This plan is available at all dining locations plus the noon luncheon prepared and served by the Quantity Foods Class, West Dining Center.

Features of the 10-Pack Meal Deal
Flexibility: Meals may be used anytime during the academic year of purchase and do not have to be used within a given meal period or week.
Guest Meals: Card holders may use any of their contract meals to cover the cost of a guest for a meal.

Special Notes: Unused meals are not refundable.

The 20/15/12-Meal Plans include Bison Bucks that may be used to purchase extra foods such as snacks, ice cream, pizza, or convenience items.

Financial Aid

Students attending NDSU for the first time must apply for admission to be considered for financial aid. If a request for aid is noted on the admission application form, financial aid information and application forms will be sent to the applicant. Returning and transfer students should contact the Financial Aid Office directly for forms and information.

All aid applicants will be expected to complete and submit the Free Application for Federal Student Assistance (FAFSA). To be considered for the maximum number of financial aid sources, the FAFSA must be processed by the FAFSA processing agency on or before April 15. To insure meeting this deadline, the completed FAFSA should be mailed by March 15.

Under ordinary circumstances, announcements of financial aid awards are made in mid-June.

Federal Pell Grants

All students who have not yet earned a baccalaureate degree are eligible to apply for grant assistance under this program. Grant amounts ranging from $400 to $3,125 per year are awarded to students with exceptional need for assistance.

Federal Supplemental Educational Opportunity Grants

These federal grants are awarded to undergraduate students with exceptional need for assistance (Pell Grant recipients must be given priority in the awarding of Supplemental Grants). Amounts range from $300 to $1,300 per year.

State Grants

North Dakota residents may be considered for a $600 State Grant by indicating on the FAFSA that information on the form may be released to their state agency. Eligibility is based upon need for assistance. Early submission of the FAFSA will insure priority consideration for the grant.

Loans

The University participates in the federal Perkins and Stafford student loan programs. Minnesota Student Educational Loan Fund (SELF), federal and nonfederal unsubsidized, and Parent Loans for Undergraduate Students (PLUS) programs are also available to qualified applicants.

Rates of interest are below those charged commercially, and borrowers may have up to 10 years after leaving school to repay these loans depending upon the total amount borrowed.

The Financial Aid Office also offers short-term emergency loans of nominal amounts to qualified students who are currently enrolled.

Academic Standards for Federal Financial Aid Eligibility

Students must meet standards of satisfactory progress to maintain their eligibility for Title IV financial assistance each year. These standards differ somewhat from the minimum standards set by the University. Changes in registration, such as dropping courses or withdrawing from all courses, may affect financial aid eligibility of applicants and recipients. For details or to obtain a copy of the “Standards of Satisfactory Progress for Financial Aid Eligibility,” contact the NDSU Financial Aid Office.

Employment

The federal Work-Study program provides jobs both on and off campus during the school year and summer for enrolled students with need for assistance.

A full-time employee of the North Dakota Job Service is available in the Office of Career Services to assist students seeking part-time jobs on campus and in the community. These job placements are not based upon need.

Scholarships

High school seniors with superior academic credentials are encouraged to contact the NDSU Office of Admission for scholarship information and application forms. Returning and upperclass students should contact their college or department regarding scholarship availability and application procedures. Students should also seek out scholarships offered through non-university sources.

Student Life

The Division of Student Affairs at NDSU serves student needs by providing specialized services, educational programs, and offerings directed at academic and student personal growth. Division personnel encourage student involvement within the University and serve as advocates for student concerns. Division functions are provided in a spirit of support for the teaching, research, and public service of the University.

Student Services

Diverse services and reinforcement programs are available at NDSU. Each is aimed at enhancing student life by assisting students to gain the maximum benefit from their experiences.

Project Success

Project Success is a campus-wide effort to provide academic and social support services for entering students at NDSU. Project Success staff provide New Student Orientation programs for freshmen and transfer students and their families. The staff coordinates academic tutoring (SuperTutor) and peer advising/mentoring programs in collaboration with academic colleges and offices throughout the University. In addition, Project Success staff conduct retention related research, develop services focusing on at-risk students, and provide support for the Skills for Academic Success Course.

Counseling and Disability Services

Counseling and Disability Services professionals understand that students have times in their lives when they need assistance with their academic, personal, career, and social issues. These professional counselors and learning specialists help students who have difficulties that range from everyday concerns to those that are more serious in nature.

Appointments to see a counselor may be made in person, (Ceres 212), by telephone (231-7671), or by letter. Students with urgent problems may be seen immediately. Counselors are also available to assist in emergencies that occur outside of regular office hours by calling 231-7671.

Counseling and Disability Services is a department within the Division of Student Affairs and is accredited by the International Association of Counseling Services, Inc. Counseling staff members honor the American Counseling Association Code of Ethics.

The Center provides a diverse array of services to students. Services include the following:

Personal counseling. Counseling and Disability Services offers a confidential place for students to explore personal concerns. Some examples of student concerns are anxiety and/or depression, academic performance difficulties, interpersonal relations problems, eating disorders, abuse and violence issues, career and academic-major decisions, crisis needs, and self-esteem enhancement. In addition to individual counseling sessions, the staff offers group counseling and support groups.

Academic counseling. Ongoing educational opportunities in learning strategies and personal development issues are provided. Center staff members serve as instructors for self-growth classes in such areas as career planning and study skills.

Career counseling. Career assessment, exploration, and counseling services are available. A career resource library is maintained to provide current information useful for educational and vocational planning. Included within the career library is DISCOVER, a computerized information and assessment system.

Psychiatric services. Counseling and Disability Services contracts with psychiatric resident physicians from the University of North Dakota Medical School and consulting psychiatrists to provide services. These physicians provide assessment and management in clients' use of medication. A nominal fee is charged for these services.

Chemical dependency services. Counseling and Disability Services staff provide referral services for individuals with chemical dependency concerns. Counselors assist in coordinating campus educational programming that fosters healthy lifestyles.

Disability services. Staff members work in cooperation with other campus personnel to ensure that students have access to campus programs and facilities. The type of academic support services and accommodations that are available to eligible students with disabilities include, but are not limited to, the following: counseling and assessment, testing accommodations, readers, assistive technology, classroom accommodations, seasonal transportation services, early registration, advocacy, interpreter service, and referral services to campus, community, and state agencies.

Services for nontraditional students. Services are provided to assist students who have been away from school for a period of time. Informal meetings are arranged to offer a supportive environment for the returning adult learner.

Testing. Counseling and Disability Services is an agency for admin-istering numerous standardized educational and professional tests. Tests commonly administered include the American College Test (ACT), College Level Examination Program (CLEP), the Michigan Test of English Language Proficiency, and qualifying exams for program entrance.

Faculty and staff development. Counseling and Disability Services personnel foster faculty and staff development through consultation with individuals and departments, campus presentations, and development of educational materials.

Multicultural Student Services

The Office of Multicultural Student Services provides a variety of support services for Native Americans and other ethnic and cultural minority students. Enrolled and prospective students may obtain assistance with admission procedures, financial aid, housing, academic advising, counseling, and tutorial services. The office works closely with the Native American pharmacy program and sponsors several educational programs throughout the year.

Native American Pharmacy Program

The Health Careers Opportunity Program funds a special program at North Dakota State University that is designed to attract and support Native Americans who have an interest in entering the pharmacy field. An extensive preliminary education component provides enrichment in the science and mathematics area for high school and college students during the summer. Additional information is available by calling 231-8205.

International Program Services

The Office of International Programs provides leadership and support services for all aspects of international education at NDSU.

Students and scholars from other countries are welcome at NDSU. The Office of International Programs provides services to assist international students and scholars prior to and after arrival at the University. These services include preparation for arrival, airport pickup, orientation, advising on personal matters, and assistance with immigration legal compliance. Additional information is provided to international students and scholars through newsletters and informational seminars.

Students from the U.S. and other countries may receive assistance in the Office of International Programs with planning experiences abroad. Information is provided to students through group seminars and individual advising. International student I.D. cards, country and program brochures, and travel related information are available to all students.

International activities are also coordinated through the Office of International Programs. The main event each year is International Week, which highlights the advantages of learning about world cultures through displays, lectures, film, food fair, and cultural shows. Students may participate in activities off campus, such as the Tri-College Community Welcome Picnic, Public Schools' Speakers Programs, and a variety of local cultural events.

Information on all matters pertaining to international students and scholars as well as prospective study abroad students is available in Ceres Hall 338, telephone 701-231-7895.

TRIO Programs

Student Support Services, the McNair Scholars Program, and the Veterans ReEntry Program are funded by the U.S. Department of Education and administered by the Division of Student Affairs and the Office of TRIO Programs. The Office of TRIO Programs is in 319 Ceres Hall, telephone 701-231-8028.

Student Support Services

The Student Support Services project provides tutoring, small group instruction, and support services to University students who meet eligibility requirements and are in need of assistance. The instruction and tutoring services are offered on an individualized basis in mathematics, science, English, reading, computer literacy, and study skills as well as some specialized course areas. The purpose is to maximize students' chances of success in their university course work. Funding for Student Support Services is provided through a $305,073 grant from the U.S. Department of Education.

McNair Scholars Program

The McNair Scholars Program is designed to increase the number of professors and doctorally prepared graduates from traditionally under-represented populations. The program provides eligible juniors and seniors with a stipend, counseling, academic enrichment, preparation for graduate school entrance examinations, and opportunities for research under the guidance of university professors. The principal purpose of the program is to increase the rate of graduate enrollment, completion of the doctorate, and attainment of professorial positions for low income and first generation college students and minorities. Funding for the McNair Scholars Program is provided through a $207,599 grant from the U.S. Department of Education.

Veterans ReEntry Program

The Veterans ReEntry Program is an individualized educational program for veterans who want to obtain academic preparation before entering or during postsecondary education. Course work in English, computer literacy, mathematics, and reading is designed to prepare veterans for successful participation in postsecondary education. The program also offers General Education Development (GED) test preparation for veterans lacking a high school diploma. In addition to academic course work, the program provides advising and referral services. Veterans may be eligible to receive educational benefits while attending the program. Funding for the program is provided through a $238,044 grant from the U.S. Department of Education.

Center for Writers

The Center for Writers is an across-the-curriculum writing support program designed to provide opportunities for students, faculty, and staff to improve the quality of their writing. In addition to offering guidance with writing, services include assisting writers with conducting library research and using reference services.

Located in the main library near the reference desk, Center consultants also work closely with reference librarians. Together they offer workshops and seminars for faculty on developing writing assignments and research and writing experiences.

Appointments may be scheduled with Center consultants at any stage of the writing process. Call 231-7927.

Career Center

The Career Center is a comprehensive resource center to assist NDSU students and alumni with their job searches and to connect them with employers. Three distinct programs are provided by the center: Cooperative Education, Career Services, and Part-Time Work. Cooperative Education is a unique program that blends classroom education with hands-on experience through career-related, paid work experiences for academic credit. Career Services facilitates the process of becoming successfully employed by providing services and resources especially essential to seniors preparing to search for a professional job. A representative from Job Service North Dakota is available to help students find part-time work on and off campus throughout the academic year as well as the summer.

The Career Center provides the following:

- Comprehensive home page
- Computer lab with Internet access
- Employer informational meetings
- Internet resumé database for seniors and co-ops
- Job search development advising
  - Interview techniques
  - Job search strategies
  - Professional image
  - Resumé and letters
  - Salary information
- Job Service North Dakota job listings
- Job Trak
- On-campus interviews
- Special career events
  - Engineering Expo
  - North Dakota Education Career Fair
  - Tri-College Career Fair
  - Tri-College Graduate School Day
- Web registration for campus interviews
- Web registration with the Career Center: Bison Student Link

Student Health Service

The C.I. Nelson Student Health Service is the on-campus medical clinic, which provides short-term health care and education. The promotion of wellness for life and academic success for NDSU students is the mission of the Student Health Service.

Funded by a student health and wellness fee, the Student Health Service integrates health promotion, education for prevention of disease, and clinical treatment for illness. Services available are short-term health care provided by a physician and nurse practitioner, routine laboratory procedures, health care referral assistance, pharmaceutical care and consultation, and health education and counseling.

The peer health education program, coordinated by the Student Health Service, educates students to promote wellness and to provide learning opportunities concerning healthy lifestyles. Peer educators reach out to students through various media to encourage healthy choices on issues that impact their lives. Students interested in promoting health and wellness on the campus are encouraged to participate in this program.

Student Activities

Participation in student activities is encouraged at NDSU because of the contribution it makes to the total educational experience of the student. Research has shown that involved students balance their courses while enjoying a greater level of satisfaction during their college years.

All student organizations and involvement opportunities are listed in the "Guide to Student Involvement." This guide is available in the Student Activities Office, 360 Memorial Union.

To help summarize the skills students develop through their campus life involvement, an official document called the Student Involvement Transcript is available. For information contact the Student Activities Office, Memorial Union, 231-7787.

Student Government and Organizations

Student participation in University affairs is coordinated by Student Government. The executive branch is represented by a president and vice president, a commissioner of student organizations, a commissioner of government relations, a commissioner of finance, a commissioner of assistant finance, a commissioner of public relations, a commissioner of academic and student affairs, and an administrative assistant. The Student Senate and the Student Court of Justice comprise the legislative and judicial branches. This government coordinates student-faculty committee appointments, and officially recognizes about 200 semi-autonomous student organizations in various categories: academic, governing and advisory, Greek, honorary, intercultural, leisure learning, military, performing and visual arts, recreational/ competitive, religious, service, special interest, and spirit. Student government also maintains a relationship with councils of independently governed groups (Residence Hall Association, Interfraternity Council, Panhellenic Council, and the Family Student Association).

Student senators also serve on University Senate committees. Other students are appointed by the student body president to joint administrative committees. Official recognition is granted to student organizations upon University acceptance of a recommendation from the Student Senate. Student organizational campus activities are financed by a student activity fee, which is administered primarily through the Student Finance Commission. Additional information may be obtained through the Student Activities Office, 360 Memorial Union.

Honor Societies

Several honor societies are well established at North Dakota State University and encourage superior scholarship in various special fields.

Alpha Epsilon (agricultural engineering)
Alpha Pi Mu (industrial engineering)
Blue Key (student leadership and service)
Eta Kappa Nu (electrical engineering)
Golden Key (student leadership, service, and scholarship)
Libra (sophomore scholarship)
Mortar Board (student leadership and service)
National Residence Hall Honorary (Leadership in Residence Halls)
Order of Omega (Greek leadership and service)
Phi Eta Sigma (freshman scholarship)
Phi Kappa Phi (all academic fields)
Phi Sigma (biology)
Phi Upsilon Omicron (family and consumer sciences)
Pi Kappa Delta (forensics)
Pi Tau Sigma (mechanical engineering)
Psi Chi (psychology)
Rho Chi (pharmacy)
Rho Lambda (leadership in social sororities)
Tau Beta Pi (engineering)
Tau Sigma Delta (architecture)
Tri-College Hugh O'Brian Leadership Club (public service and leadership)

Fraternities and Sororities

Fraternities and sororities, often called Greeks because of the use of Greek letters in their organizational names, contribute to the educational process at NDSU. Greeks encourage participation by members in academic, community service, leadership, and social-oriented activities on campus and in the community. Fraternity and sorority membership provides opportunities for individuals to develop their leadership, communication, conflict resolution, organization, collaboration, and management skills which contributes to one's educational and career plans. In addition, Greek membership fosters an environment for developing life-long friendships. Some fraternities and sororities are geared toward individuals with specific academic interests to promote professional competency and achievement within their specific fields.

Fraternities

Alpha Gamma Rho (agriculture)
Alpha Tau Omega
Delta Upsilon
Farmhouse
Sigma Alpha Epsilon
Sigma Chi
Sigma Nu
Sigma Phi Delta (engineering and architecture)
Tau Kappa Epsilon
Theta Chi

Sororities

Alpha Gamma Delta
Ceres (agriculture interest)
Kappa Alpha Theta
Kappa Delta
Phi Mu

Athletics

North Dakota State University is a member of the North Central Intercollegiate Athletic Conference. National competition is governed by the National Collegiate Athletic Association. Varsity competition for men includes football, cross country, golf, basketball, wrestling, indoor track, outdoor track, and baseball.

Opportunities for women's varsity competition include basketball, cross country, golf, indoor track, outdoor track, soccer, softball, and volleyball.

Excellence is a goal of the University and athletics is no exception. Conference honors are prevalent in the recent history of North Dakota State University, with individuals and teams also earning recognition at the national level.

Campus Recreation/Intramural Sports

The Campus Recreation/Intramural Sports (CR/IM) Department organizes and promotes formal and informal recreational activities for the enjoyment of all NDSU students, faculty, and staff. The goal of the department is to provide a wide array of opportunities utilizing University recreational facilities. In addition to the informal open recreation program with facilities open over 20 hours per week, a comprehensive intramural sports program is provided.

Special Programs

The Scholars Program

The Scholars Program is an individualized four-year program designed for students of exceptional academic and/or creative abilities. The program consists of 18 credit hours in colloquia and the completion of a senior project. The program is offered concurrently with a student's major, which may be in any discipline available at NDSU.

First-Year Colloquium

English 111, 121
Honors Composition I, II 6
Interdisciplinary investigation of conflicting values.

Second-Year Colloquium

An interdisciplinary course each semester 6
Interdisciplinary exploration of topics such as the perspective of world literature on the human condition, problems of world hunger, environmental issues, spatial conflicts, and the use of narrative in various disciplines.

Third-Year Colloquium

Humanities/Philosophy 498H
The Nature of Human Nature 6
Examination of changing views on human nature from the perspectives of diverse disciplines. Student/faculty-led discussions.

Fourth-Year Independent Study and/or Tutorials

Reading, writing, and/or work experience culminating in a senior project r - 4
For admission to the program, write to The Scholars Program, College of Arts, Humanities, and Social Sciences, 221 Minard Hall.

Cooperative Education Program

The Cooperative Education Program offers both undergraduate and graduate students a unique opportunity to integrate career, social, and personal development into the educational process. The Co-op Program is designed for students to integrate classroom study with paid professional work experiences related to their field of study. These experiences increase in complexity as the student's academic background in a given field increases.

The program offers several specific benefits to students. It provides those who have made up their minds an opportunity to obtain pre-graduation experience in their chosen careers, and those who have not, an opportunity to explore several career possibilities. It provides all participants a chance to earn money for their education and credit toward an academic degree with related work experience. And finally, it substantially improves students' opportunities for employment after graduation.

The Co-op Program option is available in most departments on the North Dakota State University campus. Freshmen may begin their career development process by enrolling in the Co-op Program. Generally, students begin their work experience in the sophomore or junior year, although seniors and graduate students can also be placed. Students may undertake either part- or full-time work experiences. All work experiences are at least one semester in length. Work experiences are available both during the academic year and the summer. A student's work may be with a single employer or it may be with different employers; increasing complexity is the critical principle. Salaries for these work experiences vary with the field of work, the complexity of the job, and location of the employer.

Cooperative Education placements generate academic credits on the student's transcript for the semester of placement. These credits document the student's "enriched degree." Credits vary from 1-3 credits per semester. The amount of co-op credit awarded for a given work experience is based on the amount of time spent in the placement. Co-op credit is granted through Continuing Education and awarded directly by the Co-op Program. Students must make their credit arrangements with the Co-op Program prior to each placement.

The North Dakota State University Co-op Program office is located in 306 Ceres Hall. Students interested in entering or learning more about the program should visit the office or call 231-8936.

Global Studies

The Office of International Programs (OIP) facilitates international educational opportunities for students, staff, and faculty. Exchange agreements are coordinated between North Dakota State University and foreign universities offering opportunities for international study, teaching, or research for the campus community through the OIP.

International Studies Major

The international studies major is a program of study that is offered concurrently with a student's primary major. 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 27 credits of course work including an integrative 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. The required 12-credit core consists of Geography 110, Political Science 140, Anthropology 111, 206, or 450, and History 140 or 141. Nine credits of electives are required and will be chosen with the help of the student's adviser. An integrative senior project that ties international study to the primary degree is also 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 Norwegian, Russian, 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.

Experience abroad. An important part of the international studies major is participation in a study, work, or research experience abroad for at least 10 weeks in duration. Assistance with finding an overseas study program is available in the Office of International Programs.

Selective admission. To be eligible to participate in the international studies major, students must have sophomore standing with a minimum grade-point average of 2.5. Eligible students must also 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 is available through the department of a student's academic major, the college International Studies adviser, the Department of Modern Languages, and the Office of International Programs.

Study Abroad

Experience abroad can provide an invaluable education for students. Studying, working, or traveling abroad offers many benefits, such as increasing cultural awareness, improving language skills, and developing an in-depth knowledge in a particular field from an international perspective. International experience offers career advantages because employers increasingly seek to hire individuals who have multinational and multicultural perspectives and experience.

North Dakota State University currently has exchange programs with universities in Canada, France, Germany, Mexico, The Netherlands, Sweden, and is developing exchange programs in other countries. For these programs, no overseas tuition is charged. Students pay regular NDSU campus tuition and fees.

North Dakota State University is also a member of the International Student Exchange Program (ISEP). The ISEP organization offers programs in more than 100 sites around the world, including Africa, Asia, Australia, Canada, Europe, and Latin America.

Students may also take advantage of numerous programs offered through The American Institute of Foreign Study (AIFS), national organizations, consortia, and other universities. Information about the variety of programs abroad is available in the Office of International Programs, 338 Ceres Hall, 701-231-7895, or e-mail (nuin@plains.nodak.edu).

Reserve Officers Training Corps (ROTC) Program

The Reserve Officers Training Corps program at NDSU is voluntary and is open to both male and female students. The program consists of Army and Air Force ROTC. The activities are conducted under separate Departments of Military Science and Aerospace Studies. Students may elect either Army or Air Force ROTC.

The first two years of the regular four-year course of ROTC at NDSU are designated as the Basic Course for Army ROTC and General Military Course for Air Force ROTC. Students participating in the basic or general course incur no military obligation or commitment.

The last two years of Army ROTC are designated as the Advanced Course. The last two years of Air Force ROTC are designated as the Professional Officer Course (POC). Qualified students may apply for and be accepted in either of these courses with a commission as Second Lieutenant in the United States Army or Air Force as the objective. The Army ROTC program also offers commissions in the Army National Guard or Reserves.

To be eligible for consideration and admission to the Advanced or Professional Officer Course, a student must be (1) a citizen of the United States, (2) of good moral character, (3) have completed either the Basic or General Military Course or the six-week basic summer training period or have received credit in lieu thereof, (4) have successfully completed the prescribed physical examinations and (5) be able to complete all requirements for a commission prior to age 30.

Students selected for admission to the Advanced or Professional Officer Course are required to sign a written agreement to fulfill certain conditions required by law and service regulations. Students so enrolled are required to attend a four-or five-week summer training period. These students earn monthly pay plus travel expenses while attending summer training.

Military uniforms, textbooks, and equipment are furnished without charge to all ROTC students. Advanced students receive a tax-free government subsistence up to $1,500 for each academic year that they are enrolled in the advanced ROTC program.

ROTC two-, three-, and four-year scholarships may be awarded to students who meet established criteria. Each scholarship provides for tuition, fees, help toward the purchase of textbooks and supplies in addition to the $1,500 subsistence for each academic year that the scholarship is in effect.

For a description of Army and Air Force ROTC courses, see the departmental course listings under Aerospace Studies and Military Science.

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 $25 application fee.

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 pay all tuition and fees and complete all assignments and tests.

Students should identify themselves as participants in the Project 65 program at the time of registration. For more information, contact the Office of the Registrar, 231-7981.

Summer Session

The 12-week summer session is organized to provide course work within various time intervals. The standard four-week session begins in May; the standard eight-week session begins in June. There are also other variations, thus providing maximum flexibility to summer students.

Summer offerings are determined by each college based upon previous experience, special requests, or planned new programs. Such offerings include agriculture, business administration, the arts and humanities, the social sciences, the biological and physical sciences, engineering, human development, education, and pharmacy. A special effort is made to offer courses approved for fulfilling general education requirements.

A schedule of the summer session course offerings is issued each February and may be obtained by writing to the Office of the Registrar, P.O. Box 5196, Fargo, ND 58105. It is also on our website at http://www.ndsu.nodak.edu/ndsu/academic/.

Fees and Housing

Fees are listed in the summer schedule.

Information concerning housing may be secured by writing to the Department of Residence Life, P.O. Box 5481, Fargo, ND 58105.

Undergraduate Admission Requirements

The course offerings of the summer school are open to all qualified students.

Students may enroll as degree candidates by meeting general University requirements as described elsewhere in this bulletin and submitting an application for admission to the Office of Admission. Students attending another institution but wishing to enroll for summer school at the University may apply for transient status by submitting a regular application for admission, a $25 nonrefundable application fee, and a letter of good standing or an official transcript from their home institution.

Credit for Courses

While the time interval of the individual sessions is different than that of the normal semester, each course carries full credit because classes meet the same number of hours as in the standard semester.

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 is 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 is facilitated during summers.

Many courses and programs are available during summers for those majoring in teacher education. 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 are urged to contact the Graduate School for further information.

Continuing Education

Continuing Education is an outreach unit of the University that makes the resources of the institution available in a variety of ways, including distance-based education. Courses, locations, and delivery systems are planned in response to requests and identified needs. Continuing Education activities fall into three main categories: on- and off-campus credit courses, non-credit activities, and learning opportunities mediated via technology.

Admission to NDSU is not required to enroll in Continuing Education courses, and enrollment in Continuing Education courses does not ensure admission to NDSU. Those interested in pursuing degrees must complete application procedures through the Office of Admission or the Graduate School.

Credit Courses

Continuing Education offers regular credit courses on campus as a means to supplement tuition-based offerings. These include developmental courses that are prerequisites for other courses as well as those that apply to programs of study.

Off-campus credit courses are regular or special courses offered by NDSU units at off-campus locations. Courses are usually established at the request of those who have special interests or educational needs. Students must consult with their advisers in advance to determine if specific courses will apply to their programs of study. There are no limits on the number of credits earned through Continuing Education that may be applied to a degree program.

Non-Credit Activities

Continuing Education offers a wide range of workshops, conferences, and inservice activities. These educational experiences vary in length from an hour, to a day, to periodic meetings distributed over several months. Continuing Education arranges transportation, housing, and physical facilities; contracts speakers and banquet facilities; and provides financial management and other special services.

The purpose of these functions is to provide needed and appropriate educational services. In some cases, Continuing Education Units (CEUs) may be earned for these activities.

Distance and Technology-Enhanced Learning

Continuing Education uses an array of distance delivery systems both for credit and non-credit courses and activities. Delivery systems include satellite, the North Dakota Interactive Video Network (ND IVN), Worldwide Web and Internet, video- and print-based individual study, videoconferencing, and combinations of these technologies.

In addition to bridging geographic limitations, some technologies allow students to complete work on their own any time, any place. Other technologies facilitate synchronous work at a distance.

Continuing Education Fees

Students enrolled in Continuing Education courses may expect to pay course fees similar to normal resident tuition. Fees may be less if grants or other external funds are available. In cases where delivery costs are higher, or for specialized programs, fees may be higher. Continuing Education reserves the right to adjust course fees as needed without prior notice. Courses offered through Continuing Education generally count toward credit totals for financial aid but not toward the NDSU tuition cap.

For further information, contact the Division of Continuing Education, 209 Engineering Technology Building, Fargo, ND 58105-5819, phone 701-231-7015, fax 701-231-7016, or http://www.ndsu.nodak.edu/conted.

Tri-College University

Tri-College University (TCU) is a consortium of the three major Fargo-Moorhead institutions of higher education: NDSU, Concordia College, and Minnesota State University Moorhead. Through the consortium, students at the three schools may benefit from what each school offers individually, plus many new and interesting options.

The Tri-College Course Exchange

Through the Tri-College course exchange, students at one campus may take courses at the other two at no extra cost and without going through separate admission procedures. Tuition is paid only to the home campus. Courses offered through Continuing Education, those that require special fees or enrollment procedures, and most workshops are not available through the Tri-College exchange.

Course limits. Concordia students—and MSUM or NDSU students wanting to take a course at Concordia—may take only one course per term under the student course exchange, and then only if they are full-time students and if that course is not available on their home campus at any time.

Grades. Grades received in TCU courses count on the student's home campus grade-point average.

Credits. Credits earned count in the same way toward graduation requirements as they would if they were taken at the student's home campus.

Course substitutions. To substitute TCU courses for required courses in the student's major or minor requires special approval in advance.

Drop/add deadlines. The deadlines of the student's home campus are followed to drop or add a course or to take a course pass/fail, regardless of the TCU institution at which the class is taken.

Registration procedures. Students register for TCU courses on their home campus and pay their home-campus tuition and fees. (The ALFI system at NDSU does not accept Tri-College registration. NDSU students register in person in 110 Ceres Hall.)

Tri-College Minors

The Tri-College schools recognize minors earned through the TCU course exchange. This means students can receive recognition on their graduation transcripts for minors completed on one of the other TCU campuses. This policy applies only to minors earned in programs not available on a student's home campus.

Majors

Majors may be earned only at the school from which a student graduates. Most students enroll initially at the school from which they intend to graduate, but the TCU course exchange agreement between MSUM and NDSU makes it possible for students to enroll at one of these schools for two or three years while pursuing a major they will complete after transferring to the other school. Students should work with the chair of the department in which they intend to major to make sure their program includes all requirements for the major and for graduation. Students may apply for tuition reciprocity prior to transferring from their home state.

Covered programs available to NDSU students at MSUM (related to MSUM/NDSU degree programs available only at one of the two campuses):

American Studies
Art (ceramics, graphics and design, print making, sculpture)
Criminal Justice
Education (elementary, health, and special)
Graphic Communications
Music (stringed instruments)
Philosophy
Social Work
Speech, Language, and Hearing Sciences
Technology

Educational Leadership Graduate Program

The staff in the field of educational leadership is an integral part of the Tri-College University. Programs meet certification requirements in the various areas appropriate to elementary and secondary administration.

Professional titles, levels, and specialties available include the following: superintendent, assistant superintendent, senior high school principal, junior high school principal, elementary school principal, community education director, or special education director. Application forms and information regarding TCU educational leadership and other offerings may be secured from the chair of the TCU Educational Leadership Program, 209 Engineering Technology Building, NDSU, Fargo, ND 58105; telephone 701-231-9732.

Library Services

Through TCU, students and faculty at each member institution have direct access to the resources of all three college libraries. Students and faculty may visit any of the three libraries and check out materials, but they may also have materials delivered to their home campus from the other two libraries on a twice-daily shuttle.

Among the many joint services offered by the three libraries are a computer-based Tri-College Union List of Serials and the Tri-College Catalog. In addition, the TCU library system is part of the Project for Automated Library Services (PALS). This connects to more than 100 libraries in the region. The on-line data base is displayed on computer terminals in each TCU library.

Bus and Parking Services

A Tri-College bus schedule provides intercampus transportation to Concordia, MSUM, and NDSU every half hour. The bus is operated weekdays by the City of Fargo during the NDSU/MSUM academic year; it does not operate summers. Bus schedules are available at the TCU office and at several locations on each campus.

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

At Concordia: Parking Lot C for students, faculty, and staff.

At MSUM: Parking Lots N, O, P, and K for students; parking Lot C for faculty and staff.

All drivers are subject to traffic regulations of the respective institutions. Lot restrictions are eased after 5:00 p.m., but there is no overnight parking.

Academic Policies

Degrees at both the undergraduate and graduate levels are offered at North Dakota State University. For the various programs of study leading toward baccalaureate degrees, consult the college sections.

Graduate degree requirements and fields of study are summarized in the Graduate School section of this bulletin. More comprehensive information is published separately in the Graduate Bulletin.

Baccalaureate Degree Requirements

To receive a baccalaureate degree from NDSU, a student must complete all of the requirements listed in this section as well as those specified for the particular degree by a college within the University. Consult the appropriate section of this bulletin for further degree requirements.

Degree candidates must satisfactorily complete one of the degree curricula offered at NDSU. Because curricula are frequently updated, students are responsible for determining curricular expectations according to the following guidelines:

1. Intended degrees, majors, and minors must be declared to become official by providing notice to the Office of Student Academic Affairs, 110 Ceres Hall.

2. Students may follow any published curricula from the year of entrance at NDSU or from the year of admission to a limited-enrollment program, whichever applies, to the year of graduation provided enrollment at NDSU has not been discontinued for more than one year.

3. Students who change their majors, minors, or type of degree are subject to meeting the requirements in effect during the year in which the new curriculum was entered. Students may follow any published curricula from the year the new curriculum was entered to the year of graduation provided enrollment at NDSU has not been discontinued for more than one year.

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

Each program of study presented by a candidate for the baccalaureate degree is audited for meeting the degree requirements by the Office of Student Academic Affairs. Degree candidates are certified by the Office of the Registrar according to total credits earned, cumulative grade-point average, and other University-wide requirements.

General Education Program

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

Intended Student Outcomes

The intended student outcomes resulting from general education include the following abilities:

1. Communicate effectively in a variety of contexts and formats.

2. Locate and use information for making appropriate personal and professional decisions.

3. Comprehend the concepts and perspectives needed to function in national and international societies.

4. Comprehend intrapersonal and interpersonal dynamics.

5. Comprehend concepts and methods of inquiry in science and technology, and their applications for society.

6. Integrate knowledge and ideas in a coherent and meaningful manner.

7. Comprehend the need for lifelong learning.

General Education Requirements*

The following requirements apply to all undergraduate students who enter NDSU.

Credits

First-Year Experience Course 1
Required of all entering freshmen and new students who transfer fewer than 24 semester credits to NDSU.

Category 1: Communication 9
Comm 110, Fund. of Public Speaking or equivalent . . . . . .(3)
Engl 110, College Composition I . . .(3)
Engl 120, College Composition II or equivalent . . . . . .(3)

Category 2: Quantitative Reasoning 3
CSci, Programming, e.g., BASIC, COBOL
Math 104, Finite Math or 146 or higher
Stat 330, Intro. Statistics or higher

Category 3: Science and Technology . . .10
• Courses in the areas of the natural sciences, the physical sciences, and technology are included in this category.

• A minimum of 4 general education credits must be in natural or physical sciences.

• A one-credit laboratory course must be taken as a corequisite with one of the general education science and technology courses.

Category 4: Humanities and Fine Arts . . . 6
• No more than 3 of the 6 credits may be in fine arts performance.

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

Category 5: Social and Behavioral Sciences 6

Category 6: Wellness 2
Required is a 2-credit course focused on wellness that integrates at least two of the four following areas of lifelong wellness: emotional well-being, nutrition, physical activity, and psychological development.

REQUIREMENTS WITH NO ADDITIONAL CREDITS:

Category 7: Cultural Diversity
This requirement may be met by 3 credits taken as part of the 6 credits required in the humanities and fine arts or as part of the 6 credits required in the social and behavioral sciences in a course approved for cultural diversity.

Category 8: Global Perspectives
This requirement may be met by 3 credits taken in any department as part of the 36-37 credits required for general education approved for global perspectives.

Category 9: Computer Usage Integrated in All majors

Category 10: Communication Activities in Upper-Division Major Courses

Category 11: Comprehension of Personal and Professional Ethics Integrated into Majors

Category 12: Capstone Experience in All Majors

Total 36-37

* Only courses approved by the University Senate Standing Committee on General Education and by the University Senate may be used to fulfill category requirements. Approved courses are listed in the appendix to this Bulletin and in the Registration Schedule each term.

General Education Category Descriptions

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

Communication is the clear, precise, and purposeful exchange of information in a variety of contexts, using either written or oral means.

Cultural diversity focuses on the social, personal, and interpersonal effects of variety and differences among cultures.

Fine arts, as an integral component of the humanities, promote the appreciation of aesthetics and the expression of creativity.

Global perspectives focus on analysis of worldwide issues illustrating the interdependence of the world and its people.

Humanities systematically explore cultural and intellectual forces shaping events, individual expression, and social values.

Quantitative reasoning 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 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 use scientific methods to analyze the behaviors, structures, and processes of individuals and groups.

Technology is the systematic application of scientific knowledge to solve problems.

Wellness 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 Administrative Policies

1. General education courses may be used to satisfy requirements for both general education requirements and the major, minor, and program emphases. No more than two courses from any given department may be double counted in a curriculum.

2. Departments or colleges may preclude their students from double counting general education courses.

3. Department or college requirements for graduation may exceed the minimum general education requirements.

4. Except for courses that meet the cultural diversity or global perspectives requirements, no course can fulfill the requirements for more than one general education category.

5. General education requirements can be met through the College Level Examination Program (CLEP), departmental examinations, the Advanced Placement Program (AP) of the College Entrance Examination Board, or equivalents. A student who passes the CLEP examinations in both the physical and biological sciences shall be considered to have fulfilled the laboratory requirement.

6. General education requirements can be met by successful completion of a course for which an approved general education course in the same department is a prerequisite or by successful completion of a course which students with advanced standing in a department may substitute for an approved general education course in that department.

7. No general education course may be taken for graduate credit.

8. Except for courses offered only on a pass/fail basis, no courses taken to meet the general education requirements may be taken for pass/fail grades.

9. The general education minimum requirements apply to all undergraduate degree programs as well as the professional degree program in pharmacy.

10. Transfer students meet NDSU's general education "College Composition I and/or College Composition II" requirement in the Communication category if they have credit in any English course (in composition, composition and literature, or the equivalent) totaling at least 2.67 semester credits per course. 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. The total for all general education categories must be at least 36 semester credits.

11. A student who has completed a general education program consisting of a minimum of 36 credits at an accredited institution and who transfers to NDSU or who pursues a second degree at NDSU is considered to have completed his or her general education requirements at NDSU.

12. General education courses at other accredited institutions, which do not have equivalent courses at NDSU, may be accepted in transfer as part of the general education requirements at NDSU.

General Education Transfer

Students transferring 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 general education requirements by transfer credits may not necessarily prepare students for advanced, upper-division study in an academic major at NDSU.

North Dakota University System Transfer Agreement

The North Dakota University System (NDUS) General Education Requirements Transfer Agreement (GERTA) was established by the State Board of Higher Education to ease student transfers within the System. Although subject to revision by the Board, the policies at the time of printing were the following:

1. If students have completed the 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.

2. If the 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.

Graduation Requirements

In fulfilling graduation requirements, there are two sets of requirements to meet: university-wide requirements, which include the general education requirements and which all students must complete, and college-level requirements, which include requirements for completing majors and minors. College-level and department-level requirements for majors and minors are listed in the Colleges section of this bulletin under the appropriate college listing.

1. **Academic major:** Satisfactorily complete all requirements of the curriculum in which one is enrolled and earn a minimum total of 122 credits in approved course work. Students should be aware that requirements for some academic majors exceed this minimum.

2. **General education requirements:** Satisfactorily complete the general education requirements as specified earlier in this section. General education requirements are an integral part of the program requirements.

3. **Scholastic standing:** A minimum cumulative grade-point average of 2.00 based on work taken at NDSU for which grades have been assigned is required for graduation. When a course is taken and repeated at NDSU, only the last grade and credits acquired will be used in computing the cumulative grade-point average; however, all attempts appear on the transcript. Students should be aware that some academic programs include more specific grade-point requirements for program components or special credentials.

4. **Upper-level credit requirements:** At least 37 of the credits presented for graduation must be in courses at the 300 and 400 level.

5. **Residence requirements and transfer credits:** Resident credits include credits registered and paid for at NDSU while attending courses offered on campus, in Tri-College, or via network telecommunication sessions. Subject to approval by the college and department in which the student is majoring, credits earned through designated programs (e.g., field trips, internships, coop education, study abroad, and capstone or exchange programs) sponsored by NDSU or originating from the NDSU campus may be accepted for all or part of the resident credit. Ordinarily, the last 30 credits must be resident credits.

A transfer student must earn a minimum of 60 semester credits from a four-year institution. Of these, at least 36 must be NDSU resident credits. Within these 36 semester credits, minimum requirements include 15 semester credits in courses numbered 300 or above and 15 semester credits in the major field of study.

Students regularly enrolled in the University will not be allowed credit toward graduation for correspondence courses taken simultaneously with resident study on the campus without the approval of the respective college dean and the University Registrar.

6. **Financial obligations:** Satisfy all financial obligations owed to the University.

7. **Application for degree audit:** Students will be sent a Graduation Audit Request postcard from the Student Academic Affairs office. Postcards will be mailed according to total degree credit requirements. Students should complete and return the card according to the following guidelines.

- For 122-150 total credits, file after completing 75 credits.
- For 151-165 total credits, file after completing 95 credits.
- For 216-229 total credits, file after completing 120 credits.

Students will be sent audits through the mail listing the requirements remaining for completion of the degree requested.

8. **Application for degree:** All candidates for a baccalaureate degree must indicate their intent to graduate during registration for their last semester. The application forms are available in the Office of the Registrar, 110 Ceres.

Failure to apply by the third week 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 in time for a planned graduation, the student must reapply for the next graduation.

Students are also responsible for submitting any name and address corrections for diploma processing.

Majors and Minors

Majors and minors are integral parts of baccalaureate degree curricula, particularly of those curricula that are largely elective.

Major: A major is a planned grouping of related courses that totals a minimum of 24 credits.

Specific curriculum requirements for majors may be acquired from the appropriate departmental office.

Minor: A minor is a similar grouping of courses that totals a minimum of 16 credits. Students must have their minor(s) verified. Verification forms are available in 110 Ceres. Completed forms must be signed by the appropriate department chair and submitted to 110 Ceres at the time of degree application.

Baccalaureate Degrees

A degree is the title that the University confers on a graduate who has completed university requirements for that degree. NDSU confers the following degrees at the undergraduate level:
Bachelor of Accountancy (B.Acc.)
Bachelor of Architecture (B.Arch.)
Bachelor of Arts (B.A.)
Bachelor of Fine Arts (B.F.A.)
Bachelor of Landscape Architecture (B.L.A.)
Bachelor of Science (B.S.)
Bachelor of Science in Nursing (B.S.N.)
Bachelor of University Studies (B.U.S.)

Second Degree

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

1. All curriculum requirements are satisfactorily completed.

2. A 30-credit minimum is earned in residence beyond all of the credits and degree requirements for the first baccalaureate degree. All requirements for both degrees must be met, including the separate residency requirements at NDSU for each (36 for the first; 30 for the second). Any repeated courses do not count toward the 30 credits. Each degree program must be approved by the appropriate department chair.

3. Each degree must be different, with one exception. More than one Bachelor of Science degree may be earned in different specified fields in engineering.

Exceptions to Degree Requirements

Academic policies and requirements are designed to ensure that programs at NDSU are consistently of high quality. All University requirements prescribed by the University Senate must be met. Students may request substitutions or waivers for college or departmental requirements when extenuating circumstances prevail.

Students should initiate requests with the Office of Student Academic Affairs. Reasons for the request along with supporting evidence must be provided in conjunction with the request. In cases where deviation from the requirements might affect the student's eligibility to enroll in a particular course, the student should begin the process early during the previous term to ensure timely processing.

Graduation with Honor

Graduation with honor applies only to the baccalaureate degree. Graduate courses will not be included in the computation. Candidates who entered NDSU as a freshman and who have earned a minimum cumulative grade-point average of 3.60 through all terms will be graduated "with honor." Candidates with transfer credits must meet the minimum cumulative grade-point average of 3.60 for all credits earned at NDSU, as well as a cumulative grade-point average of 3.60 for all credits earned including those from transfer work. All grades including those of WF and all attempts of repeated courses will be included in grade-point average calculations for graduating with honor.

Commencement

Commencement exercises are held twice a year at the close of the fall and the spring semesters. Students who completed graduation requirements during the preceding summer are eligible to participate in the December commencement exercises with the fall graduates. All graduate students must have completed all requirements by the deadlines specified by the Graduate School to participate in commencement exercises.

An undergraduate student may participate in the May commencement exercises if that student is registered to complete all graduation requirements by the end of the summer session following the May commencement. Individual colleges may set more stringent requirements.

A student may participate in commencement only once for a particular degree. The date of graduation on the diploma will comply with the actual completion date of the degree.

Reservations for commencement must be made by the date specified by the Registrar's Office. Orders for caps, gowns, and hoods must be made by the date specified by the Varsity Mart.

Diplomas

Diplomas are issued following each term and are mailed six to eight weeks following the close of the academic session in which graduation requirements have been completed. Diplomas or official transcripts will not be released for students who have outstanding debts owed to the University.

Academic Planning and Enrollment

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

Academic Year

NDSU operates on a semester system consisting of fall and spring semesters and a summer session. The 12-week summer session is arranged into condensed periods of standard 4-week and 8-week courses, as well as special short-term offerings; however, the total class hours are the same as the regular semesters.

Academic Credit

A credit is a unit used to compute the amount of work required for graduation. One semester credit is equivalent to one lecture period (50 minutes) in class per week for one semester. On an average, students should expect to spend two hours of study or preparation for each hour spent in class. In the case of laboratories, a minimum of two 50-minute periods per week for one semester is equivalent to one credit. Most workshops require one and one-half hours per week for one semester for one credit. Preparation time varies for laboratories and workshops.

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.

The Office of Student Academic Affairs operates as the centralized support center for academic advising on campus. Each of the colleges on campus has a designated staff member in Student Academic Affairs as a liaison to support and facilitate faculty advising activities.

Following admission to NDSU, each student is assigned an adviser who is usually a faculty member in the department in which the student is majoring. If a major has not been declared, an assignment is made with a faculty member who serves as an adviser for the College of University Studies. An adviser assists a student in selecting courses to ensure a well-balanced education and helps interpret University and college policies and requirements. However, students are fully responsible for their academic decisions including selecting courses, meeting prerequisites, and adhering to policies, procedures, and deadlines.

Because of the diverse student population at NDSU, other advisory services are provided to meet special needs. Refer to the section on Student Life for descriptions of additional services.

Classification of Students

Students are classified according to the progress made toward the completion of the requirements of the curriculum in which they are registered.

Classification	Completed Credits
Freshman	fewer than 27
Sophomore	27 - 59
Junior	60 - 89
Senior	90 or more

Undergraduate special student: One who is seeking continuing education credits or has not completed the formal application process for admission.

Unclassified student: One who holds a baccalaureate degree from an accredited institution and is seeking graduate credits for personal growth and improvement of skills and has declared that he or she is not working toward an advanced degree.

Full graduate standing: One who holds a baccalaureate degree from any institution of recognized standing, and who has been admitted by the Graduate School to a graduate program of 30 credits or more.

Conditional graduate status: One who holds a baccalaureate degree, but does not meet one or more requirements for admission or has deficiencies in prerequisite course work.

Provisional graduate status: One who holds a baccalaureate degree, but does not meet requirements for full graduate standing. Provisions stated must be removed according to Graduate School guidelines.

Note: Unclassified and special students may not represent the University in any extracurricular activities nor join any student organization to which co-curricular eligibility rules apply.

Eligibility for Co-Curricular Activities

Unless granted special permission by the Vice President for Student Affairs, students must fulfill the following to be eligible to participate in any public program or public contest: satisfy entrance requirements, be classified, be registered for and successfully carrying at least 12 college credits during the current semester, and have earned at least 12 college credits in residence during the semester of last previous attendance.

Student Credit Load

The standard credit load for undergraduate students is 15-18 hours per semester during the regular academic year. A minimum of 12 credits per semester is required to be considered a full-time undergraduate student (graduate students, 9 credits). Students are limited to 20 credits per semester (summer session, 15 credits). Exceptions are granted in some cases. Students who find it necessary to enroll for more than the credit limit must have an NDSU minimum cumulative grade-point average of 2.5 to be eligible to petition for an overload. Petition forms are available in the Office of the Registrar.

Registration

Registration is required of all who attend classes. Dates for advising and registration are published each semester in the "Registration Schedule." Other sources of information include the annual "NDSU Dates and Deadlines" pocket calendar and "The Spectrum," published weekly when full semester classes are in session.

ALFI. Registration is one of several features of a computerized system known as ALFI (Access Line for Information). Once enrolled, students may enter ALFI from anywhere by Touchtone telephone or from campus computers with the ALFI icon. Some features, such as registration, are only available at certain times. ALFI informs students when a feature is not available. Instructions for using ALFI are printed in the "Registration Schedule" each term.

On-site. On-site registration is provided for students who are unable to or choose not to use the ALFI system. Refer to the appropriate "Registration Schedule" for information on locations and dates.

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

Currently enrolled students: Registration usually begins during the eleventh week of each semester. Registration for summer session should be completed during the previous spring at the same time as registration for fall semester. The advising period begins one week prior to registration. Copies of the "Registration Schedule" are distributed in the Memorial Union a few days before advising week begins and are available in the Registrar's Office thereafter.

Students must see their adviser before they register. Those who do not may have an adviser hold placed on their records; thereby preventing registration. Currently enrolled students are assigned to register via ALFI according to total credits earned.

Information about the earliest time to register is available through ALFI. Consult the "Registration Schedule" for details.

Returning students: At the close of the ALFI registration time periods for currently enrolled students (approximately December 1 and May 1), start dates and times begin for returning students upon request. Registration materials will be mailed as soon as they are available following notice of intent to re-enter NDSU.

New students: Detailed information regarding registration along with the opportunity to get a head start through the orientation program will be sent to new students from the Office of Project Success.

Academic Regulations

All students are expected to comply with the various academic procedures and deadlines.

Changes in Registration

Students who use ALFI to register may process their schedule changes via ALFI through the seventh business day of the semester. (For the summer session, the time is reduced proportionately.) Refer to the "Registration Schedule" for each semester and the relevant Summer Registration Schedule for specific dates and procedures.

As of the eighth business day of the semester, all schedule changes must be made by completing a "Request for Change of Registration" form. Students must acquire the necessary signatures and submit the form along with any other required forms to the Registrar's Office. Forms are available in departmental offices of advisers and in 110 Ceres Hall.

Adding Courses/Sections

Students may add courses to their schedules during the first 15 days from the start date of the semester. (For the summer session the time is reduced proportionately. Consult the Summer Registration Schedule for specific times related to the various offerings.)

As of the eighth business day of the semester, an authorized "Class Permit" for each course to be added must be acquired from the department offering the course and submitted to the Registrar's Office along with a completed "Request for Change of Registration" form.

Dropping Courses/Sections

No-record drops. Through the first 30 business days from the semester start date, students may drop without penalty a course from their schedule. As of the eighth business day of the semester, submit a completed "Request for Change of Registration" form to the Registrar's Office. (Consult the Summer Registration Schedule for summer deadlines.)

WF/WP drops. Students may continue to drop courses after the no-record drop deadline. The difference, however, is that WF (drop-failing) will appear on the record unless the student is (a) passing the course and (b) requests a status review at the time the "Request for Change of Registration" form is submitted at the Registrar's Office. WP (drop-passing) will be placed on the record if the instructor confirms that the student was passing at the time the drop was submitted.

The last date to drop courses during a regular semester is ten business days prior to the first day of final examinations. For summer courses the time is reduced proportionately.

WF does not affect a student's grade-point average, although it remains on the academic record and is used in computing graduation with honor.

Any questionable issues should be resolved as soon as possible, but no later than the seventh week of the following semester.

Auditing Courses

An auditor may attend classes only as a listener, without privilege of 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. A student cannot fail an audit; however, an instructor may assign a "W" (withdrawn) for non-attendance.

Students may drop a regularly registered course and add it as an audit course by submitting a "Class Permit" and processing a "Request for Change of Registration" form no later than the end of the third week from the semester start date. Consult the Summer Registration Schedule for summer session dates.

Once the audit registration is processed, the decision cannot be reversed. An audit fee is one-half of the regular tuition rate.

Instructor's Drop Policy

At the end of the first week of lecture classes or following the first meeting of laboratory classes, an instructor has the option to submit a list of students who have neither attended nor notified the instructor. Administrative course drops will be processed by the Office of the Registrar for all students named on lists received. Since this is an optional procedure for instructors, students are strongly advised to process a "Request for Change of Registration" form to be assured of being dropped from the course and to avoid receiving a grade of "F" at the end of the term.

Cancellation of Registration

Students who register and then find it impossible to attend NDSU before the semester start date must cancel their registration by writing PO Box 5196, NDSU, Fargo, ND 58105 or stopping in the Registrar's Office, 110 Ceres. A telephone call is not sufficient. Further, it is not possible to cancel registration or to drop an only or last course by ALFI.

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 for refund deadlines.

Procedures to withdraw from all courses and leave the University include the following:

1. Read and complete the brochure entitled "Withdrawing to Zero Credits."

2. Consult with an NDSU staff counselor for assistance in addressing academic, personal, financial, or other concerns.

3. Withdrawals are processed at the Business Office, 101 Old Main, from 8:15 a.m. to 3:30 p.m. on regular working days. Continuing Education courses (including Co-op) must be processed in 209 Engineering Technology.

4. Students are responsible for any unpaid bills at the time of withdrawal.

5. The deadline for withdrawals is the tenth business day prior to the first day of final examinations. Withdrawals after this date will not be processed without evidence of a compelling reason or circumstances beyond the student's control.

Evaluation of Transfer Credit

A student who is admitted as a transfer from another college or university is required to have a minimum 2.00 cumulative grade-point average for all transferable work taken elsewhere. If, due to special circumstances, a student is admitted with less than a 2.00 average, that student will be admitted on academic probation, and transferable course work will be assessed

according to level of performance. These requirements apply to returning students who have attended other institutions, as well as new transfer students.

The Office of the Registrar administers the NDSU policies governing the acceptance of credit from outside institutions. Before credits may be evaluated for specific NDSU course equivalency or application to departmental programs, transfer courses must be accepted for University credit according to the following guidelines:

1. In general, all college-level credits from regionally accredited colleges or universities will be accepted for transfer. However, transfer credit is generally not accepted for vocational, technical, or non-college-level course work. For example, credit for a course is not accepted for transfer if the course is either remedial by definition of the transferring institution or if it is equivalent to a remedial course taught at NDSU. Technical or vocational credits are usually not accepted in transfer; however, in some circumstances and within limitations, "block" credits may be accepted rather than individual courses.

2. Credit will be evaluated not only as it appears on the transcript, but also on the basis by which the credit was initially awarded by the sending institution; for example, credit by examination or life experience is not accepted for transfer.

3. The Office of Student Academic Affairs determines the applicability of transfer credit toward NDSU general education requirements according to North Dakota University System guidelines, where applicable.

4. College-level credits that do not have a course equivalent at NDSU will be accepted, but may count only toward total credits. The academic department will determine whether these transfer electives satisfy specific curricular requirements. (See also General Education Administrative Policies.)

5. NDSU requires that a minimum of 37 credits toward a baccalaureate degree must be earned at the junior or senior level. Therefore, while a freshman- or sophomore-level course transferred from an outside institution may satisfy a specific program requirement at NDSU, that course will not be counted toward the 37-credit upper-division degree requirement.

6. Transferable courses with D grades will be accepted by the University; however, colleges and departments determine whether or not these courses apply toward their respective majors and programs.

7. The name of transfer institutions and total credits accepted by NDSU will be indicated on the NDSU transcript. Total transfer credits are converted to semester credits. Transfer grades are not recorded nor computed in the cumulative GPA. They are used only for purposes of admission to the University and certain programs, as well as for determining eligibility to graduate with honor.

Common Course Numbers

Institutions in the North Dakota University System have established common course numbers (CCN) for many courses to facilitate transfer of courses within the System. Under the CCN agreement, transfer students who have successfully completed CCN courses will not be required to retake them. Course requirements will have been fulfilled; however, CCN courses will not fulfill residence requirements nor will 100- and 200-level courses fulfill upper-division requirements for graduation.

A list of CCN courses at NDSU, including the previous number and title for each course, is located in the appendix of this bulletin. For descriptive information, refer to the section on Course Descriptions. Common courses at NDSU are identified by the CCN notation in the course description.

Correspondence Courses

College credit is allowed for courses completed in correspondence only when all of the following conditions have been fulfilled in advance:

1. Regular admission requirements have been satisfied.

2. Course prerequisites have been satisfied.

3. Written permission of the Dean of the college in which the student is enrolled has been filed with the Office of the Registrar.

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.

Testing Center

NDSU is a national testing center for students wishing to take CLEP and PEP examinations. For costs, times of testing, and related information, contact the Office of Counseling and Disability Services, 212 Ceres Hall, or telephone 231-7671.

CLEP General Examinations

Examinations	Minimum Scores Required	Equivalent NDSU Courses	Semester Credits
English Composition	537 (65th percentile)	Engl 110, 120	See note.

Note: The three credits for each course in English 110 and 120 are granted only on the basis of separate essays. Only students who score at or above the 65th percentile on the English Composition exam will be eligible to write an essay to receive three credits for English 110. To receive credit for English 120, students must first have received credit for English 110 before writing the appropriate essay. The English general examination must be taken prior to enrolling in any college-level writing course.

Humanities (NDSU does not grant credit for the General Humanities Exam.)

Mathematics (NDSU does not grant credit for the General Mathematics Exam. See CLEP Subject Exam.)

Natural Sciences	489 (50th percentile)	No specific course equivalent—general credit only.	6

Note: Any science credits previously earned or in progress will be deducted from the six credits.

Social Sciences and History	488 (50th percentile)	No specific course equivalent—general credit only.	5

Note: Three of the five credits are for history. Any history credits previously earned or in progress will be deducted from the three credits. Two additional credits will be granted as follows: one each in psychology and sociology. If a student subsequently takes an introductory psychology or sociology, the one credit earned in the respective area through the General Exam in Social Sciences will be forfeited.

CLEP Subject Examinations

Examinations	Minimum Scores Required	Equivalent NDSU Courses	Semester Credits
U.S. History I	45	Hist 103	3
U.S. History II	45	Hist 104	3
American Literature (Essay Required)	46	Engl 261, 262	6
General Biology	46	Biol 150	3
College Algebra	45	Math 103	3
Information Systems and Computer Applications	47	CSci 101	2
English Literature (Essay Required)	46	Engl 251, 252	6
Introductory Psychology	47	Psyc 111	3
Human Growth & Dev	45	Psyc 250	3
Principles of Accounting	47	Acct 200, 201	6
Introductory Business Law	51	Busn 431	3
Principles of Marketing	48	Busn 360	3
Introductory Sociology	47	Soc 110	3
Trigonometry	50	Math 105	3

College Level Examination Program (CLEP)

CLEP is a national testing program sponsored by the College Entrance Examination Board (CEEB). NDSU accepts official score reports for the two types of tests available under CLEP, the General Examinations and the Subject Examinations. Credit may be received for University approved, equivalent courses.

General Examinations: The following regulations apply.

1. The maximum credit a person may earn through the General Examinations is 17 semester credits.

2. Full credit in each of the General Examinations is generally granted if the examination is taken prior to enrollment as a freshman and only if the student matriculates at NDSU.

3. Credit for a CLEP General Examination is granted only for the first attempt at the examination.

Subject Examinations: The following policies apply at NDSU (also applies to PEP Examinations).

1. The Subject Examination should be taken prior to enrollment in the equivalent or more advanced college-level course.

2. Scores from a Subject 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. A year must elapse before a Subject Examination may be repeated.

CLEP Registration and Fees: CLEP Examinations are administered on Thursday and Friday of the THIRD WEEK OF EACH MONTH (except December and February). Registration must be made before the 25th of the month prior to the administration of the tests. The current fee for each of the General and Subject Examinations is $54.

Advanced Placement Examination

Examinations	Minimum Scores Required	Equivalent NDSU Courses	Semester Credits
Art History	3	Art 110	3
Studio Art, General	3	Art 122	3
Biology	3	Biol 150	3
Chemistry	4	Chem 121	3
Chemistry	5	Chem 121, 122	6
Economics: Micro	3	Econ 201	3
Economics: Macro	3	Econ 202	3
Engl Lang & Comp	4	Engl 110, 120	6
Engl Lit & Comp	4	Engl 220, 222	6
Gov & Politics: Comp	3	PolS Elective	3
Gov & Politics: U.S.	3	PolS 115	3
U.S. History	3	Hist 103, 104	6
European History	3	Hist 101, 102	6
Math Calc AB	3* or 4*	Math 146	4
Math Calc AB	5*	Math 146, 147	8
Math Calc AB	4* or 5*	Math 165	4
Math Calc BC	3*	Math 146	4
Math Calc BC	4* or 5*	Math 146 and 147	8
Math Calc BC	4*	Math 165	4
Math Calc BC	5*	Math 165 and 166	8
Physics B	4	Phys 211, 212	6
Latin Literature	3	Clas 101, 102	8
Psychology	3	Psyc 111	3
French Language	3	Fren 101, 102	8
German Language	3	Germ 101, 102	8
Spanish Language	3	Span 101, 102	8

Contact your high school counselor for further information regarding these examinations.

*For this score, the choice of courses for which a student will receive credit depends on the requirement for the student's major and should be determined in consultation with the student's adviser.

Proficiency Examination Program

Examinations	Minimum Scores Required	Equivalent NDSU Courses	Semester Credits
Anatomy & Physiology	50	Zoo 120	4
Educational Psychology	50	Educ 322	3

The policy statement governing the use of CLEP Subject Examinations also applies to the PEP Examinations.

Advanced Placement (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. The scores are forwarded to the college of the student's choice. Information regarding the examinations that are accepted by NDSU may be obtained from the Registrar's Office. Credit is based on scores and awarded no later than during the first semester of enrollment.

Proficiency Examination Program (PEP)

PEP offers only subject examinations and is sponsored by the American College Testing Program. Examinations accepted by NDSU upon receipt of official scores are listed in the corresponding table.

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 subsidiary and higher levels. Students must receive a minimum score of 5 on higher-level examinations to qualify for possible awarding of credit and advanced placement. Credit earned through IB is not resident credit and may not be used to satisfy resident-credit requirements for graduation.

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 not previously registered for credit. Further, credits earned by course challenge will not satisfy requirements toward a graduate degree.

Procedures for pursuing a course challenge include the following:

1. Obtain a "Petition for Challenge" form from the Office of the Registrar.

2. Obtain approval from the instructor of the course, chair of the department, and dean of the college. Clarify expectations of the challenge, e.g., examination only or examination plus other performance.

3. Pay the course challenge fee at the Business Office after receiving approval for the challenge.

4. Arrange a mutually convenient date and time for the challenge.

Courses successfully challenged are listed on the student's record with the notation Credit by Special Exam. Unsuccessful challenges are not recorded.

Final Examinations

Final examinations in one-credit courses are usually given during the last regular class period. Final examinations for all other courses are scheduled by the registrar, and they may not be rescheduled or given prior to the start of the final examination period. According to State Board of Higher Education policy, the examination period is instructional time and, if a final examination is not given, some instructional use of this period is expected.

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.

Class Attendance

Attendance in classes is expected, and may be required by the instructor. If attendance is required, and will impact grading, it is the responsibility of the instructor to clearly communicate that policy to students.

Grades and Honor Points

The quality of student work 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 cumulative grade-point average for the composite of work at NDSU. Calculations are based on the following:

Grade Descriptions		Honor Points for Each Credit
Passing grades		
A	Excellent	4.0
B	Good	3.0
C	Average	2.0
D	Passing	1.0
P	Pass (D or better)	*
S	Satisfactory (C or better)	*
WP	Drop Passing	*
W	Withdrew	*
Nonpassing grades		
F	Failure	0.0
I	Incomplete	*
U	Unsatisfactory	*
WF	Drop Failing	*
Additional indicators		
AU	Audit	*
CD	Credit deferred	*
CW	Credit withdrawn	*
NC	No credit	*
NR	Not reported	*
Z	Repeated course	*

* Not calculated in grade-point average, except for WF and Z in determining eligibility to graduate with honor.

Grade-Point Average Calculation

Grade-point average (GPA) 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. (Calculations include grades of F.) NDSU GPA calculations do not include developmental course work that does not count toward the graduation requirements. 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. Students are advised to check degree-program restrictions regarding acceptance of pass/fail credits. Request forms may be acquired in departmental offices of advisers and in the Registrar's Office. 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 Registrar's Office during the first three weeks of the regular semester. Refer to the Summer Registration Schedule for summer session deadlines.

3. Once a pass/fail request has been approved and filed, it cannot 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.

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.

2. The grade of Incomplete is not to be given in any instance where the student has a deficiency of more than five weeks of work including final exam week. (The time period is proportional for variable length courses and summer session.)

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. Except in courses designated as practicum, internship, individual study, field experience, study abroad, or graduate-level research or investigation, the grade of Incomplete must be removed not later than the end of the seventh week of the next semester enrolled. Any alternative arrangements must be made by written agreement of the instructor and filed with the department chair and the Office of the Registrar.

5. Grades of Incomplete are removed when the student has completed all course requirements and the instructor of the course files a change of grade form with the Office of the Registrar.

6. All grades of Incomplete that are not removed within the specified time are automatically changed to F grades by the Registrar's Office.

7. Grades of Incomplete 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 Registrar's Office during the first term of re-entry.

Mid-Term Grades

Approximate class standing at mid-term is to be provided to all students in all courses. Upon request, all instructors shall inform students directly of their approximate mid-term grades before the end of the seventh week of the semester.

Course Failures

The grade of F may not be removed by special examination. When a grade of F has been received in any given course, credit for that course may be earned only by re-enrolling in it and completing it satisfactorily.

Grade Appeals

A course grade is considered final unless an appropriate appeal is filed by the student. For the student who has reason to believe the grade issued is incorrect, the following appeal procedure steps are provided by the University.

1. A student must initiate a request for change of a grade with the instructor within three (3) weeks of the time the grade was awarded.

2. The student must consult the following persons in order as listed and proceed to the next only after an unsatisfactory resolution of the conflict continues: (a) the instructor, (b) the department chair, and (c) the dean or a designated college committee. In the event that the instructor is also the department chair or dean, he or she need only be consulted in the capacity of instructor.

3. The instructor must be informed of all proceedings that occur in relation to any continuing consultations taken in step 2.

4. Both the instructor and the student have the right at any time during the proceedings to call a meeting of all persons involved in submitting and considering the complaint and, optionally, to invite the Grade Appeals Board to send an observer to that meeting.

5. In the event of an unsatisfactory resolution of the conflict within the college, the student may submit a formal written appeal to the Grade Appeals Board. Such an appeal must be made within six (6) weeks after the start of the regular academic semester following the semester for which the grade was awarded. For more complete details on hearing procedures, consult the publication entitled "Rights & Responsibilities of Community: A Code of Student Behavior" available in 100 Old Main.

Repeated Courses

If students have failed a course at NDSU and wish to take advantage of the "repeated course" opportunity to remove the F from their grade calculations, then that course must be repeated at NDSU, with one exception only. NDSU students may register for a Tri-College course to repeat a course previously taken at NDSU.

Repeated courses will be accepted in transfer from other accredited institutions; however, they will not replace any grades previously earned at NDSU in NDSU grade calculations.

When a course is repeated at NDSU, all attempts remain on the academic record but only the credits, grades, and related honor points for the most recent time the course was taken will be used in calculating the cumulative grade-point average. Only credits received the most recent time the course was taken count toward credits for graduation.

(The only exception is that all credits attempted and grades received will be used in computing graduation with honor.)

All grades received remain on the transcript; however, students forfeit the previous grade no matter what grade is earned when the course is repeated. All repeated courses are marked with a "Z" on the transcript to indicate the course was repeated in a following term.

Courses taken for regular, A-F grades may not be repeated for pass-fail grades.

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

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 for 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 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 the Registrar.

Scholastic Honesty

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 cheating and plagiarism at the beginning of each course, and should use precautionary measures and security in cases where cheating is likely to occur.

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 the students 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 and may recommend a disciplinary sanction to the dean of the college.

For complete information regarding disciplinary sanctions, appeal procedures, and hearing guidelines, refer to the "NDSU Policy Manual," section 335.

Academic Status

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

Dean's List

To be eligible for inclusion on the Dean's List, a student must have earned a grade-point average of no less than 3.50 while completing at least 12 semester hours in graded course work using traditional grades that carry honor points. The student may not have any grades of Incomplete for the semester. A Dean's List is not compiled for the summer session, nor does the list include graduate students.

Academic Probation and Suspension

To be eligible to register continuously without conditions, a student must maintain good academic standing. The following scholastic standards, relative to completed credits and grade-point average (GPA), determine a student's academic standing:

Minimum GPA	Completed Credits
1.75 (freshman)	fewer than 27
1.90 (sophomore)	27-59
2.00 (junior & senior)	60 or more

Records of all students are examined at the end of each grading period. Students failing to meet the scholastic standards are subject to review by the Student Progress Committee of the college in which they are matriculated.

Recommendations of the respective college committees are subject to further review by the University Committee on Academic Standards. Committee actions relate to the following.

Grading Period

NDSU has three grading periods (terms) per academic year: fall semester, spring semester, and summer session.

Grade-Point Average (GPA)

Semester GPA refers to the grade-point average for any given grading period (term). Cumulative GPA refers to the grade-point average for all grading periods completed at NDSU. Grades related to transfer credits are not included in calculations for determining general scholastic standing.

Academic Warning

An academic warning is to alert a student that the semester GPA for the most recent term was below the minimum required for good standing for the student's classification. An academic warning does not appear on the academic record.

An academic warning is issued for the following:

1. A freshman whose GPA is less than 1.75 upon the completion of the first term of residence at NDSU.

2. A student who transferred in good standing whose GPA is deficient upon completion of the first term of residence at NDSU.

3. A student who has been in residence two or more terms and has an acceptable cumulative GPA, but whose semester GPA is deficient.

Academic Probation

An academic probation is a formal warning that a student's cumulative GPA is below minimum standards for the student's classification. Students placed on academic probation may enroll for no more than 16 credits for the following semester or 12 credits for the following summer session without permission of the college dean. An academic probation appears on the student's academic record. A student on academic probation must see an adviser. An adviser hold will be placed on the student's record.

Academic probation is issued for the following:

1. A student who entered the grading period in good standing and has been in residence two or more terms, but whose cumulative GPA is deficient for the student's classification.

2. A student who entered the grading period on academic warning and whose cumulative GPA is deficient for the student's classification.

Continued Probation

Continued probation is a formal extension of the initial academic probation status and is issued when the cumulative GPA is still below minimum, but adequate progress is made by attaining the minimum GPA for the term for student classification. Students placed on continued academic probation may enroll for no more than 16 credits for the following semester or 12 credits for the following summer session without permission of the college dean. Continued probation appears on the student's academic record. Students placed on continued probation must see an adviser. An adviser hold will be placed on the student's record.

Continued probation may be issued for the following:

A student who entered the grading period on academic probation and whose cumulative GPA is still deficient for the student's classification, but the semester GPA is at or above the minimum. A continuance may be granted to a maximum of three (3) consecutive times.

Academic Suspension

Academic suspension may be issued when the academically deficient student does not demonstrate an improvement in his or her cumulative GPA. Registration for the following full semester or for summer courses of more than four weeks in length will be canceled. A student may not be considered for readmission for two grading periods following an academic suspension. An academic suspension appears on the student's academic record.

Academic suspension may be issued after two or more terms in residence for the following:

1. A student who entered the grading period on either probation or continued probation whose semester GPA and cumulative GPA are both deficient for the student's classification.

2. A student who entered the grading period on continued probation for the third consecutive time and whose cumulative GPA is still deficient for the student's classification.

Suspension Appeals

A student who has been suspended may appeal the suspension if there were extraordinary circumstances beyond the student's control. Following the imposition of suspension, appeals must be submitted in writing at the Office of the Registrar not later than the close of business on the semester start date or the first day of the standard 8-week summer courses following the imposition of suspension.

Suspended Students

NDSU honors suspensions of other institutions. Further, students suspended from NDSU or any other institution may not transfer course work into NDSU that was completed during the suspension period. Transfer and returning students who fail to report all previous college work are subject to dismissal or loss of credit or both.

Readmission

To be considered for readmission, suspended students must file a petition in the Office of the Registrar at least 30 days prior to the beginning of the semester in which readmission is sought. If the petition is approved by the Committee on Academic Standards, the student may register, but will be readmitted on probation.

Transcripts

Transcript requests must be submitted in writing and include the student's signature. According to federal law, telephone requests cannot be honored nor can requests from others on behalf of the student. A request for a transcript of credits by a student who is in debt to the University will not be honored until the indebtedness has been paid. The transcript only includes work completed at NDSU. Requests for transcripts of work completed elsewhere must be made directly with the respective institution.

Correction of Transcript Errors

Students may access their grades via ALFI at the end of each term. Access times are printed in the "Registration Schedule" and usually begin one week after the last day of final examinations. If a student becomes aware of an error in recording on the transcript, the student must appeal to correct the error within one academic year of receipt of the academic record. Appeals must be submitted to the Office of the Registrar.

College of Agriculture

Morrill Hall 314 (701) 231-7656
Patricia A. Jensen, Dean

Agriculture provided the foundation upon which this institution was established in 1890. Its primary mission, to serve the people, has not changed over the years and the achievements by the faculty in teaching, research, extension, and service provide testimony to its success as a land-grant institution.

The demand for graduates with expertise in agricultural disciplines continues to grow. Career opportunities for men or women with rural and urban backgrounds are rapidly expanding in the agricultural industry. The availability of human resources has become a critical issue. Tomorrow's graduates in agriculture will be the benefactors of today's increasing shortages in human capital.

Faculty in the college are deeply involved in basic and applied research and, as a result, provide students with a unique educational experience utilizing state-of-the-art equipment and laboratory relevant exercises in many programs.

Degree Programs

At the undergraduate level the College of Agriculture offers a Bachelor of Science degree and a preprofessional program for veterinary school.

The pre-veterinary medicine program does not offer a B.S. degree and students are urged to select an additional major area of study. By following this recommendation, students will complete the requirements to veterinary medical school and earn a Bachelor of Science degree in a related field, such as animal and range sciences, biotechnology, food science, or microbiology. A graduate program is available in agriculture with curricula leading to Master of Science and Doctor of Philosophy degrees. Graduate program information is available in the Graduate Bulletin.

Degree Requirements

All students enrolled in the College of Agriculture are expected to meet or exceed the following basic requirements before graduating with the Bachelor of Science degree in agriculture.

	Credits
Program Core Requirements	24
First-Year Experience	1
Written and Oral Communications*	12
This includes 9 general education credits from the communication category and 3 credits involving active student participation in writing/speaking.	
Basic and Applied Sciences*	20
This includes 10 general education credits from the science and technology category and 3 credits from the quantitative reasoning category.	
Humanities and Fine Arts*	6
Social and Behavioral Sciences*	6
(A three-discipline minimum is required across 15 credits in the two preceding categories.)	

Wellness*	2
Electives	42
Curriculum Total	128

*Refer to Courses Approved for General Education Requirements listed in the Appendix.

Candidates for the Bachelor of Science degree must complete a minimum of 128 credits in one of the curricula of the college. They must also meet the requirements of the University. Program core requirements include courses in the major and supporting disciplines and are determined by the major.

Graduation Status

A graduation status review is available to students each semester through their adviser.

Honor System

The College of Agriculture recognizes the ability of its students to govern themselves as mature men and women. The Honor System has been functioning in the college since 1955 and provides students with a method of self-government during examinations. All students who are enrolled in agriculture courses are required to uphold the Honor System.

Scholarships

Students who have declared a major in one of the agriculture disciplines are eligible for scholarships through their major department and the dean's office. Scholarships are awarded to students who have demonstrated excellence in their work, high interest in pursuing a career in agriculture, and involvement in University and community activities.

Several departments offer scholarships having specific requirements and students are encouraged to consult individual departments for details.

Special Opportunities

Special opportunities available as a supplement or an enhancement to college majors include the following.

Agribusiness Minor

The 19 credit agribusiness minor supplements a student's technical training in agricultural sciences with an understanding of fundamental business concepts and applies business strategies to agribusiness decision making. The agribusiness minor is restricted to students whose major is in the College of Agriculture, but excluding agricultural economics.

Agricultural Extension

Persons seeking careers in agricultural extension with the Cooperative Extension Service or similar positions with other agencies may enroll in agricultural education, offered through the College of Human Development and Education.

Field Experience or Cooperative Education

Students majoring in one of the agricultural disciplines may gain practical experience by enrolling in the field experience courses in their major (195, 495) or through Cooperative Education (Univ 395). Students must enroll for field experience and follow the requirements of the individual department to receive credit. Cooperative Education credits are considered an enrichment experience and may not substitute for academic credits required for graduation.

ROTC Programs

Up to 18 elective credits may be earned by participation in the Army or Air Force ROTC programs. Men or women may take these programs for elective credit and in addition may complete either program and receive a commission upon graduation. For details of

the ROTC programs and scholarships available see Reserve Officers Training Corps programs under the Special Programs section.

Agricultural Economics

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

As the global population grows and the world's economies become more interdependent, economic principles become increasingly important for problems facing the agribusiness industry. 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 system economics. Increasing specialization permits students to concentrate in areas of particular interest: agribusiness, agrifinance, commodity marketing, or production and farm management.

Choice of a custom option or involvement in the natural resources management program broadens the options available to students interested in other areas of applied economics. These options allow students to select programs of study consistent with their personal career objectives.

Curriculum Options

Agricultural economics majors may choose from the following options:

Agribusiness: This option provides students with a broad background, preparing them for general career alternatives in agribusiness.

Agrifinance: This option prepares students for careers in agribusiness finance, agricultural lending, financial institution management, accounting, insurance, and investment.

Commodity Marketing: This option prepares students for careers in agricultural marketing (especially commodity marketing), sales, or product marketing.

Production and Farm Management: This option prepares students for both management and technical aspects of farming, ranching, and agribusiness, or for employment in extension, consulting, and government agencies.

Custom Option: This option includes programs created to meet unique student interests in areas such as extension, community development, pre-law, public relations, journalism, broadcasting, or computer applications (contact department for details).

Minor: Students in other majors may earn a minor in agricultural economics.

Recommended Curriculum Agricultural Economics

First Year	Credits
AgEc 150, 201, 202, Quant, Micro, Macro	2,3,3
Agri 150, Ag Orientation	1
Agri 189, Skills for Academic Success	1
Comm 110, Fund of Public Speaking	3
CSci 146, Busn Use of Computers	3
Engl 110, 120, College Composition I, II	3,3
Math 103, College Algebra or Math 104, Finite Math	3
Ag Science Elective	3
Free Electives	3
Total	31

Second, Third, and Fourth Years

	Ag-Bus.	Ag. Fin.	Comm. Mktg.	Prod. Mgt.
Science and Mathematics				
Natural Science	4	4	4	4
Statistics	5	5	5	5
Ag Sciences Electives	6	6	8	12
Business				
Accounting Principles	3	6	3	3
Intermediate Accounting	-	6	-	-
Fin, Mkgt, Mgt	6	3	6	3
English and Communication	9	9	9	9
Humanities and Fine Arts	6	6	6	6
Intermediate Economic Theory	6	9	6	6
Wellness	2	2	2	2
Agricultural Economics				
Requirements	24	24	24	24
Category Electives	19	11	16	11
Free Electives	7	6	8	12
Totals	97	97	97	97
Curriculum Total	128	128	128	128

Agricultural Systems Management

The agricultural systems management (ASM) major prepares students for success in the delivery, management, and technical support of systems for food, agricultural, or closely related industries.

The ASM major blends the study of mechanized systems principles, computer-based technologies, business management, agricultural sciences, and communications. Students complete courses in machinery principles, off-road power systems, precision agriculture, commodity handling and processing, natural resources (soil, water, and air) management, electrical and electronic systems, and information decision support technology.

A strong business background is developed by taking courses in accounting, economics, marketing, management, business law, sales, and finance. Personal career objectives may be pursued through specialization in areas such as agribusiness, production agriculture, or applied technology. Students are encouraged to minor in agribusiness, business administration, or another discipline.

Agricultural systems management graduates are typically employed in positions that provide a link between the researcher, designer, engineer, manufacturer, and the consumer. Employers include companies and agencies that provide inputs, products, and services for agricultural production; companies or agencies in the business of handling, storing, processing, and distributing agricultural products, commodities, and processed food and non-food products; and companies and agencies that supply services to rural and urban communities. Graduates are also frequently self-employed as owners/operators of commercial farms and businesses, and as consultants or production specialists.

Students from other majors may minor in agricultural systems management by working with department faculty to select 16 credits in agricultural systems management or closely related fields.

Students interested the innovation, design, test, manufacture, 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 curriculum in the College of Engineering and Architecture.

Recommended Curriculum Agricultural Systems Management

First Year	Credits
Agri 189, Skills for Academic Success	1
ASM 115, Fundamentals of ASM	3
ASM 125, Fabrication and Constr Tech	3
Comm 110, Fund of Public Speaking	3
CSci 147, Microcomputer Packages	3
Engl 110, 120, College Composition I, II	3,3
Math 103, 105, College Algebra, Trig	3,3
Agriculture/Biological Science Elective	3
Humanities and Fine Arts	3
Second Year	
Acct 200, 201, Elements of Accounting I, II	3,3
AgEc 201, 202, Micro, Macroeconomics	3,3
ASM 264, Natural Resource Mgt Systems	3
ASM 225, Computer Appl in ASM	3
Chem 121, 122 General Chemistry I, II	3,3
Phys 211, 211L, General Physics I, Lab	3,1
Psyc 111, Introduction to Psychology	3
Third Year	
ASM 323, Post Harvest Technology	3
ASM 373, Tractors and Power Units	3
ASM 374, Power Units Lab	1
ASM 378, Machinery Principles and Mgt	3
Stat 330, Intro Statistics	3
Agriculture/Biological Science Elective	3
Comm Elective	3
Wellness	2
Electives (Free)	6
Electives (Specialization/Minor)*	7
Fourth Year	
ASM 354, Electricity and Electronic Appl	3
ASM 368, Structures and Environ Syst	3
ASM 427, Unit Operations in Food Manuf	3
ASM 475, Mgt of Agricultural Systems	2
ASM 491, Seminar	1
Agriculture/Biological Science Elective	5
Humanities and Fine Arts	3
Electives (Option/Minor)*	9
Elective (Free)	2

*Options/Minors (Choose One)

Agribusiness or Business Administration (16)
Students select courses in agricultural economics, business, and related areas to achieve career goals in agribusiness and related industries.

A dealer management specialization within the business option is available. This specialization is designed for students who want careers as equipment dealer managers or with equipment manufacturers. Technology, agribusiness, and communications are emphasized. Requirements include a minor in agricultural economics, agribusiness, or business administration and two paid internships with equipment dealerships. Several industry scholarships are available to students enrolled in this specialization.

Applied Technology (16)
Students select courses to enhance curriculum diversity or interests in areas such as communications, international studies, industrial management, construction management, or food processing.

Production Agriculture (16)
Students select courses in agricultural sciences and supporting areas to achieve career goals in the technical and management aspects of production agriculture.

Curriculum Total 128

Agricultural/Industrial Equipment Option

The agricultural/industrial equipment option in the ASM program is collaboratively offered by North Dakota State University and North Dakota State College of Science (NDSCS). This collaboration gives students primary experience in physical science, engineering technology, and machinery systems with complementary hands-on training in mechanized systems laboratories at NDSCS. Students complete their education at NDSU in agricultural systems management and complement their program by selecting a business specialization or minor emphasizing courses in management, sales, marketing, finance, and personnel management. Completion of one or more cooperative education or internship placements in the equipment industry is also required.

Potential positions available for graduates include salesperson, service manager, parts and inventory control manager, sales manager, territory service manager, finance manager, general manager, regional marketing representative, manufacturer's representative, district sales manager, and warranty manager.

Recommended Curriculum Agricultural/Industrial Equipment Option*

First Year at NDSCS	Credits
Comm 110, Fundamentals of Speech	3
CSci 101, Computer Literacy	2
DTec 101, Electrical Systems	2
DTec 112, Intro to Diesel Engines	3
DTec 122, Preventive Main/Power Trains	3
Econ 201, 202, Micro, Macroeconomics	3,3
Engl 110, 120, Coilege Composition I, II.	3,3
Math 103, 105, College Algebra, College Trig.	3,2
Tech 121, Engine Fundamentals.	4
Elective	2

* The remaining curriculum is taken at NDSU in the ASM major.

Animal and Range Sciences

The Animal and Range Sciences major is designed to prepare students for careers in agriculture and related fields. Course work includes biological principles, scientific relationships, management practices, and business concepts applicable to animal products, livestock production, and range science.

Curriculum Options

Three options are available. Each is designed to strengthen career preparation.

Production/Business: This option is for students interested in careers associated with the production, marketing, and management of farm animals and the products they produce.

Range Science: This option is for students who are interested in careers that involve the conservation and improvement of natural range resources. This option enables the student to meet federal employment requirements for related careers in range science.

Science: This option is designed for students who are interested in specific careers that require advanced course work in the biological sciences. The option is designed to prepare students for graduate study or to provide a science-oriented degree while meeting the course requirements for veterinary schools.

Minor: Students may minor in animal and range sciences by completing 16 credits. Formal approval by the department is required.

Transfer credits: Transfer courses with grade C or better only will be accepted for courses in the major.

Major: The following requirements must be met by all animal and range sciences majors.

Recommended Curriculum Animal and Range Sciences

First Year	Credits
AgEc 201, Prin of Microeconomics	3
Agri 150, Agriculture Orientation	1
Agri 189, Skills for Academic Success	1
ARSc 114, Introduction to Animal Sciences	3
ARSc 123, Feeds and Feeding	3
Chem 121, 121L, General Chemistry I, Lab	3,1
Engl 110, 120, College Composition I, II.	3,3
Math 103, College Algebra	3
PlSc 110, World Food Crops.	3
Social/Behavioral Sciences Elective	3
Wellness	2
Total	31

Second, Third and Fourth Years	Options Prod/ Bus.	Sci.	Range Sci.
ARSc 220, Livestock Production	3	3	3
ARSc 222, Meat Animal Evaluation	2	2	-
ARSc 320, 330, 331, Judging	2	2	-
ARSc 323, Fund of Nutrition	3	3	-
ARSc 336, Intro to Range Mgt	3	3	3
ARSc 357, Animal Genetics	3	3	-
ARSc 450, 452, 456	-	-	9
ARSc 463, Physiology of Reprod	4	4	-
ARSc 470, Applied Nutrition	4	4	-
ARSc 480, 482, 484, 486, 488	4	2	2
ARSc 491, Seminar	2	2	2
Bot 170, 314, 380, 460	-	-	14
Comm 110, Fund of Public Spkg	3	3	3
Engl 320, Practical Writing	3	3	3
Biol 202, 202L, Intro Microbiol, Lab	3	3	-
PlSc 315, Genetics	3	3	3
Soil 210, 444	-	-	8
VetS 135, 365	7	3	-
Biology	3	4	4
Electives	15	16	19
Electives from AgEc, Busn	6	-	-
Electives from Humanities	6	6	14
Electives from Biol, Bot, Chem, Ent, Genetics, Geol, Math, Micro, Phys, Zoo	2	9	-
Organic Chemistry/Biochem	4	7	4
Soc/Behav Sci	6	6	-
Statistics, Computer Sci	6	6	6
Curriculum Totals	128	128	128

Biotechnology

Biotechnology is the application of technology in living systems to improve, modify, and/or produce important products or processes beneficial to society. Examples of this technology include cell culture, plant regeneration, monoclinal antibodies, gene transfer, recombinant DNA, embryo manipulation, and cell fusion. The application of biotechnology to agriculture offers a tremendous potential in the production of needed food, fiber, timber, and chemical feed stocks. An exciting frontier in agriculture has been opened up with this technology that will complement the traditional methodology in breeding, production, and disease prevention.

The curriculum in biotechnology is an interdisciplinary program requiring knowledge and technical experience in the basic and applied sciences. Students have an opportunity to work with scientists in various areas of agricultural biotechnology. Faculty advisers are assigned to students according to their interests in plants, animals, or microorganisms. Graduates of this program have excellent opportunities for employment in the biotechnology industry or for graduate work. The major in biotechnology leading to a B.S. degree is offered through the College of Agriculture and the College of Science and Mathematics. A 2.50 cumulative grade-point average is required to remain in the program.

Recommended Curriculum Biotechnology Major

First Year	Credits
Agri 189, Skills for Academic Success	1
Biol 150, 150L, General Biology, Lab	3,1
Bot 170, Plant Form and Diversity or Zoo 170, 170L, General Zoology, Lab	4
Chem 121, 121L, General Chem I, Lab	3,1
Chem 122, 122L, General Chem II, Lab.	3,1
Engl 110, 120, College Composition I, II.	3,3
Math 146, 147, Applied Calculus I, II	4,4
Wellness	2

Second Year	Credits
Chem 341, 341L, Organic Chem I, Lab	3,1
Chem 342, Organic Chem II	3
Micr 350, 350L, Gen Microbiology, Lab	3,1
Phys 211, 211L, College Physics I, Lab	3,1
Phys 212, 212L, College Physics II, Lab	3,1
PlSc 315[1], 315L[1], Genetics, Lab	3,1
Computer Science	3
Social and Behav Sci, Humanities	6
Third Year	
Bioc 460[1], 461[1], Found of Biochem I, II	4,4
Comm 110, Fund of Public Speaking	3
Micr 470[1], Basic Immunology	3
Micr 471[1], Immuno & Serology Lab	2
Stat 330, Intro Statistics	3
Biotechnology Elective[1,2]	2
Seminar[1]	1
Social and Behavioral Sci, Humanities	9
Fourth Year	
Bioc 465, Prin of Phys Chem and Biophys	4
Bioc 474[1], Methods in Recombinant DNA Tech	3
Bot 380[1], Plant Phys or Zoo 460[1], Animal Physiology	4
Micr 482[1] Bacterial Genetics and Phage	3
Biotechnology Elective[1,2]	2-3
Biotechnology Senior Research	2-4
Biotechnology Senior Thesis[1]	1
General Electives	9
Social and Behavioral Sci, Humanities	3
Curriculum Total	128

[1]Major courses

[2]Biotechnology electives (2 courses required): Bioc 473, Methods of Biochemical Research or PSci 409, Isotope Tracer Techniques; Bioc 485, Industrial Biotechnology; Bot 480, Plant Tissue Culture; Micr 445, Animal Cell Culture Techniques; PlSc 484, Plant Tissue Culture and Micropropagation; PPth 453, Microscopy.

Minor

A minor in biotechnology requires satisfactory completion of 22 credits in the following courses:

Required:	Credits
Bioc 460, Found of Biochemistry I	4
Bioc 461, Found of Biochemistry II	4
PlSc 315, Genetics	3
PlSc 315L, Genetics Laboratory	1
Electives in Biotechnology Technique	
Choose 2 courses from the following:	
Bioc 473, Methods of Biochemical Research	3
Bioc 474, Meth in Recombinant DNA Tech	3
Bioc 485, Industrial Biotechnology	3
Bot 480, Plant Tissue Cltr	2
Micr 445 Ani Cell Cltr Tech	2
PPth 453, Microscopy	3
PlSc 484, Plant Tissue Cltr & Micropropag	2
Electives in Specialized Areas (6 credits)	
Bot 380, Plant Physiology	4
Micr 470, Basic Immunology	3
Micr 471, Immunology and Serology Lab	1
Micr 482, Bacterial Genetics & Phage	3
PPth 324, Intro to Plant Pathology	3
Zoo 370, Cell Biology	3
Zoo 460, Animal Physiology	4

Crop and Weed Sciences

Instruction in crop and weed sciences includes field and forage crop production and management, weed science, general and plant genetics, plant breeding, experimental design, 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. A 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 and management aspects; in natural resources conservation service; by those interested in production agriculture; or as a prerequisite for graduate study.

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, including Plant Sciences 110, 225, two courses from 311 and 312, 320, or 323, plus a minimum of 5 credits approved by the department. A minimum of 8 credits must be taken at NDSU, and at least 6 credits must be at the 300-400 level.

Major

All of the following requirements including courses in supporting disciplines must be met by majors.

Recommended Curriculum Crop and Weed Sciences

First Year	Credits
AgEc 201, Prin of Microeconomics*	3
Agri 150, Ag Orientation	1
Agri 189, Skills for Academic Success	1
Biol 150, 150L, Gen Biology, Lab	3,1
Bot 170, Plant Form and Diversity	4
Chem 121, 121L, General Chem I, Lab	3,1
Engl 110, 120, College Composition I, II	3,3
Math 103, College Algebra	3
PlSc 110, World Food Crops	3
Wellness	2
Second, Third, and Fourth Years	
Written and Oral Communications:	
Comm 110, Fund of Public Speaking	3
Engl 320, Practical Writing	3
Social and Behavioral Sciences*	3
Humanities and Fine Arts*	6
Basic and Applied Sciences:	
Bot 380 or ARSc 323	3-4
Chem 122, 122L, Gen Chem II, Lab	3,1
Chem 240, or Bioc 260	3-4
CSci 147, Microcomputer Pkgs	3
Stat 330, Intro Statistics	3
Crop and Weed Sciences:	
PlSc 225, Principles/Crop Production	3
PlSc 315, 315L, Genetics, Lab	3,1
PlSc 320, Forage Crops	3
PlSc 323, Weed Science	3
PlSc 455, Cropping Systems	3
PlSc 291, 491, Sophomore, Senior Seminars	1,1
PlSc 300, 400, Electives	4
Complementary Agricultural Sciences:	
Biol 202, 202L, Intro Microbiol, Lab	2,1
Ent 350, General Entomology	5
PPth 324, Intro Plant Path	3
Soil 210, Intro Soil Science	4
300-400, Electives	6
Electives	26-28
Curriculum Total	128

*Required: 6 credits of humanities and fine arts and 6 credits of social and behavioral sciences including AgEc 201. One 3-credit course must fulfill the cultural diversity requirement for general education.

Curriculum Options

Students may select one of the following options within crop and weed sciences. Students interested in a business career in crop and weed sciences should consider the agribusiness minor through either the College of Agriculture or College of Business Administration. Students interested in integrated pest management should follow the weed science option or pursue a second major in plant protection.

Students interested in biotechnology may major through crop and weed sciences or complete the biotechnology 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 must complete Bioc 460, Bot 380, Micr 350, 350L (instead of Biol 202, 202L), plus Math 105 or 146, PlSc 346, and PlSc 431 or 453, and PlSc 484 or Bot 480.

Production: This option is for students most interested in production agriculture. This is the most popular option with students and provides the most flexibility of course selection. This option is fulfilled by completing the basic crop and weed sciences curriculum.

Science: This option is intended for students who are interested in graduate studies and want more basic science courses as a foundation for graduate studies. Bot 380, Chem 341, 341L, and Math 146 must be taken under the general Basic and Applied Sciences requirements, plus 12 credits of science electives from outside the agriculture field. Suggested electives are Bioc 350, 460, 461, Bot 314, 460, Chem 342, Math 147, Phys 211, 212, or Stat 331.

Weed Science: This option is intended for students interested in crop consulting or weed science areas. AgEc 375 or Busn 431, Bot 380, PlSc 453, and PPth 454, are required. ASM 378, Bot 314, PlSc 210, 211, and Soil 322 are suggested electives. Students pursuing this option should consider a double major in plant protection.

Food Science

The College of Agriculture and the College of Human Development and Education offer an undergraduate major in food science leading to a B.S. degree.

The food science major 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 unique and is structured to develop an understanding of the nature, properties, and characteristics of foods through foundation courses in biochemistry, chemistry, microbiology, physics, and other sciences. Food science courses are built on this foundation. 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. Additional 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 curriculum in the food science program is approved by the Institute of Food Technologists (IFT). 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.

Recommended Curriculum Food Science

First Year	Credits
Agri 150, Ag Orientation	1
Agri 189, Skills for Academic Success	1
Chem 121, 121L, General Chemistry I, Lab	3,1
Chem 122, 122L, General Chemistry II, Lab	3,1
CSci 147, Microcomputer Packages	3
CS 210, Intro to Food Sci and Tech	2
Engl 110, 120, College Composition I, II	3,3
F&N 250, Nutrition Science	3
Math 146, 147, Applied Calculus I,II or Math 165, 166, Calculus I,II	4,4
Total	32

Second Year	
AgEc 201, Prin of Microeconomics	3
ARSc 340, Meat Science and Technology	3
Biol 150, General Biology	3
Chem 341, 341L, Organic Chemistry I, Lab	3,1
Comm 110, Fund of Public Speaking	3
Phys 211, 211L, College Physics I, Lab	3,1
*Electives	12
Total	32

Third Year	
Bioc 460, Biochemistry	4
CS 430, 431, Food Unit Operations, Lab	2,1
Engl 320, Practical Writing	3
Micr 350, 350L, General Microbiol, Lab	3,1
Stat 330, Introductory Statistics	3
*Electives	15
Total	32

Fourth Year	
CS 450, Cereal Technology	3
CS 460, 461, Food Chemistry, Lab	3,1
CS 470, 471, Food Processing, Lab	3,1
F&N 464, Food Analysis	3
Micr 453, Food and Dairy Microbiology	3
*Electives	15
Total	31
Curriculum Total	128

*Electives may be chosen from approved courses to fulfill the general education requirements, and to emphasize one of the following areas: sciences, engineering, business, nutrition, or processing.

General Agriculture Degree Program

The degree program in general agriculture is designed to serve students who wish to pursue a college education in a broad area 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 this program of study.

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 second semester of the junior year. This plan of study must include a "statement of goals" or why a tailored degree is desired and an outline of courses to be taken to meet their stated career goals. Identification of the capstone course and any internship that the student plans to take is also to be included in the plan of study.

Curriculum Requirements General Agriculture Major

	Credits
Major	42
Required: a minimum of 12 credits in two Ag disciplines plus 9 credits in two other Ag disciplines.	
Basic and Applied Sciences	20
Required: Chem 121, CSci 146 or 147, Math 103 or 104, PlSc 315, and Stat 330	
Written and Oral Communications	12
Required: Comm 110, Engl 110, 120, and 220 or 320	
Social/Behavioral Sciences and Humanities	12
Required: Six credits in Humanities	
Agricultural Science Electives	12
Electives	26
Other	
Agri 150, Ag Orientation	1
Agri 189, Skills for Academic Success	1
Wellness	2
Curriculum Total	128

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. The minor is intended for students who are majoring in a college other than agriculture.

General Agriculture Exploratory Program (Non-Degree Program)

The exploratory program in general agriculture is intended for students who know they are interested in agriculture but are undecided on a major. This program is designed to expose students to various agricultural disciplines and, thereby, various career options. New students are encouraged to enroll in at least three introductory courses in different agricultural majors in their freshman year in addition to completing general education requirements in English, math, chemistry, social and behavioral sciences, and humanities. By following the exploratory program, students may easily be phased into a specific discipline by the end of their sophomore year. About 85% of entering students selecting general agriculture initially will transfer to a specific discipline.

Exploratory General Agriculture (Non-Degree Program)

First Year	Credits
*Agricultural Sciences	8-12
**Basic Sciences	7
English	6
Mathematics	3
Orientation/Skills for Success	2
Social and Behavioral Sciences	6

Second Year	
*Agricultural Sciences	10-12
**Basic Sciences	10
Computer Science	3
Social and Behavioral Sciences/Humanities	3-6
Speech Communication	3
Wellness	2
Electives	3

*Agricultural science courses recommended include AgEc 201, 242 or 244; AgEd 232; ASM 115 or 125; ARSc 114 or 123; Biol 202 and 202L; CS 210; Ent 210 or 350; PlSc 110, 111, 210 and 211 or 225; PPth 324; or Soil 210. Students are encouraged to select at least one course within each discipline.

**Basic science courses in biology, botany, chemistry, entomology, microbiology, or zoology are recommended.

Advisers for students in the exploratory program are selected from the various disciplines in agriculture. These faculty members work with students to develop an appropriate plan of study and assist them in exploring various career opportunities. Once the student identifies the discipline of choice, an adviser in that discipline should be selected by the student.

Horticulture

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

The horticulture major is a four-year curriculum leading to the B.S. degree. Students may also minor in horticulture. Prospective students should consult with department advisers regarding horticulture programs and options so their educational needs may best be fulfilled. Master of Science and Ph.D. degree programs are also available. Refer to the Graduate Bulletin for details.

Curriculum Options

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

Horticulture Biotechnology: This option is for students who plan to engage in laboratory research or further their education in the biotechnology of horticultural crops.

Horticulture Science: This option is for students who plan to continue formal graduate school education leading to careers in research, teaching, and extension.

Landscape: This option is for students interested in planning, designing, and installing landscape plantings for functional and aesthetic purposes (a 16-credit minor in landscape architecture is required).

Production Business: This option is for students who wish to grow, market, and process horticultural crops; for example, nursery and/or greenhouse flower, fruit, and vegetable crops.

Urban Forestry and Parks: This option is for students who desire a career in the management of urban forests and the horticultural aspects of park-like areas, including golf courses and other sports facilities.

Special Opportunities

Pre-Forestry: A two-year pre-forestry curriculum may be selected by the student who desires to major in forestry. However, the forestry student must transfer to another institution to complete degree requirements.

Interdisciplinary Program: A four-year interdisciplinary program (plant protection major) is available with a horticultural specialization. (See Plant Protection).

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

Recommended Curriculum Horticulture Major

First Year	Credits
AgEc 201 or 202, Prin of Micro or Macro	3
Agri 150, Ag Orientation	1
Agri 189, Skills for Academic Success	1
Biol 150, 150L, Gen Biology, Lab (Biol 150L not required for Landscape OR Urban For-Prk Options)	3,1
Bot 170, Plant Form and Diversity	4
Chem 121, 122, 121L, Gen Chem I, II, Lab I	3,3,1
Engl 110, 120, College Composition I, II	3,3
Math 103, College Algebra (Not required for Biotech Option)	3
PlSc 210, 211, Horticulture Science, Lab	3,1
Total	31

Horticulture Options	Hort Biotech	Hort Sci	Lndscp	Prod Busn	Urban For-Prk
Major:					
PlSc 177, Floral Design -	-	2	-	-	
PlSc 219, Prairie & Comm For	-	-	-	-	2
PlSc 341, Land Bidding & Contr	-	-	1	-	-
PlSc 355, Woody Land Plants	3	3	3	3	3
PlSc 360, Hort Food Crops	4	4	-	4	-
PlSc 365, Herb Land Plants	-	-	2	-	2
PlSc 368, Plant Propagation	3	3	-	3	-
PlSc 372, Grnhse Crop Prod	-	-	-	3	-
PlSc 375, Turf Management	-	-	3	-	3
PlSc 382, Nursery Crop Prod	-	-	-	2	-
PlSc 465, Advanced Land Plants	-	-	2	-	2
PlSc 485, Arboriculture	-	-	-	-	3
PlSc 484, Pl Tiss Cult & Micro	2	-	-	-	-
PlSc 486, Eco-Physiol of Hort Crp	2	2	2	2	2
PlSc 491, Hort Seminar	1	1	1	1	1
PlSc Electives	5	7	4	2	2
Agriculture:					
Ent 350, General Entomology	5	5	5	5	5
PlSc 315, Genetics	3	3	3	3	3
PlSc 315L, Genetics Lab	1	1	-	1	1
PlSc 323, Prin of Weed Science	-	3	3	3	3
PPth 324, Intro Plant Path	3	3	3	3	3
PPth 455, Plant Disease Mgt	-	-	-	3	-
PPth 456, For & Shade Tree Path	-	-	-	-	3
Soil 210, Intro to Soil Science	-	4	4	4	4
Basic and Applied Sciences:					
Biol 202, Intro Micro	2	-	-	-	-
Biol 202L, Intro Micro Lab	1	-	-	-	-
Bot 380, Plant Physiology	4	4	-	-	-
Bot 460, Plant Ecology	-	-	3	-	3
Chem 240, Survey of Organic Chem OR/ Chem 260, Elements of Bioc	-	4	-	3/4	3/4
Chem 341, Org Chem I	3	3	-	-	-
Chem 341L, Org Chem Lab		1	1	-	-
Chem 342, Org Chem II	3	-	-	-	-
CSci 147, Microcomp Pkgs	3	3	3	3	3
Math 146, Applied Calculus I		4	4	-	-
Phys 120, Fund of Physics	-	3	-	-	-
Stat 330, Intro Statistics	3	3	3	3	3
Humanities and Fine Arts/ Soc and Behavioral Sci: (including AgEc 201 or 202, Micro or Macro)	12	12	12	12	12
Written and Oral Communications:					
Comm 110, Fund Public Speaking	3	3	3	3	3
Engl 320, Practical Wtg	3	3	3	3	3
Related:					
Acct 102, Fundamentals of Acct	-	-	-	3	-
AgEc 380, Pub Pol Choices	-	-	-	-	1
AgEc 382, Econ State & Loc Govt	-	-	-	-	2
Busn 350, Prin of Mgt	-	-	-	3	3
Busn 431, Busn Law I	-	-	3	-	-
Busn 450, Human Resource Mgt	-	-	-	3	-
HPER 426, Parks & Rec Adm	-	-	-	-	3
LA 331, Intro to Planting Design	-	-	-	-	3
PolS 360, Prin of Pub Admin	-	-	-	-	3
Wellness	2	2	2	2	2
Minor in Biotechnology (See Hort Biotech Opt)	13	-	-	-	-
Minor in Landscape Arch (See Landscape Hort Opt)	-	-	16	-	-
General Electives	11	13	9	16-17	8-9
Curriculum Totals	128	128	128	128	128

Horticulture Minor

Required Horticulture Courses:	**Credits**
PlSc 210, 211, Hort Science, Lab	3,1
At least three of the following four courses:	
PlSc 355, Woody Landscape Plants	3
PlSc 360, Horticultural Food Crops	4
PlSc 365, Herbaceous Landscape Plants	2
PlSc 368, Plant Propagation	3
Electives from the following to total 18 credits minimum:	
Any 300-400 level PlSc course (except PlSc 321), Ent 350, PPth 324, or Soil 210.	

Two-Year Pre-Forestry

First Year

AgEc 201, Prin Microeconomics	3
Agri 150, Ag Orientation	1
Agri 189, Skills for Academic Success	1
Biol 150, General Biology	3
Bot 170, Plant Form and Diversity	4
Chem 121, 122, 121L, Chem I,II, Lab I	3,3,1
Engl 110, 120, College Composition I,II	3,3
Math 103, 105, or above, College Alg, Trig	3,3
Wellness	2
Total	33

Second Year

Comm 110, Fund of Public Speaking	3
CSci 147, Microcomputer Packages	3
Ent 350, General Entomology	5
Phys 120, Fund Physics	3
PlSc 219, 355, Pr and Com For, Wdy Land Pla	2,3
PlSc 315, 315L, Genetics, Lab	3,1
Soil 210, Intro Soil Science	4
Soc Sci, Hum and Fine Arts Electives	6
Total	33

Microbiology

Microbiology is a fundamental biological science that offers a variety of challenges and opportunities. Some of the most important scientific discoveries in this century have been made by microbiologists. Since 1910, about one-third of the Nobel Prizes in medicine and physiology have been awarded to microbiologists. The discipline covers a wide spectrum of specialized interest areas that show how microbes affect human and animal health, our environment, 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 find it advantageous to minor in microbiology.

Students may minor in microbiology by selecting a total of 16 credits including Microbiology 350-350L. Additional credits are to be earned in other 300- or 400-level microbiology courses, Plant Pathology 460, or Veterinary Science 365.

Recommended Curriculum Microbiology

First Year	**Credits**
Agri 189, Skills for Academic Success	1
Biol 150, 150L, General Biology, Lab	3,1
Chem 121, 121L, General Chemistry I, Lab	3,1
Chem 122, 122L, General Chemistry II, Lab	3,1
Comm 110, Fund of Public Speaking	3
Engl 110, 120, College Composition I, II.	3,3
Biol 202, 202L, Intro Micro, Lab or Zoo Elective	3-4
Math, or Statistics (GenEd)	3-4
Wellness	2
Second Year	
Chem 341, 341L, Organic Chem I, Lab	4,1
Chem 342, Organic Chem II	3
Micr 350, 350L, Gen Microbiology, Lab	3,1
Phys 211, 211L, College Phys I, Lab	3,1
Phys 212, 212L, College Phys II, Lab	3,1
PlSc 315, 315L, Genetics, Lab.	3,1
Elective Major Courses	2-5
Math, or Statistics Elective.	2-4
Third Year	
Bioc 460, 461, Found of Biochem I,II	4,4
Elective Major Courses	13-15
Humanities	6
Social and Behavioral Sciences.	3-6
Fourth Year	
Micr 486, Capstone	3
Elective Major Courses	5-11
Other Writing or Speaking	3
Social and Behavioral Sci	3-6

General Electives (balance of credits to total at least 128)

Natural Resources Management

The natural resources management major prepares students to fill positions requiring a broad background in natural resources as well as depth in one or two specific areas. The program addresses the biological, engineering, and social and economic aspects of managing natural resources as an integrated system.

The natural resources management major, leading to a B.S. degree, is offered through the Colleges of Agriculture, Engineering and Architecture, and Sciences and Mathematics.

Emphasis Areas

Natural resources management majors may choose from courses in one of the three emphasis areas.

Biotic Resources Science: This emphasis area deals with basic scientific principles that govern the interrelationship between biotic (e.g., plants, animals, insects, microorganisms) and abiotic factors (e.g., climate, soils) in major ecosystems and the use of these principles for environmentally sound management of natural resources and agroecosystems. Topics of study include grassland ecosystems, wetland ecosystems, land reclamation, agroforestry, wildlife, sustainable agriculture, soil biology, and others.

Physical/Earth Resources Sciences: This emphasis area provides an understanding of the physical and chemical aspects of ecosystems. Topics of study include hydrology, water management and quality, waste management, soil properties, data acquisition, energy resources, and land-use management.

Social Sciences: This emphasis area prepares students for management, administrative, regulatory, and policy positions that require a broad understanding of the social, biological, and physical aspects of natural resources management and allocation. This area concentrates on human factors (social, political, economic) in environmental management, while recognizing constraints and opportunities presented by physical and biological factors.

Recommended Curriculum
Natural Resources Management

First Year	Credits
AgEc 201, Prin of Microeconomics	3
Agri 189, Skills for Academic Success	1
Biol 150, General Biology	3
Chem 121 or 150, Gen Chem I or Prin of Chem I	3
Chem 121L or Geol 105L, Lab	1
Comm 110, Fund of Public Speaking	3
Engl 110, 120, College Composition I, II	3,3
Geol 105, Physical Geology	3
Math 104, Finite Mathematics	3
NRM 150, Orientation	1
Wellness	2
Total	29

	Options		
Second Year	Biotic Resources	Physical & Earth Resources	Social Sci.
AgEc 375, Appl Ag Law	2	2	2
NRM 225, Natural Resources & Agroeco	3	3	3
Bot 170 or Zoo 170, 170L, Plant Form or Gen Zoo	4	4	4
Bus 280 or Econ 220, Intro to Busn or Econ of Reg	3	3	3
Engl 215 or 320, Wtg for Work or Pract Writing	3	3	3
Hist 267 or Pols 215, US Envir Hist or Prob & Pol in Amer Govt	3	3	3
Math 146, Applied Calculus I	-	4	-
Math 147, Applied Calculus II	-	4	-
NRM 264, Nat Resource Mgt	3	3	3
Soil 210, Intro to Soil Sci	4	4	4
Stat 330, Intro Statistics	3	3	3
Emphasis Area	2	-	5
Free Electives	5	-	2
Totals	35	36	35
Third Year			
AgEc 380, Publ Policy Choice	1	1	1
AgEc 382, Econ of State and Local Govt	-	-	2
ASM 299, Meas in NRM	-	1	-
Biol 364, General Ecology	3	3	3
Chem 122, Gen Chem II	3	-	-
Chem 260, Elem of Biochem	4	-	-
Econ 341, Intermed Microecon	-	-	3
Geol 412, Geomorphology or Soil 444, Soil Genesis & Survey	-	4	-
NRM 381, Resource Econ	2	2	2
Soc 340, Soc Research Meth or AgEc 339, Quan Meth & Decision Making	-	-	3
Humanities and Fine Arts	3	3	3
Science and Technology	2	2	2
Emphasis Area	6	2	2
Free Electives	6	12	9
Totals	31	30	31
Fourth Year			
Capstone	3	3	3
Cultural Diversity	3	3	3
Geog 455, Geo Info Systems	3	3	3
Humanities and Fine Arts	3	3	3
NRM 491, Senior Seminar	1	1	1
Emphasis Area	17	17	16
Free Electives	2	2	3
Totals	32	32	32
Curriculum Totals	128	128	128

Plant Protection Major

Plant protection is the management of insects, weeds, and diseases that affect agronomic and horticultural crops. The major is interdisciplinary, combining plant pathology, entomology, and plant sciences. The major gives students a firm foundation in pest and disease management and other critical agronomic areas such as soil science, crop and weed relationships, plant genetics, and horticulture. The plant protection major is designed to prepare professionals who are directly involved with pest management, who consult and advise others in management practices, or who work with businesses that are impacted by pest problems.

Students may obtain either a minor or major. Because of the important differences in production systems, students may select an option in either agronomic or horticultural plant protection. This major also allows students to take electives to fill the requirements for entry into a graduate program in plant sciences, entomology, or plant pathology.

Recommended Curriculum
Plant Protection

First Year	Credits
Agri 150, Ag Orientation	1
Agri 189, Skills for Academic Success	1
AgEc 201, Prin of Microeconomics	3
Biol 150, 150L, General Biology, Lab	3,1
Chem 121, 121L, General Chemistry I, Lab I	3,1
CSci 147, Microcomputer Packages	3
Engl 110, 120, College Composition I, II	3,3
Math 103, College Algebra	3
PlSc 110, World Food Crops or PlSc 210, 211, Hort, Lab	3-4
Humanities and Fine Arts	3
Second Year	
Biol 202, 202L, Intro Microbiol, Lab	2,1
Bot 170, Plant Form and Diversity	4
Chem 122, 122L, General Chemistry II, Lab II	3,1
Comm 110, Fund of Public Speaking	3
PlSc 291, Sophomore Seminar	1
Soil 210, Intro to Soil Sci	4
Stat 330, Intro Statistics	3
Field Crops or Hort Specialization	3
Humanities and Fine Arts	3
Social and Behavioral Sciences	3
Wellness	2
Third Year	
AgEc 375, Applied Ag Law	2
Biol 364, General Ecology	3
Chem 260, Elements of Biochemistry	4
Engl 320, Practical Writing	3
PlSc 315, 315L, Genetics, Lab	3,1
PlSc 323, Principles of Weed Science	3
PPth 324, Intro Plant Pathology	3
Field Crops or Hort Specialization	6
General Electives	6
Fourth Year	
Bot 380, Plant Physiology	3
PlSc 453, Advanced Weed Science	2
PlSc 496, Internship	1-3
PlSc 491, Senior Seminar	1
Soil 322, Soil Fertility	3
Field Crops or Hort Specialization	8-10
General Electives	10-13
Curriculum Total	128

Curriculum Options

Agronomic: This option is for students interested in pest management in field crop production.

Field Crops Specialization	20 Credits
Ent 350, Gen Entomology	5
PlSc 225, Prin Crop Production	3
PlSc 320, Prin Forage Prod	3
PlSc 455, Cropping Systems	3
PPth 454, Diseases/Field Crops	3
Elective	3

Horticulture: This option is for students interested in management of urban plant problems and pests associated with fruits, vegetables, landscape plants, and nursery/greenhouse crops.

Horticulture Specialization	19 Credits
Ent 350, Gen Entomology	5
PlSc 355, 365, Landsc Plants	3, 2
PlSc 360, Hort Food Crops	4
PlSc 486, Eco-Physio/Hort Crop	2
PPth 455/456, Plant Disease Mgt	3

Soil Science

Soil science deals with soil and the associated atmosphere, especially the environment in which crops grow. Study is designed to provide understanding of these basic resources. This includes the processes operative in the soil-plant atmosphere continuum and their amenability to management for improving results with crops and for soil protection. Study deals with the major areas of soil science, including fertility management, conservation, physics, chemistry, genesis, and classification, as well as the closely interacting field of agricultural meteorology.

Students also gain an appreciation for environmental concerns such as erosion, land-use decisions, and water quality.

The following requirements must be met by all majors in soil science:

Recommended Curriculum
Soil Science

	Credits	
First Year	F	S
Agri 150, Ag Orientation	1	
Agri 189, Skills for Academic Success	1	
Chem 121, 121L, Gen Chemistry I, Lab	3,1	
Chem 122, 122L, Gen Chemistry II, Lab		3,1
Engl 110, 120, College Composition I,II	3	3
Math 103, 105, College Algebra, Trig	3	3
PlSc 110, World Food Crops		3
Wellness		2
Electives	5	2
Totals	17	17
Second Year		
ASM 264, Natural Resource Mgt Sys		3
CSci 147, Microcomp Pkgs, 122, BASIC, or 126, FORTRAN		3
Math 146 or 165, Calculus	4	
Phys 211, 211L, General Physics, Lab	3,1	
Soil 210, Intro to Soil Science	4	
Soil 217, Intro to Meteorol and Climat		3
Soil 322, Fertility and Fertilizer		3
Electives	3	4
Totals	15	16

Third Year	F	Credits S
Biol 150, General Biology	3	
Biol 202, 202L, Intro Microbiol, Lab		2,1
Chem 240 or 341, Organic Chemistry	3	
Comm 110, Fund of Public Speaking		3
Soil 321, Mgt and Conservation	3	
Soil 333, 339, Managing Soil Phys Prop, Lab	2,1	
Stat 330, Intro Statistics		3
Electives	4	6
Totals	16	15
Fourth Year		
Engl 215, Wtg/Work or 320, Pract Wtg		3
Soil 444, Soil Genesis and Survey	4	
Soil 455, Soil Chemistry	3	
Soil 499, Soil Microbiology		2
Soil 491, Capstone Seminar I, II	1	1
Electives	8	10
Totals	16	16
Curriculum Total		128

Soil Science Minor

A minor in soil science requires a minimum of 16 semester credits. An introductory course and at least one course in each of the soil science discipline areas are required. The following guidelines are recommended:

Soil 210, Intro to Soil Science
Soil 217 or 333 and 339 or 447
Soil 321
Soil 322 or 455 or 465
Soil 410 or 444

Up to two credits may be substituted from a related course in a different department. For example, a civil engineering course emphasizing soil mechanics (e.g., CE 316) may be substituted for a soil physics course. Contact the department chair (231-8903) for questions about course substitution.

Veterinary and Microbiological Sciences

This department offers instruction in veterinary science and microbiology (listed earlier), including the anatomy and physiology of domestic animals; the epidemiology and prevention of livestock diseases; courses in virology, medical terminology, animal restraint, and introduction to the veterinary profession. The courses are primarily for supplementary training to students majoring in animal or biological sciences. The veterinary technology major is offered through the department.

Recommended Curriculum Pre-Veterinary Medicine

All veterinary schools stress the importance of high scholastic standing and judge applicants on academic preparation, character, personality, general fitness, and adaptability for veterinary medicine.

For entrance, most veterinary medical schools require at least two years of general college study.

Because the number of students admitted to veterinary schools is limited, prospective students should check the specific requirements of the college of their choice well in advance to make certain that preparatory work is properly channeled. Consult the pre-veterinary adviser.

Pre-Veterinary students should enroll in the College of Agriculture.

Veterinary Technology

Veterinary technology is an exciting and challenging major that offers a multitude of career opportunities in animal health care and related areas. The veterinary technology major leads to the B.S. degree. 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 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 second year of the program is limited to a maximum of 24 students who are selected on a competitive basis.

The veterinary technology program is accredited by the American Veterinary Medical Association.

General Courses	Credits
Acct 102, Fundamentals of Acct	3
Agri 189, Skills for Academic Success	1
ARSc 114, Intro to Animal Sciences	3
Biol 150, 150L, General Biology, Lab	3,1
Biol 202, 202L, Intro Microbiology, Lab	2,1
Chem 117, 117L, Chem Concepts, Lab or Chem 121, 121L, Gen Chem I, Lab	3,1
Comm 110, Fund of Public Speaking	3
CSci 146, Busn Use or 147, Micro Packages	3
Engl 110, 120, College Composition I, II	3,3
Engl 320, Practical Writing	3
Math 104, Finite Math	3
Micr 460, Pathogenic Microbiology	3
PlSc 315, 315L, Genetics, Lab	3,1
VetS 194, Breeds of Animals	1
VetS 365, Fund of Animal Disease	4
General Electives	13
Humanities and Fine Arts	6
Science and Technology Electives	3
Social and Behavioral Sciences	6
Wellness	2
Pre-Professional Veterinary Technology Courses	
VetS 115, Medical Terminology	1
VetS 125, Animal Restraint	2
VetS 135, Anat and Phys of Domestic Ani	3
VetS 136, Anatomy and Phys Lab	1
VetS 150, Intro to the Vet Profession	1
Professional Veterinary Technology Courses (limited enrollment)	
VetS 196, Ward/Clinic Care 2 @ 1 credit	2
VetS 255, Fund of Vet Radiography	3
VetS 256, Vet Clinical Tech. and Instruments	3
VetS 259, Small Animal Diseases	2
VetS 357, Vet Pharmacology	3
VetS 358, Vet Surg Nurs Tech	4
VetS 359, Vet Hosp Info and Proc	2
VetS 385, Vet Clin Path I	3
VetS 386, Vet Clin Path II	3
VetS 387, Vet Clin Path III	3
VetS 485, Externship	12
VetS 496, Ward/Clinic Care 2 @ 1 credit	2
Curriculum Total	128

College of Arts, Humanities, and Social Sciences

Minard Hall 221 (701) 231-8338
Thomas J. Riley, Dean

In addition to providing the preparation needed to earn a livelihood in our highly competitive society, the academic majors in the College of Arts, Humanities, and Social Sciences provide skills that generalize to the world in which its graduates will live.

The successful graduate will have mastered critical thinking, be able to communicate effectively, and will be able to call on the wisdom of the past to negotiate an increasingly diverse and global society.

The graduate will be prepared for leadership positions in a variety of fields from business and the arts to government and academe.

Comprehensive preparation in the college emphasizes cooperative education as well as classroom experience.

Degree Programs

The College of Arts, Humanities, and Social Sciences offers basic undergraduate degree programs. The breadth in cultural background and analytical thinking, characteristic of liberal education, are stressed in the degree programs.

B.A. or B.S. Degree

Students seeking a broad educational background may choose to complete requirements for either a Bachelor of Arts or Bachelor of Science degree. Majors available for either degree include the following:

- Art
- English
- French
- German
- History
- Humanities
- Mass Communication
- Music
- Political Science
- Social Science
- Sociology
- Spanish
- Speech Communication
- Theatre Arts

B.S. Degree with Special Professional Intent

Students planning a specific career with a baccalaureate background are encouraged to pursue the related curriculum leading to the Bachelor of Science degree. Majors available for the B.S. with special professional intent are the following:

- Communication
- History
- Political Science

B.F.A. Degree

A Bachelor of Fine Arts in theatre arts is available and is outlined under the Division of Fine Arts.

Graduate Degree

Master's degrees are offered in English, history, mass communication, political science, social science, sociology, speech communication, and theatre arts. Refer to the Graduate Bulletin for details.

Teacher Certification

Many of the majors available through the College of Arts, Humanities, and Social Sciences lead to careers in teaching. Students who are interested in becoming professional educators should refer to the degree program offered through the School of Education. Teacher certification is available in the following areas: English, French, German, history, music*, social science, sociology, Spanish, and speech communication.

*K-12 certification available; all others are secondary only.

Degree Requirements

All degree candidates must apply for graduation through the Office of Student Academic Affairs according to University procedures and deadlines.

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

Bachelor of Arts degree requirements include completion of two years of one foreign language at the college level. Bachelor of Science degree requirements include completion of an approved minor.

Students with two or more years of a foreign language in high school may earn advanced placement credit according to the guidelines listed in the modern languages section.

Students in the college may take courses under the pass/fail option for free elective credits only, with a limit of 16 hours.

All majors must complete the 37-credit University-wide general education requirements. An additional 12 credits are required by the College of Arts, Humanities, and Social Sciences as follows:

	Credits
Fine Arts (Art, Music, Theatre Arts)	3
Humanities (English, French, German, Humanities, History, Philosophy, Religion, Spanish	3
Social Science (Anthropology, Communication, Economics, Political Science, Sociology)	3
Area outside the student's major	3
Total	12

All courses except internships may be used to fulfill these requirements.

Field Experience Courses

1. Field Experience/Internships (496) do not meet the requirements for general education.

2. Departments may adopt either pass/fail or letter grade options for Field Experience/ Internships.

   a) Where Field Experience/Internship credits are a requirement of a program, these credits may be graded pass/fail to satisfy requirements for a major.

   b) Where Field Experience/Internship credits are not a requirement of a program, up to 3 credits may be graded pass/fail to satisfy requirements for a major.

Right of Petition

Students who consider that they should be entitled to relief or deviation from any academic rules and regulations administered by the college may submit their case for consideration by the Committee on Student Progress.

Pre-Professional Curricula

Requirements for admission to most professional academic programs may be met at NDSU. The specific courses taken in a pre-professional program depend primarily upon the admission requirements of the program to which a student wishes to apply.

Pre-Law

Although a baccalaureate degree is a requirement for admission to law school, most law schools do not prescribe a specific undergraduate program. Emphasis is placed on the development of scholarly skills and insights rather than the mastery of a prescribed subject. Thus, the pre-law student may elect the Bachelor of Arts or Bachelor of Science degree, selecting a major or minor of special personal interest.

To attain the necessary breadth of knowledge for successful practice, the student should elect the basic courses in several fields of learning. At the same time the student should avoid an elective program of only single courses in many fields, opting instead for some depth of study in each elected field. While a listing of all relevant fields would be impossible, the following disciplines are suggested as a guide: accounting, communication, economics, foreign language, history, mathematics, political science, and natural or physical sciences.

Additionally, the pre-law student should pursue sufficient advanced courses in one or two fields to master the analytic skills that derive from such specialization. The major and minor sequence meet this criterion. For further development of the mental discipline necessary for success in law school, students are encouraged to select advanced courses demanding high-quality performance.

Pre-Medicine and Pre-Dentistry

The suggested program will meet the requirements of most medical and dental schools. In general, these requirements include organic chemistry, physics, and the equivalent of a year of general biology. Some college-level mathematics, such as Math 146-147, is strongly recommended. The Bachelor of Arts degree program is recommended. Contact the Department of Zoology for additional information (231-8421).

Pre-Medical and Pre-Dental Requirements

	Credits
English and Speech Communication	9
Foreign Language	12
Humanities and Social Sciences	28*
Major	30*
Sciences and Mathematics	32
Skills for Academic Success	1
Wellness	2
Electives	10
Total	124

*Approximate number of credits in this subject area

KDSU

KDSU 9.9 FM is an affiliate of North Dakota Public Radio. Students in the College of Arts, Humanities, and Social Sciences have the opportunity to gain valuable experience as interns at the station, which is located in the Memorial Union.

Interdisciplinary Minors

Interdisciplinary study involves an integration of more than one perspective on a topic. Programs in two interdisciplinary minors are available: gerontology and women's studies.

Gerontology Minor

This program is sponsored through the College of Human Development and Education and the College of Arts, Humanities, and Social Sciences. It makes use of the Tri-College University resources to provide students with an integrated understanding of the process of aging, aging services, and the aged in America. For further information, refer to the Human Development and Education section.

Women's Studies Minor

The women's studies minor is an interdisciplinary program that may complement various majors. It is sponsored by the College of Arts, Humanities, and Social Sciences and College of Human Development and Education. For further information, refer to the Human Development and Education section.

Anthropology

See the Department of Sociology and Anthropology.

Art

See the Division of Fine Arts.

Communication

Majors and minors in speech communication and mass communication at both an undergraduate and graduate level are available through the Department of Communication. Students may elect to concentrate their studies in one or more areas within the department.

Mass Communication

The program in mass communication includes a 36-credit mass communication major and a 21-credit minor. Students with a mass communication major are prepared for careers in public relations, institutional relations, information services, technical writing, newspaper and magazine journalism, radio and television journalism and production, or for graduate studies.

Major. Students choosing to major in mass communication will take a 21-credit core consisting of Comm 112, 200, 310, 313, 320, 431, and 437. Students choose six credits of professional specialization courses focusing on an area of interest, including Comm 240, 242, 345, 362, 370, 425, 445, and 472. Six hours of advanced electives must be selected from the following: Comm 434, 435, 436, 442, 443, and 495. The remaining three credits include one other course designated in English (215, 320, 358, 454), business (350, 360, 461), communication (211, 214, 216, 308, 315, 483), or sociology (340, 341).

Professional Intent Majors. A number of professional intent majors, including sports information, government information, religious communication, editing, and arts and entertainment promotion, are designed for students with specific communication career goals. The 72-credit professional major is made up of a 30-credit mass communication major, a 24-credit cognate, and a research-methods sequence. The student also takes an 18-credit component designed to enhance career goals or personal interests.

The professional-intent major is designed by the student and adviser and is submitted to the dean of the college for approval.

Minor. Students choosing to minor in mass communication will take Comm 112, 200, 310, and 431; six credits of professional specialization courses; and three credits of electives in mass communication.

Recommended Curriculum Mass Communication

	Credits	
First Year	**F**	**S**
Comm 112, Understanding Media		3
Comm 114, Human Communication	3	
Engl 110, 120, College Composition I, II	3	3
Math 103 or 104, College Alg or Finite Math	3	
Univ 189, Skills for Academic Success	1	
Behavioral/Soc Sci Electives	3	3
Humanities Electives	3	3
Science and Lab		4
Wellness		2
Totals	16	18

	Credits	
Second Year	**F**	**S**
Comm 110, Fund of Public Speaking	3	
Comm 200, 310, Intro, Ad Media Writ	3	3
Comm 313, Editorial Processes		3
Behavioral/Soc Sci Electives	3	3
Humanities/Fine Arts Electives	3	3
Minor Courses	3	3
Totals	15	15
Third Year		
Comm 320, Communication Analysis	3	
Comm 362 Prin Design Print	3	
Comm 370, Prin Public Relations		3
Humanities Electives		3
Mass Comm Electives	3	3
Science/Technology	3	3
Electives	3	4-5
Totals	15	16-17
Fourth Year		
Comm 431, Comm Ethics		3
Comm 437, Mass Comm Theory	3	
Soc 340, 341, Soc Research Meth, Lab		3,1
Behavioral/Soc Sci Electives	3	3
Minor Courses	9	6
Totals	15	16
Curriculum Total		126-127

Speech Communication

The undergraduate speech communication major consists of 36 credits. The major is designed to provide students with a theoretical basis of knowledge about human communication, and to give students an opportunity to gain practical communication experience.

Students choosing a major in speech communication will take a core of the following courses: Comm 114, 212, 216, and 320. They must also take 9 credits of required options and 15 credits in elective courses (with a minimum of 9 credits of the 36-credit major at the 400 level). For those seeking speech communication as a second major, up to six credits of electives from the student's other major may be used to fulfill the noncore requirements of the speech communication major, if approved by the chair.

Speech Communication Education.

Students who major in speech communication education are required to apply to the School of Education for admission to the teacher education program. Upon acceptance, the student must take the required education courses, as well as meet the general education requirements for the School of Education, which vary from the requirements of the College of Arts, Humanities, and Social Sciences. Students seeking the speech communication education major will take Communication 150, 211, 212, 214, 216, 222, 314, 315, 401, plus 3-6 credits of electives in speech communication. Students choosing the speech communication education minor will take Communication 211, 212, 216, 314, 315, plus 6 electives in speech communication.

Minor. Students who seek to minor in speech communication will take Communication 114, 216, plus 6 credits of required options and 6 credits of electives (3 of the 6 credits of electives must be at the 400 level).

Professional Degree Tracks.

For those students seeking to combine speech communication with another discipline, the following courses are recommended as either electives or part of a professional degree track program:

Agricultural Communication: Comm 114, 212, 214, 216, 271, 308, 315, 370, 483.

Broadcast Communication: Comm 114, 211, 212, 214, 216, 222, 271, 308, 314, 315, 370, 483.

Business and Organizational Communication: Comm 114, 212, 214, 216, 271, 308, 314, 315, 370, 483.

Communication for the Helping Professions: Comm 110, 114, 211, 212, 216, 222, 271, 308, 315, 480, 483.

Communication for the Scientific and Technological Professions: Comm 110, 114, 212, 214, 216, 222, 271, 315, 483.

Human Development Communication: Comm 114, 212, 214, 216, 271, 308, 315, 480, 483.

Interpersonal Communication: Comm 114, 212, 214, 216, 271, 315, 480.

Legal Communication: Comm 110, 114, 212, 150, 214, 216, 222, 271, 308, 314, 370, 401, 402, 483.

Military Communication: Comm 110, 114, 212, 214, 216, 271, 308, 311, 312, 314, 315, 323, 370, 402, 483.

Political Communication: Comm 114, 150, 211, 214, 216, 271, 308, 314, 320, 401, 402, 483.

Rhetorical Communication: Comm 114, 150, 211, 214, 216, 222, 271, 308, 314, 320, 370, 401, 402.

Sales and Public Relations Communication: Comm 114, 212, 214, 216, 222, 271, 308, 314, 315, 370, 402, 483.

Recommended Curriculum Speech Communication

	Credits	
First Year	**F**	**S**
Comm 110, Fund of Public Speaking		3
Comm 114, Intro to Human Comm	3	
Comm 150, Forensic Practicum	1	1
Engl 110, 120, College Composition I, II	3	3
Univ 189, Skills for Academic Success	1	
Humanities	3	3
Math/Science	3	3
Social Sciences	3	3
Wellness		2
Totals	17	18
Second Year		
Comm 150, Forensic Practicum	1	1
Comm 212, Interpersonal Comm		3
Comm 214, Persuasive Speaking	3	
Comm 216, Intercultural Comm	3	
Comm 308, Bus and Prof Speaking		3
Humanities	3	3
Math/Science and Lab	3	3
Social Sciences	3	3
Totals	16	16
Third Year		
Comm 314, Argumentation & Debate		3
Comm 315, Small Group Comm	3	
Comm 320, Communication Analysis	3	
Comm Electives	6	3
Req Classes by Degree Option	6	9
Totals	18	15
Fourth Year		
Comm 401, Survey of Rhet Theory	3	
Comm 402, Contemp Rhet Theory		3
Comm 483, Organiz Communication	3	
Req Classes by Degree Option	6	6
Electives	3	6
Totals	15	15
Curriculum Total		130

English

The department intends that its students will form strong communication skills, establish research methods, develop flexibility in facing complex situations, and increase their awareness of the humanities tradition. These ideals suit both the liberal arts major and the practical, pre-professional student. Success in the marketplace is tied to the ability to analyze, understand, and restate written material. Such success requires habits of investigation, a fluency with documents and speeches, and the self-assurance to handle unfamiliar materials. Thus, in its offerings, the department serves the traditions of language and literature, while it responds to the needs of today's students.

The department further reflects such responses in its participation in the Humanities major, the Scholars Program, and the Women's Studies minor. Moreover, the department supports the Cooperative Education Program and welcomes efforts to create student internships.

Freshman English requirements are met by completing English 110 and 120 or 111 and 121. An alternative two-semester sequence (English 112 and 122) is available to non-native speakers.

Majors

Presently there are two major sequences leading to the Bachelor of Arts degree. One is for students in liberal arts. The second is for students preparing for high-school teaching. Either major requires completion of two years of one foreign language (or the equivalent of second-year competency), and a minimum of 30 credits in English courses beyond the Freshman English sequence must be completed by English teaching majors and 33 credits by English liberal arts majors. English teaching majors should contact the School of Education or the English education adviser for additional requirements.

Transfer credits with grades of D are not accepted for English major requirements.

Liberal Arts Major: Engl 251 and 252 or 261 and 262, 271, 358, one English linguistics/ language course (450 or 451 or 452 or 453 or 454), 467, and nine of the remaining 15 elective credits at the 400-course level.

Teaching Major: Engl 222, 240, 251 or 252, 261 or 262, 271, 358, 380, 450, 451, and 458.

Minors

Minor sequences are available for teaching and liberal arts. In addition, there is a third sequence for students preparing for a writing career.

The teaching minor requires six credits in English educational methods and 15 credits in English beyond the Freshman English sequence. The other two minors require a minimum of 21 credits in English beyond the Freshman English sequence.

Liberal Arts Minor: Engl 251 and 252 or 261 and 262, 271, 358, and nine elective credits.

Teaching Minor: Engl 240, 251 or 252, 261 or 262, 358, one English linguistics course (450 or 451 or 452 or 453 or 454), and Educ 481 and 482.

Writing Minor: Engl 215 or 320, 322, 323, 358, 458, and six elective credits.

Recommended Curriculum Liberal Arts

	Credits	
First Year	**F**	**S**
Comm 110, Fund of Public Speaking		3
Engl 110, 120, College Composition I, II	3	3
Math 104 or higher OR CSci 122	3	
Univ 189, Skills for Academic Success	1	
Foreign Language	4	4
Science and Tech, Lab	4	
Soc and Behav Sci	3	3
Wellness		2
Elective		3
Totals	18	18
Second Year		
Engl 261, 262, Surv of Am Lit I, II	3	3
Engl 271, Literary Analysis	3	
Foreign Language	3	3
Humanities and Fine Arts	3	3
Science and Tech	3	3
Elective (e.g., career-oriented, minor)		3
Totals	15	15
Third Year		
Engl 251, 252, Surv of Brit Lit I, II	3	3
Engl 322 or 323, Creative Writing		3
Engl 358, Intermed Composition		3
Engl 380, Shakespeare	3	
American or British Novel	3	3
Electives (e.g., minor)	6	3
Totals	15	15
Fourth Year		
Engl 467, Capstone		3
400-Level English	9	9
Electives (e.g., career-oriented, minor)	6	3
Totals	15	15
Curriculum Total		126

Division of Fine Arts

The Division of Fine Arts faculty believes that the practice and proliferation of art positively reflects cultural awareness, diversity, and endurance, as well as freedom of expression.

The Division of Fine Arts includes the visual arts, music, and theatre.

Visual Arts

Art students develop a life-long commitment to visual understanding and expression, which always serves them well. Career applications include elementary/secondary art education, commercial art/graphic design, animation, illustration, arts marketing, commercial photography, museum/gallery work, exhibition design, independent studio art, municipal art programs, art criticism, independent art instruction, art media research, arts organizations, arts-funding agencies, and university instruction.

A comprehensive curriculum in visual arts is offered in an intimate, highly supportive studio program. Emphasis is on developing individual concept and content within a broad range of knowledge and skills. The faculty is composed of active studio artists, all with extensive professional experience outside of the academic setting. Well-equipped facilities are maintained for drawing, painting, printmaking, photography, sculpture, and ceramics.

All majors start the program with a strong foundation in design and drawing. Through experience in diverse art media, majors develop an area of concentration culminating in a six-credit baccalaureate project and thesis exhibition during the senior year. Limited scholarships are awarded to motivated upper-class students. All art students are strongly encouraged to supplement their education with outside art experience, such as summer internships, and to participate in national and international art competitions and exhibitions.

Art Major

Students majoring in art may pursue either the Bachelor of Science, requiring a minor in a second field, or the Bachelor of Arts, requiring a foreign language completed through the intermediate level. All students must complete the College of Arts, Humanities, and Social Sciences basic curriculum plus 50 credits in art, as listed, with a minimum total of 122 credits, as shown in the sample curriculum.

Art Requirements

Foundation Requirements	**Credits**
Art 122, Two-Dimensional Design	3
Art 124, Three-Dimensional Design	3
Art 130, Drawing I	3
Art History Requirements	
Art 210, Art History I	3
Art 211, Art History II	3
Art 451, Hist of American Art	3
Art 452, Contemporary Art OR Any Upper-Division Art History Elective	3

Studio Requirements	**Credits**
Art 220, Painting I OR Art 270, Printmaking I	3
Art 230, Drawing II	3
Art 250, Ceramics I OR Art 265, Sculpture I	3
Art 280, Photography	3
Art 361, Drawing III	3
Art 489, Baccalaureate Project	6
Upper-Division Level Studio Electives	8
Art Requirements	50

Recommended Curriculum Art Major

	Credits	
First Year	**F**	**S**
Art 122, 124, Two-Dim, Three-Dim Design	3	3
Art 130, 230, Drawing I, II	3	3
Engl 110, 120, College Composition I, II	3	3
Math 104, Finite Mathematics	3	
Univ 189, Skills for Academic Success	1	
Science and Lab		4-5
Social/Behavioral Science	3	3
Wellness	2	
Totals	18	16-17
Second Year		
Art 210, Art History I	3	
Art 211, Art History II		3
Art 280, 361, Photog I, Drawing III	3	3
Comm 110, Fund of Public Speaking	3	
Foreign Language or Minor	3	3
Humanities Elective		3
Math/Technology Electives	3	3
Totals	15	15
Third Year		
Art 220 or 270, Painting or Printmak	3	
Art 250 or 265, Ceramics or Sculp		3
Art 451, Hist of American Art		3
Foreign Language or Minor	3	3
Social/Behavioral Science	3	3
Studio Elective	3	
Electives	3	3
Totals	15	15
Fourth Year		
Art 452, Contemporary Art		3
Art Studio Electives	6	3
Baccalaureate Project		6
Humanities Elective	3	
Electives	6	3
Totals	15	15
Curriculum Total		124-125

Art Minor

An art minor is recommended as a positive addition to any other area of study. The study of art improves comprehension and interpretation of all visual input. The art minor is available upon completion of 18 credits in art including Basic Drawing, Introduction to Studio I and II, Art History or Art Appreciation, and two additional art electives either in studio or art history.

Music

The Department of Music serves to prepare students for careers in teaching and/or performance; to provide a creative outlet for all talented student musicians, regardless of major; and to foster an appreciation of music by all NDSU students. The department is accredited by the National Association of Schools of Music (NASM). Programs of study leading to the Bachelor of Science, Bachelor of Arts, and Master of Music Education degrees are offered.

Majors/Minors

Admission to the music major or minor programs is dependent upon an audition arranged through the Division of Fine Arts office. Auditions are held each semester.

All undergraduate music majors take courses in music theory, music literature, music history, conducting, private lessons on a selected instrument and/or voice, and ensemble participation. Other courses are selected in accordance with a chosen area of concentration. In all programs, applied instrumental or vocal study are central in developing musicianship and performance ability. Private lessons are available on wind, percussion and keyboard instruments, and voice. Students are accepted for private lessons depending upon demonstrated musical ability and available staff time.

Music Education Major. The music education major (B.S. degree) 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. The following options are available: (a) instrumental major, vocal minor; (b) vocal major, instrumental minor. The music education program is accredited by the National Council for Accreditation of Teacher Education (NCATE).

Music Major. Music majors pursuing a B.A. degree with the expectation of a career in music or continuing with graduate study may choose an emphasis in one of five major categories: (a) instrumental performance, (b) piano performance, (c) vocal performance, (d) history and literature, (e) theory and composition. A general curriculum in music is available for students who do not wish to pursue a performance or teaching career.

Special Expectations. All music majors taking applied music for credit are required to attend recitals and concerts sponsored by the Department of Music and to perform for the jury examination at the end of each semester. Music minors also must perform for the jury examination and are encouraged to attend departmental recitals.

Concurrent participation in a related performance ensemble (major or minor) is required of any student enrolled in private study (with the exception of private piano study).

Music Ensembles

The Department of Music sponsors a variety of musical ensembles including the Gold Star Concert Band, the Varsity Band, the Gold Star Marching Band, the Brass Ensemble, the Jazz Ensemble, the Jazz Lab Band, the Pep Band, the Concert Choir, the University Chorus, the Madrigal Singers, Dakota Jazz, and small chamber ensembles such as brass quintets, saxophone quartets, woodwind quintets, jazz combos, clarinet quartets, and flute ensembles. In addition, the Tri-College Percussion Ensemble and the Tri-College Opera are sponsored jointly by the Departments of Music at NDSU, Moorhead State University, and Concordia College. All music groups regularly perform on campus and in the surrounding area. The Concert Choir and Gold Star Concert Band make extensive concert tours each year. The Jazz Ensemble, Dakota Jazz, Saxophone Quartet, and Brass Quintet also have touring programs. Participation in these ensembles is open to all students.

Music Curricula

Music courses for majors and minors are grouped into categories for reference. Refer also to graduation requirements listed in the Academic Policies section. A student handbook containing more detailed information about curricular expectations and departmental policies is available from the music department.

B.S. with a Major in Music Education

All students must complete the education requirements, the common music requirements, and either the vocal or instrumental emphasis. Specific general education requirements, admission to the School of Education, and other information may be obtained from the Division of Fine Arts office.

Common Music Requirements	Credits
Musc 130, 131, Elem Harmony I, II	3,3
Musc 132, 133, Elem Ear Training I, II	1,1
Musc 150, Vocal Methods & Ped I[1]	2
Musc 230, 231, Adv Harmony I, II	3,3
Musc 232, 233, Adv Ear Training I, II	1,1
Musc 250, Basic Conducting	2
Musc 341, Music History II[2]	3
Musc 353, Woodwind Methods I	2
Musc 355, Brass Methods I	2
Musc 359, Percussion Methods	2
Applied Piano	2

I. Vocal Emphasis

Musc 174, 175, Pronun for Singers I, II	1,1
Musc 332, Choral Arranging	2
Musc 352, Choral Conducting & Lit	2
Musc 358, Jazz Methods	2
Applied Voice	7
Major Choral Ensemble	7
Major Instrumental Ensemble	2

II. Instrumental Emphasis

Musc 331, Instrumental Arranging	2
Musc 351, Instrumental Conducting & Lit	2
Musc 354, Woodwind Methods II	2
Musc 356, Brass Methods II	2
Musc 357, Marching Band Meth/Tech OR Musc 358, Jazz Methods	2
Applied Major Instrument	7
Applied Voice	2
Major Choral Ensemble	2
Major Instrumental Ensemble[3]	7

[1]For students whose primary instrument is keyboard, Keyboard Literature (2) is required. Only 10 credits of Methods 150, 353-356, or 359 are required.

[2]Musc 103 and 340 are prerequisites for Musc 341. These courses may be taken to fulfill the humanities and fine arts general education requirement.

[3]For the instrumental emphasis, students whose primary instrument is keyboard, 4 credits of Piano Chamber Music may be substituted for 4 of the 7 Major Instrumental Ensemble credits.

Education Requirements	Credits
Educ 321, Intro to Teaching	3
Educ 322, Educational Psychology	3
Educ 381, Early Experience	1
Educ 389, Native Am/Instr Pract	3
Educ 451, Instr Planning & Strategies	3
Educ 481, 482, 483, Clrm Prac/Meth I,II,III	2
Educ 485, Student Teaching Seminar	1
Educ 486, Classroom Mgt	3
Educ 487, Student Teaching/Sec*	10
Total	33

***K-12 Option**

CDFS 230 Life Span Dev OR Psyc 250, Dev Psyc (Psyc 111 prereq)	3
Educ 300, Orient/Elem Teaching	2
Substitute Educ 487 Stud Teach/Sec for the following:	
Educ 487, Stud Teaching/Sec AND	(5)
Educ 487, Stud Teaching/Elem	(5)
Total	5

Music Education Major Requirements

General Education	37
Music (vocal or instrumental)	59
Education	33
K-12 Option	(5)
Curriculum Total	127-132

B.A. with a Major in Music

Majors interested in a career other than music education should pursue one of the six B.A. degree tracks: General Music or one of five areas of emphasis (Instrumental Performance, Piano Performance, Vocal Performance, Music History and Literature, Music Theory and Composition).

General Music

The general studies in music curriculum is designed for students interested in a liberal arts degree and without the expectation of pursuing a performance or teaching career in music.

	Credits
Core Requirements for Emphasis Areas	
Musc 103, Intro to Music History	3
Musc 130, 131, Elem Harmony I, II	3,3
Musc 132, 133, Elem Ear Training I, II	1,1
Applied Music	6
Major Ensembles	6
Music Electives	18
Total	41

General Music (B.A.) Requirements Summary

Foreign Language	14
General Education	49
General Music Core	41
Electives	18
Curriculum Total	122

Note. 37 credits must be at the 300-400 level.

Emphasis Areas

The emphasis areas in music are designed for students wishing to pursue a career in music or to continue music study at the graduate level.

Core Requirements for Emphasis Areas **Credits**

Musc 103, Intro to Music History 3
Musc 130, 131, Elem Harmony I, II 3,3
Musc 132, 133, Elem Ear Training I, II 1,1
Musc 230, 231, Adv Harmony I, II 3,3
Musc 232, 233, Adv Ear Training 1,1
Musc 250, Basic Conducting 2
Musc 330, Contemp Harmonic Techniques 3
Musc 340, 341, Music History I, II 3,3
Musc 430, Counterpoint 3
Applied Music (100-level, 2 semesters) 1,1
Applied Music (200-level, 2 semesters) 1,1
Major Ensemble (4 semesters) 1,1,1,1
Total 41

Emphasis: Instrumental Performance

Two credits from the following:

Musc 141, Symphonic Literature 2
Musc 142, Operatic Literature 2
Musc 143, Keyboard Literature 2
Musc 494, Solo and Chamber Lit 2
Total 2

Two credits from the following:

Musc 311, Jazz Ensemble 1
Musc 318, Dakota Jazz 1
Musc 322, Jazz Combo 1
Musc 358, Jazz Methods 2
Musc 364, Jazz Improvisation 2
Total 2

Four credits from the following:

Musc 353, Woodwind Methods I 2
Musc 354, Woodwind Methods II 2
Musc 355, Brass Methods I 2
Musc 356, Brass Methods II 2
Total 4

All of the following:

Musc 480, junior, senior recitals 1,1
Applied study, 300 level (2 semesters) 1,1
Applied study, 400 level (2 semesters) 1,1
Major Ensemble (2 semesters) 1,1
Minor Ensemble (4 semesters) 1,1,1,1
Total 12

Emphasis: Piano Performance

Two credits from the following: **Credits**

Musc 141, Symphonic Literature 2
Musc 142, Operatic Literature 2
Total 2

Two credits from the following:

Musc 311, Jazz Ensemble 1
Musc 318, Dakota Jazz 1
Musc 322, Jazz Combo 1
Musc 358, Jazz Methods 2
Musc 364, Jazz Improvisation 2
Total 2

All of the following:

Musc 143, Keyboard Literature 2
Musc 365, Applied Piano (2 semesters) 1,1
Musc 373, Suppl Applied Music (Concurrent with Musc 365) 1,1
Musc 465, Applied Piano (2 semesters) 1,1
Musc 473, Suppl Applied Music (Concurrent with Musc 465) 1,1
Musc 480, Junior, Senior Recitals 1,1
Minor Ensemble (4 semesters) 1,1,1,1
Total 16

Emphasis: Vocal Performance

Two credits from the following: **Credits**

Mus 141, Symphonic Literature 2
Mus 142, Opera Literature 2
Musc 143, Keyboard Literature 2
Musc 494, Solo and Chamber Lit 2
Total 2

All of the following:

Musc 150, 350, Vocal Meth & Ped I, II 2,2
Musc 165, Applied Piano (2 semesters) 1,1
Musc 174, 175, Pronun for Singers I, II 1,1
Musc 367, Applied Voice (2 semesters) 1,1
Musc 467, Applied Voice (2 semesters) 1,1
Musc 480, Junior, Senior Recitals 1,1
Major Ensemble (2 semesters) 1,1
Minor Ensemble (2 semesters) 1,1
Total 18

Emphasis: History and Literature

All of the following:

Musc 108, Roots of American Pop Music 3
Musc 141, Symphonic Literature 2
Musc 142, Operatic Literature 2
Musc 143, Keyboard Literature 2
Musc 201, World Music 3
Music 494, Jazz History and Lit 2
Musc 394, Junior Project 2
Musc 494, Senior Project 4
Total 20

Emphasis: Theory and Composition

Two credits from the following:

Musc 141, Symphonic Literature 2
Musc 142, Operatic Literature 2
Musc 143, Keyboard Literature 2
Total 2

Two credits from the following:

Musc 311, Jazz Ensemble 1
Musc 318, Dakota Jazz 1
Musc 322, Jazz Combo 1
Musc 358, Jazz Methods 2
Musc 364, Jazz Improvisation 2
Total 2

All of the following:

Musc 322, Choral Arranging 2
Musc 331, Instrumental Arranging 2
Musc 494, Applied Comp (4 semesters) 1,1,1,1
Musc 494, Jazz Composition & Arr 2
Musc 394, Junior Project 2
Musc 494, Senior Project 4
Total 16

Emphasis in Music Major (B.A.) Requirements Summary

Core Music courses 41
Emphasis Course Requirements 20
Foreign Language 14
General Education 49
Curriculum Total 124

Music Minors

Music Minor—General **Credits**

Musc 103, Intro Music History 3
Musc 130, 131, Elem Harmony I, II 3,3
Musc 132, 133, Elem Ear Train I, II 1,1
Applied Study (2 semesters) 1,1
Major Ensemble (2 semesters) 1,1
Music Electives 6
Total 21

Music Minor for Education Majors

Musc 103, Intro Music History 3
Musc 130, 131, Elem Harmony I, II 3,3
Musc 132, 133, Elem Ear Training I, II 1,1
Musc 150, Basic Conducting 2
Applied Study (2 semesters) 1,1
Major Ensemble (2 semesters) 1,1

And two credits from the following: **Credits**

Educ 481, Clrm Prac/Meth of Teach (Instr) 2
Educ 482, Clrm Prac/Meth of Teach (Vocal) 2
Educ 483, Clrm Prac/Meth of Teach (Elem) 2

And two credits from the following:

Musc 150, Vocal Methods & Pedagogy I 2
Musc 353, Woodwind Methods I 2
Musc 355, Brass Methods I 2
Musc 359, Percussion Methods 2
Total 21

Theatre Arts

Programs of study in Theatre Arts lead to the Bachelor of Science, Bachelor of Arts, Bachelor of Fine Arts, and Master of Arts degrees. The requirements for all degree tracks are flexible enough to be designed to fit the individual student's career goals. Specialization is possible in the areas of acting, design, directing, technical theatre, theatre history and literature, and theatre management.

In addition to academic course work, every undergraduate theatre major is required to participate in some way in at least one theatrical production per semester. Little Country Theatre (LCT), the producing arm of Theatre Arts, has been an important part of campus life at NDSU since 1914 and is the oldest theatre in the state. LCT productions include three to four plays each year—plays that challenge and enrich the mind, talent, and imagination. Productions are chosen in such a way that students will have an opportunity to be exposed to the full heritage of western drama during their years at the University. Participation in LCT productions is open to all NDSU students, regardless of major.

The Bachelor of Arts (B.A.) and the Bachelor of Science (B.S.) with a major in theatre arts are general baccalaureate degrees providing a liberal arts background with major emphasis in theatre. Two years of a foreign language are required for the B.A. degree, while an approved minor area is required for the B.S. degree.

The Bachelor of Fine Arts (B.F A.) with a major in theatre arts is a professionally oriented program and can be entered only by faculty approval, usually at the end of the sophomore year. This degree program provides indepth study of a theatre specialization and related fine arts fields. Students graduating with the B.F.A. must complete, during the senior year, a project demonstrating mastery of advanced skills and creative expressiveness.

A minor in theatre arts is available with emphasis in either design and technical theatre or in acting and directing.

A student who wishes to teach theatre in high school should select a teaching major approved by the School of Education and supplement that major with a major or minor in theatre arts.

Courses for theatre arts majors and minors are grouped into tracks and emphasis areas. Refer also to graduation requirements listed in the Academic Policies section.

Note: Curricula for Theatre Arts undergraduate degree programs are being revised to meet national accreditation requirements. Curriculum changes were not complete at the time this bulletin went to press. Students should consult their advisers about new course requirements for their chosen degree track.

B.A. or B.S. with a Major in Theatre Arts

Major Requirements	Credits
Art 210, 211, Art History I, II	6
Musc 104, 105, Intro to Music Lit I, II	6
Thea 110, Intro to Theatre Arts	3
Thea 161, Acting I	3
Thea 201, Theatre Practicum	8
Thea 270, Stagecraft	3
Thea 275, Makeup Design I	3
Thea 280, World Theatre	3
Thea 365, Directing I	3
Thea 450, Capstone Experience	3
Thea 475, Design for the Stage I	3
Thea 480, 481, Hist and Lit of Theatre I, II	6
Total	50

Plus 21 credits from the following:

Thea 115, World Film	3
Thea 199, Theatre Promotion and Mgt	3
Thea 261, Acting II	3
Thea 271, Costume Construction	3
Thea 276, Makeup Design II	3
Thea 361, Movement for the Actor	2
Thea 362, Voice for the Actor	2
Thea 363, Auditioning	3
Thea 372, Stage Management	3
Thea 465, Directing II	3
Thea 476, Design for the Stage II	3
Total	21

And 3 credits from the following:

Engl 344, American Drama	3
Engl 380, Shakespeare	3
Engl 462, Modern European Drama	3
Engl 483, Elizabethan & Jacobean Drama	3
Engl 484, Restor & 18th Century Drama	3
Total	3

B.F.A. with a Major in Theatre Arts: Performance Track

Major Requirements	Credits
Musc 104, 105, Intro to Music Lit I, II	6
Thea 110, Intro to Theatre Arts	3
Thea 201 Theatre Practicum	8
Thea 161, 261, 460, Acting I, II, III	9
Thea 270, 271, Stagecraft, Costume Const.	6
Thea 275, 276, Makeup Design I, II	6
Thea 280, World Theatre	3
Thea 361, Movement for the Actor	2
Thea 362, Voice for the Actor	2
Thea 363, Auditioning	2
Thea 365, 465, Directing I, II	6
Thea 372, Stage Management	3
Thea 450, Capstone Experience	3
Thea 475, 476, Design for the Stage I, II	6
Thea 480, 481, Hist and Lit of Theatre I, II	6
Total	71

Plus 15 credits from the following:

Art 210, 211, Art History	6
Engl 344, American Drama	3
Engl 380, Shakespeare	3
Engl 462, Modern European Drama	3
Engl 483, Elizabethan and Jacobean Drama	3
Engl 484, Restor and 18th Century Drama	3
Total	15

B.F.A. with a Major in Theatre Arts: Design and Technical Theatre Track

Major Requirements	Credits
Musc 104, 105, Intro to Music Lit I, II	6
Thea 110, Intro to Theatre Arts	3
Thea 161, Acting I	3
Thea 201, Theatre Practicum	8
Thea 270, 271,Stagecraft, Costume Const	6
Thea 275, 276, Makeup Design I, II	6
Thea 280, World Theatre	3
Thea 363, Auditioning	2
Thea 370, Technical Theatre Production	3
Thea 372, Stage Management	3
Thea 399, Drafting for Theatre	3
Thea 450, Capstone Experience	3
Thea 475, 476, 477, Design for the Stage I, II, III	9
Thea 480, 481, Hist & Lit of Theatre I, II	6
Total	64

Plus 3 credits from the following:

Engl 344, American Drama	3
Engl 380, Shakespeare	3
Engl 462, Modern European Drama	3
Engl 483, Elizabethan & Jacobean Drama	3
Engl 484, Restor and 18th Century Drama	3
Total	3

And 6 credits from the following:

Art 210, 211, Art History I, II	6
ATID 315, 316, History of Interiors I, II	6
Total	6

And 6 credits from the following:

Art 130, 230, Drawing I, II	6
Art 220, 362, Painting I, II	6
Total	6

And 6 credits from the following:

Arch 321, 322, History of Architecture I, II	6
ATID 310, Evolution of Fashion	3
ATID 355, Apparel/Pattern Design	3
ATID 486, Dress and Human Behavior	3
Total	6

Minor in Theatre Arts: Performance Emphasis

	Credits
Thea 110, Intro to Theatre Arts	3
Thea 161, 261, Acting I, II	6
Thea 201 or 350, Theatre Prac and/or Studio Theatre	2
Thea 275, Makeup Design I	3
Thea 280, World Theatre	3
Thea 365, 465, Directing I, II	6
Total	23

Minor in Theatre Arts: Design/Technical Theatre Emphasis

	Credits
Thea 110, Intro to Theatre Arts	3
Thea 201 or 350, Theatre Practice and/or Studio Theatre	2
Thea 270 or 271, Stagecraft or Costume Const	3
Thea 275, Makeup Design I	3
Thea 280, World Theatre	3
Thea 372, Stage Management	3
Thea 399, Drafting for Theatre	3
Thea 475, Design for the Stage I	3
Total	23

History

There are three options with the regular major in history. The B.A. degree with a major in history is recommended for students planning on graduate school or law school who desire a liberal arts education. The B.S. degree with a major in history and an approved minor is recommended for a career in government or business. For preparation to teach high school, consult both with the School of Education and with an adviser in the Department of History. The history education option leads to the B.S. degree.

The three options for a regular major in history all require 36 credits distributed as follows:

B.A. and B.S. with a Major in History, B.S. with a Major in History Education

	Credits
Hist 101, 102, Western Civ I, II	3,3
Hist 103, 104, U.S. to 1877, Since	3,3
One complete upper-level United States sequence (410-411 to 436-437)	6
One complete upper-level non-United States sequence (440-441 to 482-483)	6
489, Senior Seminar	3
History Elective (3 credits from 201-299)	3
History Electives (6 credits from 401 to 499)	6
Total	36

Completion of upper-level courses from at least three different instructors in the department is required for each major.

History education majors who enter NDSU after Fall 1997 are required to complete three credits of history other than European or United States. They must also complete one 200-level or above course in anthropology, geography, political science, psychology, or sociology.

A fourth option is the professional major in the careers in history option. This requires 60 credits in professional courses to prepare for a career in public history. This includes fields such as archival and museum work, historical editing, historic preservation, costume conservation, and archeology. This program was the first of its kind in the Upper Midwest. Internships with public historical agencies and societies are offered in connection with the careers in history programs. Contact the history department chair for details.

Public History Option

	Credits
Arch 321, 322, History of Architecture	6
Hist 101, 102, Western Civ I, II	3,3
Hist 103, 104, U.S. to 1877, Since	3,3
Hist 251, Intro to Public History	3
Hist 252, Intro to Museum Work	3
Hist 253, Archival Photography	3
Hist 401, Archival Theory and Practice	3
Hist 436, American Frontier to 1850	3
Hist 437, American West Since 1850	3
Hist 489, Senior Seminar	3
History Elective (to be arranged by student and adviser at junior-senior level)	3
Approved Internship	9-12
One complete-year, upper-division non-United States history sequence	6
Total	57-60

Supplementary Vocational Recommendation

18 credits from the following:	Credits
Anth 111, Intro to Anthropology	3
Anth 204, Archeology and Prehistory	3
Anth 208, Folklore and Culture	3
Art 210, Art History I	3
Art 211, Art History II	3
Art 451, History of American Art	3
ATID 150, Design Fundamentals I	4
ATID 310, Evolution of Fashion	3
ATID 315, History of Interiors I	3
ATID 316, History of Interiors II	3
Comm 200, Intro to Media Writing	3
Comm 313, Editorial Processes	3
Total	18

History Minor

	Credits
Hist 101, 102, Western Civ I, II	3,3
Hist 103, 104, U.S. to 1877, Since 1877	3,3
One complete upper-level sequence (410-411 to 482-483)	6
Total	18

Recommended Curriculum B.A. with a Major in History

	Credits F	S
First Year		
Comm 110, Fund of Public Speaking	3	
Engl 110, 120, College Composition, I, II	3	3
Foreign Lang 101, 102, First-Year	4	4
Hist 103, 104, U.S. to 1877, Since 1877	3	3
Univ 189, Skills for Academic Success	1	
Science and Technology	3	4
Wellness		2
Totals	17	16
Second Year		
Hist 101, 102, West Civ I, II	3	3
Foreign Lang 201, 202, Second-Year	3	3
Humanities and Fine Arts	3	3
Quantitative Reasoning		3
Science and Technology	3	
Social and Behav Sci	3	3
Totals	15	15
Third Year		
Two-semester sequence in upper-level U.S. History	3	3
Two-semester sequence in upper-level non-U.S. History	3	3
Humanities and Fine Arts	6	6
Social and Behav Sci	6	3
Totals	18	15
Fourth Year		
Hist 489, Senior Seminar	3	3
Hist Electives in upper level	6	6
Free Electives	9	3
Totals	18	12
Curriculum Total		126

Humanities

Humanities is a theme-centered interdisciplinary program in the arts, history, literature, philosophy, and religion. Through interdisciplinary study, students develop an awareness and understanding of the major events and ideas that have shaped the civilization in which they live.

Humanities Major

The humanities major is a multi-course program designed to offer perspectives in depth and breadth from related disciplines. The major leads to the B.A. degree and consists of 39 credits distributed among the following requirements.

	Credits
Engl 240 and 335 (or Hum 385)	6
Univ 350, 401, 402, 403, or 404 (Interdisciplinary)	3
A 6-credit sequence from each of the following areas:	
1. Fine arts (history, interpretation, and philosophy of fine arts, rather than the applied arts) or religion	6
2. History or literature	6
3. Philosophy or architecture	6
Hum 304 (Humanities Tutorial)	3-6
Electives at 300-400 level	6-9
Total	39

Two years of a foreign language, classical or modern, western or non-western, are required for both the major and the minor.

Humanities Minor

The humanities minor is designed to stimulate creative expression and complement a major field of study. The minor consists of 21 credits distributed among the following requirements.

	Credits
Engl 240 and 335	6
Two upper-level sequences in philosophy, religion, anthropology, history, literature, art history, history of theatre, or history of music	12
Univ 350, 402, 403, or 404 (Interdisciplinary)	3
Total	21

Recommended Curriculum Humanities Major

	Credits F	S
First Year		
Engl 110, 120, College Composition I, II	3	3
Univ 189, Skills for Academic Success	1	
Foreign language	4	4
Quantitative Reasoning		3
Science and Technology	3	3
Social and Behavioral Sci	3	3
Wellness	2	
Totals	16	16
Second Year		
Comm 110 and Free Elective	3	3
Fine Arts Sequence	3	3
Foreign Language	3	3
Science and Tech and Free Elective	4	3
Social and Behavioral Sci	3	3
Totals	16	15
Third Year		
Arch 321 and 322 (or phil sequence)	3	3
Engl 240 and 335	3	3
Univ 350, 401, 402, 403, or 404 and Free Elective	3	3
Literature sequence	3	3
Free Electives	3	3
Totals	15	15
Fourth Year		
Hum 304 (Humanities Tutorial)	3	2
History Electives	3	3
Humanities Electives	3	3
Free Electives	6	7
Totals	15	15
Curriculum Total		123

The Humanities major and minor are administered by the dean of Arts, Humanities, and Social Sciences. Refer also to graduation requirements listed earlier in the Academic Policies section.

Modern Languages

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

The Department of Modern Languages has three language programs: French, German, and Spanish. Through the Tri-College University consortium, NDSU students may also study Chinese, Japanese, Norwegian, and Russian for full credit. Classical languages are available in cooperation with Cardinal Muench Seminary. Programs for study abroad are available for those who desire the experience of living in another culture in addition to linguistic mastery.

The language laboratory, located in Minard Hall, is equipped with international satellite television reception and multi-media computer workstations.

Language Placement

Students must adhere to the placement requirements when enrolling in a language course for the first time at North Dakota State University. Enrollment in a course below the student's background level will result in no credit for that course.

If, after appropriate placement, the student's instructor recommends that because of exceptional circumstances the student should be placed at a lower level, full credit at the new level may be granted upon approval by the chair of the department and the student's dean (or director of Student Academic Affairs).

Student's Language Background	Appropriate NDSU Language Course
No previous study or limited experience (less than two high school units/years) in the language	Course 101
Two or three high school units/years or one year college credit	Course 201
Four or more high school units/years or two years college credit; Bachelor of Arts language requirement is satisfied	Course 311
All other cases	Level to be determined by department

Credit for Advanced Placement

A student placed at an advanced level may receive NDSU credit for those courses waived, upon fulfillment of the following conditions.

1. The student has completed no previous college-level credit in that language;

2. The student enrolls consecutively in at least two courses within the same level, i.e., 201-202, (intermediate); 311-312, (advanced); and receives a grade of C or better, (courses may not be taken pass/fail);

3. The student submits a petition form obtained from the Department of Modern Languages, signed by the instructor and the department chair.

Major and Minor Programs

Language majors and minors may be obtained in French, German, and Spanish.

A major consists of a minimum of 24 credits above the intermediate level. At least 9 of these credits must be in advanced language; the remainder may be chosen from a variety of courses in linguistics, literature, and culture. A minimum of one year of a second foreign language at NDSU, or the equivalent, is required.

A minor necessitates completion of a minimum of 18 credits beyond the intermediate level. At least 9 of these credits must be in advanced language (normally conversation/composition).

Introductory Curriculum French as Example

	Credits	
First Year	**F**	**S**
Anth 111, Intro to Anthropology	3	
Engl 110, 120, College Composition I, II	3	3
Fren 101, 102, First-Year French I, II	4	4
Hist 101, 102, Western Civ I, II	3	3
Soc 110, Intro to Sociology		3
Univ 189, Skills for Academic Success	1	
Wellness		2
Totals	14	15
Second Year		
Biol 124, Environmental Sci	3	
Comm 110, Fund of Public Speaking		3
Engl 220, Intro to Lit	3	
Fren 201, 202, Second-Year French I, II	3	3
Geog 161, World Regional Geog	3	
Math 104, Finite Mathematics		3
PolS 115, American Government		3
PolS 220, International Politics	3	
Psyc 111, Intro Psychology		3
Totals	15	15

Junior and senior year course work will be determined in consultation with a faculty adviser according to the student's background and interests.

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 travel agency 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. Thus, the department offers a plan of study in Career Preparation for International Business. Also, many progressive companies currently without 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.

Political Science

Political science is the study of politics, government, and related topics. This includes the investigation of political behavior, 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.

Political science 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.

Major

A total of 36 credits is required for a major in political science. All students are required to complete Introduction to Political Science (110), American Government (115), an introductory course in political inquiry, and a senior-level seminar. In addition, at least one class must be taken from law (430-431), behavior (420-421), theory (410-411) and international relations (442-443). Twelve credits of electives are also to be selected in consultation with an adviser.

Minor

The minor in political science requires a minimum of 21 credits including Introduction to Political Science (110) and American Government (115). Six credits of electives and three classes of the student's choice at the 400 level in law, behavior, international relations, or theory are required.

Public Service Option

The public service option is a special professional intent track that provides students with the opportunity to concentrate their course work in two non-teaching and non-law professional areas of study and enables them to prepare for private and public sector employment. The program provides students with a substantial background in the study of government, which comprises the fields of political behavior, political theory, international relations, and the judiciary. Integrated within the curriculum of study is a 15-credit internship that may be taken at various levels of government and of major political party organization. The public service option consists of two tracks: (a) a program in government administration for those who aspire to future employment in government agencies and (b) an emphasis on political management for those who desire employment with political party organizations.

The department also offers internships and cooperative education opportunities. For specifics contact the department.

Recommended Curriculum Political Science

	Credits	
First Year	**F**	**S**
Comm 110, Fund of Public Speaking		3
Engl 110, 120, College Composition I, II	3	3
PolS 110 115, Intr, Am Gov,	3	3
Univ 189, Skills for Academic Success	1	
Computer Science		3
Humanities/Fine Arts	3	3
Political Science Elective	3	
Soc/Behavioral Sciences	3	
Totals	16	15
Second Year		
Humanities/Fine Arts	3	3
Political Science Electives	3	6
Science and Lab		4-5
Soc/Behavioral Sciences	3	
Social Sciences	3	
Free Electives	3	2
Totals	15	15-16
Third Year		
Political Science Upper-Div	3	3
Science/Technology	3	3
Social Sciences/Free Electives	9	9
Wellness		2
Totals	15	17
Fourth Year		
Political Science Upper-Div	3	6
Free Electives	12	9
Totals	15	15
Curriculum Total		123-124

Religious Studies

From 1932 to 1977 the School of Religion was independent from the University but in close association with it. Presently, the School of Religion continues as a part of the College of Arts, Humanities, and Social Sciences.

A minor in religious studies is available. The minor consists of 20 credits of which 12 credits may be at the 100-200 level and 8 credits must be at the 300-400 level. For advice on the distribution of the remainder of the electives consult with the director of the School of Religion.

Seminary—Cardinal Muench

The Cardinal Muench Seminary is a private institution in Fargo. The program of courses offered at and by the seminary supplements the course offerings of the College of Humanities and Social Sciences at NDSU. The seminary is primarily intended to prepare students to enter any recognized school of divinity after the completion of the general requirements for graduation. Most course offerings at the seminary are also open to NDSU students for the enrichment of cultural, linguistic, or philosophical programs of studies and, at the discretion of the student's college, for major degree programs.

In addition to other University requirements, a major in classical languages is a minimum of 30 credits in Latin and Greek (excluding 100-level Latin courses) including a minimum of 8 credits in Greek. A minor in classical languages is 20 credits (excluding 100-level courses) including a minimum of 8 credits in Greek. A minor in Biblical languages is 20 credits of at least 6 credits in Hebrew and 8 credits in Greek.

Social Science

A special interdisciplinary social science major is available. The basic requirements include the following.

	Credits
HD&E 120, Orientation to HD&E	1
HD&E/Univ 199, Skills for Academic Success	1
PolS 420, Exec/Legis Process	3
PolS 421, Political Parties	3
American History, one-year sequence at the 400-level	6
Geography	6
Psychology or Sociology (300-400 level)	9
Electives	6
Total	35

Before taking advanced course work required for the Social Science major, the student should complete at least one year in each of the required disciplines. In addition, students should complete course work in Economics and World History.

Students who wish to prepare for high school teaching should make this intention known to the School of Education before entering their junior year to ensure that state teacher certification requirements are met.

Students not planning to teach may major in social science leading to either the B.A. or B.S. degree. These students should declare their majors at the Student Academic Affairs Office and be assigned advisers with whom they will plan programs of study. The program of study must be approved in advance by the adviser and the Student Academic Affairs Office.

Sociology and Anthropology

The Department offers courses and programs focused on the study of various forms of human behavior in social settings.

Sociology is the study of human social interaction and social organization, especially as an operating system.

Anthropology is the study of humans, past and present, familiar and exotic. Its unique approach emphasizes the development and use of the cultural perspective in understanding human behavior.

Majors

Curriculum flexibility allows majors to pursue various interests. Topics include the study of small groups, population and social change, families, communities, criminal justice organizations, medical and mental health programs, the aged in American society, rural and urban environment, and social and public service agencies.

Sociology Major—General. The 32-credit requirement includes the following core: Anth 111, Soc 110, 340, 341, and 489. (Note: An introductory statistics course is a prerequisite for Soc 340.) In addition to the 14 core credits, majors must complete 18 elective credits in sociology and/or anthropology.

Sociology Major–Anthropology Emphasis. Anthropology consists of four subfields: archaeology, cultural-social anthropology, linguistic anthropology, and biological anthropology. Thus, anthropologists study past and present cultures, historical and structural aspects of languages, and human populations. The 31-credit requirement includes Anth 111; Soc 110; three of the following: Anth 204, 205, 206, 208; two area courses; one domain course; Anth 450 and 480; and 489 (offered spring only).

In the anthropology emphasis, students have the opportunity to explore the four branches of anthropology. At NDSU, the focal area has been North America and Oceania, although other areas of the world are in the curriculum. The Native American specialization reflects both the expertise of the anthropological faculty and the relevance of this focus to the northern plains region. Additional emphasis within anthropology includes archaeology (the study of past cultures through the analysis of material remains) and folklore (the study of expressive culture, particularly unrecorded traditions).

Sociology Major–Criminal Justice Emphasis. Students who wish to pursue studies in criminal justice may select a major in sociology, which permits enrollment in courses emphasizing this interest. In addition to meeting the requirements for a sociology major, students also enroll in psychology, political science, and accounting. This provides the student with an interdisciplinary preparation for a career in the criminal justice system. For details, contact the department.

Sociology and Education Major. A student who wishes to prepare for high school teaching should contact the School of Education and also consult with an adviser in the sociology/anthropology department to ensure that state teacher certification requirements are met. Students planning to teach are encouraged to combine a sociology major with a second teachable major, such as social science, to enhance marketability.

Minors

Because the study of sociology/anthropology helps to understand and explain shared behavior of people in organized groups, a minor is an asset to majors in many other fields.

Community Development Minor. The community development minor is an applied, multidisciplinary program consisting of 18 credits that includes course work and an experiential component. Requirements include Soc 405; a 3-credit internship; and a minimum of 3 credits in each of the following areas: economics, business, and social science. Contact the department for the approved courses in each area.

Sociology Minor—Anthropology Emphasis. The 18-credit requirement includes Anth 111; Soc 110; two of the following courses: Anth 204, 205, 206, and 208; and two 300- 400-level anthropology courses.

Sociology Minor—General. The 18-credit requirement includes Anth 111, Soc 110, 340, and 422. At least six additional credits must be taken at the 300 or 400 level.

General Information

Students wishing to pursue concentrations in fields other than anthropology or criminal justice should meet with a faculty member for purposes of tailoring a program of study.

Students interested in social work should complete Soc 350 and 351, but a social work major is not offered within the department. Students interested in social or public agency work are advised to follow the Bachelor of Science degree program.

The department offers a wide range of part-time and full-time internships. Placements may include field work in business, community agencies, criminal justice, medical and mental health, and aging and social work throughout the region. Upon approval of the student's application to the department and the sponsoring agency, students are placed in an environment in which both the applied and intellectual aspects of the professional experience are emphasized. The department also works with cooperative education to support their efforts on behalf of experiential education. Interested students should contact the department chair.

Recommended Curriculum
Sociology Major (General)

	Credits	
First Year	**F**	**S**
Anth 111, Intro to Anthropology		3
Comm 110, Fund of Public Speaking	3	
Engl 110, 120, College Composition I, II	3	3
Math 104, Finite Math		3
Soc 110, Intro to Sociology	3	
Univ 189, Skills for Academic Success	1	
Humanities and Fine Arts	3	3
Electives, Modern Lang or Minor	3-4	3-4
Totals	16-17	15-16
Second Year		
Humanities and Fine Arts	3	3
Science and Technology, Lab	4	3
Wellness	2	
Electives, Modern Lang or Minor	6	9
Totals	15	15
Third Year		
Soc 340, 341, Soc Research Meth, Lab	3,1	
Soc 422, Dev/Social Theory		3
Stat 330, Intro Statistics	3	
Science and Technology		4
Soc Electives	3	3
Social/Behavioral Sciences	3	3
Electives or Minor	3	3
Totals	16	16
Fourth Year		
Soc 489, Capstone		1
Soc 496 (optional)	6	
Soc Electives	6	6
Electives or Minor	3	8
Totals	15	15
Curriculum Total	122-124	

Curricula for the anthropology and criminal justice emphases are available in the department office.

College of Business Administration

Putnam Hall 105 (701) 231-8651
Jay A. Leitch, Dean

The mission of the College of Business Administration is to provide students with a broad base of knowledge plus courses necessary for careers in a variety of public and private organizations.

Undergraduate majors offered are accounting, accountancy, business administration, economics, and management information systems. Academic minors in support of other programs across campus are accounting, business administration, and corporate agribusiness.

Admission Requirements

Students who wish to major in accounting, accountancy, business administration, or management information systems at NDSU enroll as a pre-professional student in the College of Business Administration for their freshman or sophomore years. Pre-professional students apply for admission at least one semester prior to enrolling in the professional program. Transfer students with sufficient credits and appropriate course work may also apply. Admission to the professional program is based upon successful completion of all pre-professional requirements, junior standing, and a minimum 2.50 cumulative grade-point average. Students must be admitted into a professional program prior to enrolling in the advanced 300- 400-level accounting and/or business administration courses.

Students may take validating examinations to receive transfer credits for business administration and accounting courses that were completed at other colleges or universities. Credits established by validating examinations will not count toward the NDSU 36-credit residency requirement.

Transfer credits with grades of D in Elements of Accounting courses and 300- and 400-level business and accounting courses are not accepted for program requirements.

Degree Programs

The College of Business Administration offers undergraduate programs leading to the Bachelor of Arts, Bachelor of Science, and Bachelor of Accountancy degrees. A Master of Business Administration is also offered and is described in the Graduate Bulletin.

Degree Requirements

All majors are required to complete all course requirements of one of the curricula in the college. Requirements for graduation are those in existence at admission to the professional program. In addition, all majors must maintain a 2.50 cumulative grade-point average.

Of the credits completed in residence at least 30 credits must be in 300- and 400-level accounting and business administration courses while enrolled in the profressional program.

All majors are required to complete all course requirements of one of the curricula in the college. Requirements for graduation are those in existence at admission to the professional program. Requirements for a Bachelor of Arts degree include two years of one foreign language, which may also satisfy the humanities category of the General Education Requirements. In addition, all majors must maintain a 2.50 cumulative grade-point average.

Practicum Requirement

Students in the College of Business Administration are required to complete a three-credit practicum experience while enrolled in the professional program. This requirement is to prepare students for the challenges of the business world through practical experience in their primary area of study. Students must consult with their academic adviser and obtain approval prior to enrolling in the practicum. The following choices are available to meet the practicum requirement:
Acct 413, Accounting Internship
Acct 430, Tax Practice and Research
Busn 413, Business Internship
Busn 496, Business Consulting
Busn 499, Special Topic: Thesis
IME 452, Program and Project Management
Univ 397, Cooperative Education
Univ 492, Study Abroad

Accounting Major

Accounting is a profession that deals with providing financial information used in making business decisions. Financial accountants prepare financial statements used in making investing and lending decisions. Auditors examine financial statements and attest to their status. Management accountants identify and communicate internal financial information used by managers to operate a business. Accountants also provide tax advisory services to employer 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 use computers 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 is a four-year program, which 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) and Certified Internal Auditor (CIA).

Accountancy Major

Accountancy involves a range of skills which includes collecting, measuring, interpreting, analyzing, and communicating financial activity. A major in accountancy focuses on the development of such skills along with an understanding of the legal, social, and ethical responsibilities involved in the profession.

This five-year program leading to a Bachelor of Accountancy degree is specifically designed to prepare students for the profession of public accounting. This program fulfills a law in North Dakota and other states, which requires candidates for the Certified Public Accountant (CPA) examination to have completed a 150-hour program of study in accounting.

Students interested in majoring in accountancy must enroll as a pre-professional student in pre-accounting.

Recommended Curriculum Pre-Accounting Major*

First Year	Credits F	Credits S
Comm 110, Fund of Public Speaking		3
CSci 146, Busn Use of Computers	3	
Econ 201, 202, Prin of Micro, Macro	3	3
Engl 110, 120, College Composition I, II	3	3
Math 146, Applied Calculus I		4
Univ 189, Skills for Academic Success	1	
Humanities and Fine Arts Elective	3	3
Science and Tech, Lab Elective	4,1	
Totals	18	16
Second Year		
Acct 200, 201, Elem of Accounting I, II	3	3
PolS 115, American Government	3	
Psyc 111, Intro to Psychology		3
Rel 260, Intro to Ethics		3
Soc 110, Intro to Sociology	3	
Stat 330, Intro Statistics	3	
Stat 331, Regression Analysis		2
Cultural Diversity Elective		3
Humanities and Fine Arts		3
Wellness	2	
Elective	3	
Totals	17	17

Accounting Major*

Third Year	Credits F	Credits S
Acct 311, 312, Intermediate Acct I, II	4	4
Acct 320, Cost Management Systems	3	
Acct 321, Govt/Not-for-Profit Acct		3
Busn 350, Prin Management	3	
Busn 360, Prin Marketing	3	
Busn 370, Mgt Info Systems		3
Busn 430, Legal/Social Envir of Busn		3
Econ 324, Money and Banking	3	
Engl 320, Practical Writing OR Engl 358, Intermediate Composition		3
Totals	16	16

Accounting Practicum[1] . . . . . 3 Credits

Fourth Year		
Acct 318, Taxation in Mgt Decisions	3	
Acct 420, Acct Info Systems	3	
Acct 421, Auditing I	3	
Acct 440, Mgt Control Systems		3
Busn 340, Prin Finance	3	
Busn 489, Strategic Mgt		4
300-400 Accounting Elective[2]		3
300-400 Business Electives	3	3
Free Elective		2
Totals	15	15

Four-Year Curriculum Total 130

Accountancy Major*

Third Year	Credits F	Credits S
Acct 311, 312, Intermediate Acct I, II	4	4
Acct 320, Cost Management Systems	3	
Acct 321, Gov/Not-for-Profit Acct		3
Busn 340, Principles of Finance		3
Busn 350, Principles of Management	3	
Busn 360, Principles of Marketing	3	
Busn 430, Legal/Social Envir of Busn		3
Comm 214, 216, 271, 308, or 315		3
Psyc 322, Thinking & Making Decisions	3	
Totals	16	16
Fourth Year		
Acct 418, 419, Tax Accounting I, II	3	3
Acct 420 Acct Info Systems	3	
Acct 421, 422, Auditing I, II	3	3
Busn 352, Production/Operations Mgt	3	
Busn 370, Mgt Info Systems	3	
Busn 431, Business Law I	3	
Econ 324, Money and Banking		3
Engl 320, Practical Writing OR Engl 358, Intermediate Composition		3
300-400 Business Elective[3]		3
Free Elective		1
Totals	18	16
Fifth Year		
Acct 415, Advanced Accounting	3	
Busn 489, Strategic Management	4	
Engl 320, 322, 323, 358, or 458	3	
300-400 Level Acct Elective[2]	3	
300-400 Level Busn Elective[3]	3	
Total	16	

Accounting Practicum[1] . . . . . 3 Credits

Five-Year Curriculum Total 150

*Degree requirements are subject to change.

[1]Students must complete a practicum experience and should consult their academic advisers for further details.

[2]Select from the following: 410 Forensic Accounting, 411 Advanced Managerial Accounting, 413 Accounting Internship, 425 Accounting Theory, 430 Tax Practice and Research.

Accounting Minor

Students earning majors in other fields may select a minor in accounting. A minor includes Elements of Accounting (Acct. 200 and 201), Intermediate Accounting (Acct. 311 and 312), plus nine credits in approved accounting courses. In addition, students must earn a 2.25 cumulative grade-point average in the accounting courses to be awarded a minor.

Completion of a minor in accounting provides students with additional depth in accounting that many employers prefer.

Business Administration Major

The Bachelor of Science degree with a major in business administration provides students with a broad base of knowledge in the various functional areas of business (such as accounting, finance, management, and marketing). The program is structured to allow students to pursue one or more of the functional areas in greater depth. A thorough background in mathematics, statistics, computer science, and economics provides the student with the theory and analytical tools required for leadership in the modern business world.

The general education component of the degree has been designed to develop basic skills, such as oral and written communication, as well as an understanding of people, culture, and natural phenomena.

To meet the changing needs in today's global environment, the business administration program emphasizes international coverage. International courses in finance, marketing, and management enable students to develop skills in understanding the global dimensions of decision making.

The business administration major is flexible so that students may tailor their program to their particular interests such as finance, human resource management, or marketing. Students who wish to pursue international careers should consider a second major in International Studies or develop conversational skills in one or more foreign languages.

Students completing the major in business administration find positions in banks, insurance companies, retail business, manufacturing, government service, and some manage their own business.

Recommended Curriculum Pre-Business Administration* Major

First Year	Credits F	Credits S
CSci 146, Busn Use of Computers	3	
Econ 201, 202, Prin of Micro, Macro	3	3
Engl 110, 120, College Composition I, II	3	3
Math 146, Applied Calculus I		4
Soc 110, Intro to Sociology	3	
Univ 189, Skills for Academic Success	1	
Humanities and Fine Arts Elective	3	3
Wellness		2
Totals	16	15
Second Year		
Acct 200, 201, Elem Accounting I, II	3	3
Comm 110, Fund of Pub Speaking		3
Psyc 111, Intro to Psychology	3	
Rel 260, Intro to Ethics	3	
Stat 330, Intro to Statistics	3	
Stat 331, Regression Analysis		2
Cultural Diversity Elective		3
Science and Technology Elective		5
Free Elective	3	
Totals	15	16

Business Administration Major*

Third Year		
Busn 340, Principles of Finance	3	
Busn 350, Principles of Management	3	
Busn 351, Organization Behavior		3
Busn 360, Principles of Marketing	3	
Busn 370, Mgt Info Systems		3
Econ 324, Money and Banking		3
Engl 320, Practical Writing OR Engl 358, Intermediate Composition	3	
300-400 Level Business Electives[1]		3
300-400 Level Busn w/Intn'l Emphasis		3
Free Electives	3	3
Totals	15	18

Bus Admin Practicum[2] . . . . . 3 Credits

Fourth Year	Credits F	S
Busn 352, Prod/Oper Mgt	3	
Busn 430, Business Ethics/Legal Envir	3	
Busn 451, Managerial Economics	4	
Busn 489, Strategic Mgt		4
300-400 Level Business Electives[1]	6	12
Totals	16	16

Curriculum Total 130

*Degree requirements are subject to change.

[1]At least 15 credits must be in business administration; no more than 9 credits in accounting.

[2]Students must complete a practicum experience and should consult their academic adviser for further details.

Business Administration Minor

Majors outside the College of Business Administration often select a minor in business administration. A minor includes Acct 102 or Acct 200 and 201; Econ 201 or 202; two of the following: Busn 340, 350, 360; 12 credits of 300- or 400-level business administration courses, excluding accounting and management information courses beyond Busn 370. The 300-400-level business administration courses must be completed at NDSU in the College of Business Administration. In addition, students must earn a 2.25 cumulative grade-point average based upon the courses used in the minor. Approval by the College of Business Administration is required.

The completion of a minor in business administration helps to enhance the range of employment opportunities for many majors.

Corporate Agribusiness Minor

The 21-credit corporate agribusiness minor is an alternate track to the agribusiness minor in the College of Agriculture. The minor supplements a student's technical training in agricultural sciences with an understanding of fundamental business concepts and applies business strategies to corporate agribusiness decision making. The corporate agribusiness minor is restricted to students with a major in the College of Agriculture, excluding agricultural economics majors.

This minor includes Acct 102, AgEc 201, Busn 340, 350, and 360 plus 3 credits at the 300-400 level in AgEc and 3 credits at the 300-400 level in Busn.

Economics

Economics is the social science that deals with problems of scarcity. It does so through a systematic and logical framework for analyzing how a society solves such problems as what goods and services to produce, how to organize their production, and for whom goods and services are to be produced. Knowledge of economics is necessary for understanding and dealing intelligently with such current topics as inflation, unemployment, international trade and monetary systems, economic growth, government finance, and various forms of market regulation. Besides being important for understanding contemporary social issues, economics is useful in developing career skills for business, law, teaching, public administration, and research. Both verbal and mathematical training are involved in learning the discipline of economics.

Degree Programs

Undergraduate students majoring in economics may choose either the Bachelor of Arts degree or the Bachelor of Science degree. During the freshman year, both programs require basic college courses such as English, mathematics, and science. The introduction to economics includes (a) macroeconomics, which is the study of such topics as the general level of prices, employment, and output; (b) microeconomics, which is the study of relative prices and the consequences of different market forms; and (c) international trade and international monetary systems.

Both programs allow for selecting electives and developing areas of specialization in economics. Areas of specialization may emphasize such fields as money and banking, international economics, labor, industrial organization, or public finance.

Requirements for the Bachelor of Arts degree include two years of one foreign language. For the Bachelor of Science degree, students are required to select a minor area of study from another discipline.

Career Choices

People with economics majors are employed in virtually every area of the economy. In banks and financial institutions they forecast market activity, exchange rates, and interest rate movements. In industrial firms they forecast sales, evaluate changes in cost conditions, analyze changes in international economic conditions, and provide data needed for critical decisions.

Governments are among the largest employers of economists because they rely on the skills of these professionals to evaluate proposed projects and review tax policies. Virtually no other academic major offers the diversity in employment opportunities and flexibility among careers as does the study of economics.

A background in economics provides students with a set of versatile skills that will not become outdated with introduction of new technology.

Economics Major

The economics major requirements include a minimum of 27 credit hours in economics. All majors must take the following:
Econ 110, Principles of Microeconomics
Econ 111, Principles of Macroeconomics
Econ 341, Intermediate Microeconomics
Econ 343, Intermediate Macroeconomics
Plus 15 credit hours of electives in economics. One approved elective (300 or 400 level) may be in agricultural economics.

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. Examples of topics included are general levels of prices, employment and output, relative prices, and the consequences of various market forms.

The minor in economics consists of Principles of Economics (Econ 201 and 202), Intermediate Economic Theory (Econ 341 and 343), plus two elective economics courses (one elective course must be at the 400 level).

Recommended Curriculum Economics

First Year	Credits F	S
Comm 110, Fund of Public Speaking	3	
Engl 110, 120, College Composition I, II	3	3
Math 146, Applied Calculus I		4
Univ 189, Skills for Academic Success	1	
Science and Technology Electives[1]	3	4-5
Soc/Behavioral Sci Electives	3	3
Free Electives	3	
Totals	16	14-15
Second Year		
Econ 201, 202, Prin of Micro, Macro	3	3
Stat 330, Intro Statistics	3	
Stat 331, Regression Analysis		2
Behavioral/Soc Sci Elective	3	
Humanities and Fine Arts Electives[2]	3	3
Modern Lang or Minor Electives[3]	3	3
Wellness		2
Free Elective		3
Totals	15	16
Third Year		
Econ 341, 343, Intermed Micro, Macro	3	3
Economics Elective		3
English Elective	3	
Humanities and Fine Arts Electives[2]	3	3
Modern Lang or Minor Electives[3]	3	3
Free Electives	3	3-4
Totals	15	15-16
Fourth Year		
Economics Electives	6	6
Minor Electives[3]	3	3
Free Electives	6	6
Totals	15	15

Curriculum Total 122

Curriculum Notes:

[1]Students with a lack of familiarity with personal computer software applications must take CSci 146, Business Use of Computers or CSci 147, Micro-computer Packages. At least 4 credits must be natural or physical science and include a lab.

[2]At least 6 credits must be in humanities, but no more than 3 credits may be in fine arts performance, in courses that are approved for the university General Education Requirements.

[3]Students may choose between two degree programs in economics: the Bachelor of Arts degree in economics that requires 14 credits of modern/foreign language (through the intermediate level) or the Bachelor of Science in economics, which requires a minor in another discipline.

Management Information Systems

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 the design, development, implementation, maintenance, and management of organizational information systems.

The MSI program at NDSU is a collaborative effort by the faculty of two disciplines: business administration and computer science. The objective is to provide students with both theoretical knowledge and hands-on experience. In addition to the required courses in business administration and computer science, majors must complete a practicum in the management systems area.

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.

Recommended Curriculum

Pre-Management Information Systems Major*

	Credits	
First Year	**F**	**S**
Comm 110, Fund of Public Speaking		3
CSci 146, Busn Use of Computers	3	
Econ 201, 202, Prin of Micro, Macro	3	3
Engl 110, 120, College Composition I, II	3	3
Math 146, Applied Calculus I		4
Psyc 111, Intro to Psychology	3	
Univ 189, Skills for Academic Success	1	
Humanities and Fine Arts Elective	3	
Cultural Diversity Elective		3
Totals	16	16
Second Year		
Acct 200, 201, Elem of Accounting I, II	3	3
CSci 227, 228, Comp Fund I, II	3	3
Rel 260, Intro to Ethics		3
Soc 110, Intro to Sociology	3	
Stat 330, Intro to Statistics	3	
Stat 331, Regression Analysis		2
Humanities and Fine Arts Elective		3
Science and Technology Elective	5	
Wellness		2
Totals	17	16

Management Information Systems Major*

	Credits	
Third Year	**F**	**S**
Busn 340, Prin of Finance		3
Busn 350, Prin of Management	3	
Busn 352, Prod Oper Mgt		3
Busn 360, Prin of Marketing	3	
Busn 370, Mgt Info Systems	3	
Busn 376, Data & Telecom Admin		3
CSci 125, Beginning COBOL	3	
CSci 315, Sys Analy & Design	3	
CSci 316, Sys Testing & Main		3
Engl 320, Practical Writing OR Engl 358, Intermediate Composition		3
Totals	15	15
Management Information Systems Practicum[1]	**3**	
Credits		
Fourth Year		
Busn 430, Legal/Social Envir of Busn	3	
Busn 470, Info Systems		3
Busn 489, Strategic Mgt	4	
CSci 345, Telecommunications	3	
CSci 372, Comparative Languages		3
CSci 489, Soc Impl of Comp		3
Computer Science Elective	3	
300-400 Level Busn Electives[2]		3
Free Elective		4
Totals	16	16
Curriculum Total	130	

*Degree requirements are subject to change.

[1]Students must complete a practicum experience and should consult their academic advisers for further details.

[2]Consult adviser for relevant electives.

Graduate Program

The Master of Business Administration (MBA) is available. More information about this program is in the Graduate Bulletin.

College of Engineering and Architecture

Engineering Center 203 (701) 231-7494
Otto J. Helweg, Dean

The vision for the College of Engineering and Architecture is to provide leadership in education and research in the fields of engineering and architecture and to achieve a national reputation in selected areas. The college also will enhance the economy, environment, and society of the region through the development, communication, and application of knowledge in engineering and architecture.

The mission of the College of Engineering and Architecture is to provide outstanding education, research, and service to students, alumni, state residents, research partners, businesses, organizations, and government. Further, college faculty will provide leadership in economic development by transferring technology and by providing information and innovative design. College goals:

• Delivery quality undergraduate and graduate education by creating and utilizing effective instruction and by demonstrating commitment to each student's development.
• Encourage continuous learning among faculty, students, alumni, and the public.
• Develop distance education and continuing education for professionals seeking to upgrade skills.
• Provide laboratories and studios to facilitate quality education, research, and creativity.
• Foster research with an emphasis on engineering applications and creative design that most directly serves the region and influences the global community.
• Pursue niches of research opportunity and develop an industry/college learning center.
• Serve citizens, businesses, and industry in the region by providing professional expertise, outreach, and partnerships.

The departments include Agricultural and Biosystems Engineering, Architecture and Landscape Architecture, Civil Engineering and Construction, Electrical and Computer Engineering, Industrial and Manufacturing Engineering, and Mechanical Engineering.

Accreditation

The facilities and curricula of the college are inspected periodically by the Accreditation Board for Engineering and Technology, the National Architectural Accrediting Board, the American Council for Construction Education, and the Landscape Architecture Accreditation Board. These organizations are recognized national accrediting agencies for the engineering, architecture, landscape architecture, and construction curricula.

Admission Requirements

Applicants for admission must satisfy the general admission requirements of the University and the special requirements of the college as stated in detail in the earlier section on admission. Students who enter with deficiencies in high school mathematics are registered for special programs to correct these deficiencies. Admission to the architecture program is selective. Applicants should obtain information regarding the method of application from the NDSU Office of Admission.

Degree Programs

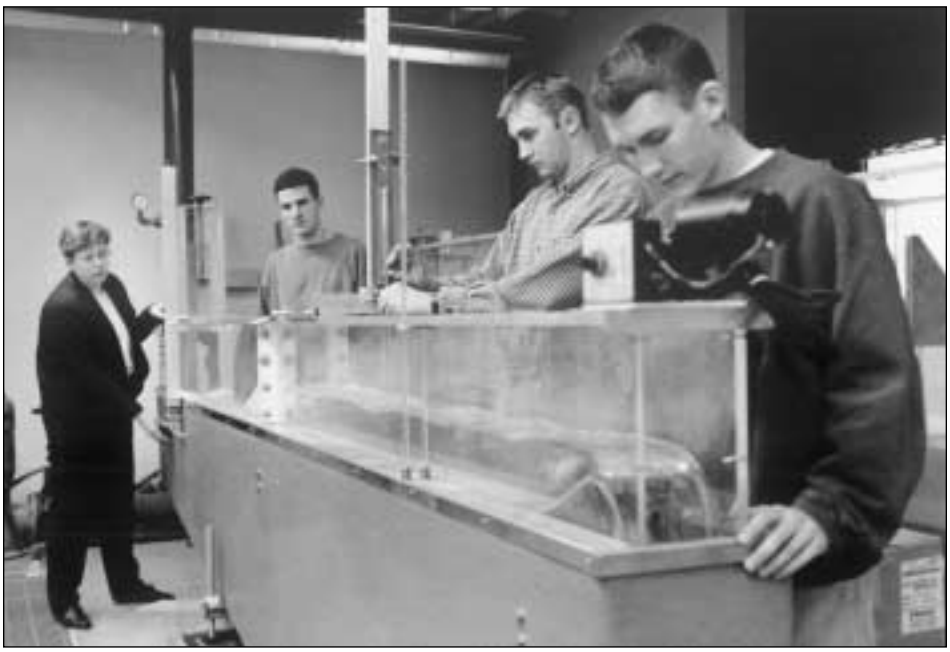
Undergraduate programs of study lead to the Bachelor of Science degree in the specific fields of agricultural and biosystems engineering, civil engineering, construction engineering, construction management, construction technology, electrical engineering, environmental design, industrial engineering and management, manufacturing engineering, and mechanical engineering. A five-year professional degree completes the programs in architecture and landscape architecture. Each of the curricula includes a number of options for specialized study.

The college has developed its programs of study to provide an educational experience in keeping with the professions of architecture, landscape architecture, and engineering and engineering technology. The classrooms, studios, and laboratories are well-equipped and every effort is made to keep them abreast of current technology. Graduates successfully apply for registration as professional engineers or architects after minimum periods of professional experience. Examinations of the North Dakota State Board of Registration for Engineers and Architects are given on the campus each year. All engineering seniors are encouraged to take the examinations as soon as they are eligible.

Graduate courses are available in most departments. Programs of study may be arranged leading to the Master of Science degree in the engineering fields and to the Master of Architecture degree. The Doctor of Philosophy in Engineering degree is a single doctoral program in the College of Engineering and Architecture administered by the Graduate School and the College of Engineering and Architecture. A number of graduate assistantships are available to students undertaking graduate study. Detailed information concerning graduate study is in the Graduate Bulletin.

Degree Requirements

To earn a baccalaureate degree from any of the engineering programs or the construction management program, a student must complete at least 60 semester credits of upper-division course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs



with professional accreditation are exempt from the residence requirement, but subject to NDSU's residence policy. Other exemptions must be approved by the college.

Special Opportunities and Services

The college serves both students and the public. Special opportunities include the following.

General Program

The general program of the College of Engineering and Architecture is designed to allow students, who have not chosen the branch of engineering they wish to study, to take basic courses for one year. Students are encouraged to select an engineering curriculum as soon as possible, but no later than the end of their first year.

ROTC Programs

Up to 18 semester credits may be earned by participation in the Army or Air Force ROTC programs. Men and women may enroll in these programs for partial elective credit. In addition, they may complete either program and receive a commission upon graduation. Students receiving commissions will have the opportunity to serve as officers in active service or in army reserve components.

Student Societies and Organizations

American Society of Agricultural Engineers, American Society of Civil Engineers, American Society of Landscape Architects, American Society of Mechanical Engineers, Associated General Contractors, Institute of Electrical and Electronic Engineers, Institute of Industrial Engineers, Institute of Transportation Engineers, National Association of Home Builders, and the Society of Women Engineers are actively supported for the benefit of students in the related curricula. All students are eligible to join one or more of these organizations.

The Student Engineering and Architecture Council plans and administers many extracurricular student activities and is composed of elected representatives from the student societies.

Several national professional honor societies have chapters on the campus for which students with high academic attainments are eligible in their junior or senior years. Eligible students are selected for Tau Beta Pi from all engineering curricula, Tau Sigma Delta from architecture, Alpha Epsilon from agricultural engineering, Eta Kappa Nu from electrical engineering, Alpha Pi Mu from industrial engineering, Sigma Alpha Lambda from Landscape Architecture, Sigma Lambda Chi from construction management and engineering, and Pi Tau Sigma from mechanical engineering. Membership in these societies is a coveted honor and highly regarded in the engineering and architectural professions.

The Engineering and Architecture Experiment Station and Extension Service

Research and development projects are administered by an executive staff responsible for general policies, publications, and cooperative relations with private and governmental agencies.

Executive Staff

Director, Otto J. Helweg, PE
Agricultural and Biosystems Engineering, Earl C. Stegman, PE
Architecture, Paul H. Gleye
Civil Engineering, G. Padmanabhan, PE
Electrical and Computer Engineering, Orlando R. Baiocchi
Industrial and Manufacturing Engineering, David Wells
Mechanical Engineering, Robert V. Pieri

Special research activities and projects of the college are coordinated through the Experiment Station. The professional services of faculty and the facilities of the college are available to both private and governmental agencies for research and development studies on engineering or architectural problems. Research projects of individual faculty members are sponsored and promoted by the station.

The Engineering Extension Service provides special educational project services to adult groups in conferences, workshops, short courses, and publications. The laboratory facilities of the college are available for specialized instruction under the supervision of faculty. Organizations planning educational programs or special projects for their members are invited to consult the service for assistance.

Aerospace Studies (Air Force ROTC)

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 a designated Air Force base 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 year.

Cadets enrolled in the Professional Officer Course (POC) (junior and senior years) receive a monetary allowance of $200 per month. AFROTC college scholarships are awarded to the best-qualified students. AFROTC college scholarships are available ranging in length from 1 to 4 years. These grants cover the costs of tuition, incidental lab fees and textbooks—plus the regular $200 per month. POC Incentive Scholarships are also available for students not already on scholarship. They pay $1,725 per semester.

Upon entering the Air Force, students who wish to become Air Force pilots will receive 48 weeks of pilot training leading to the rating of Air Force pilot.

Satisfactory completion of the four-year Air Force ROTC program, 16 credits, constitutes a minor in aerospace studies in the College of Engineering and Architecture.

Agricultural and Biosystems Engineering

The agricultural and biosystems engineering major is designed to educate men and women for careers that require the application of engineering, physical, and biological sciences to problems that involve living systems. Agricultural and biosystems engineers plan, design, develop, and test engineered products or systems for agricultural and biological industries and related environmental areas. Typical examples include mechanization and automation of agricultural production equipment and processes, design for food processing and packaging, storage systems for agricultural and other biological materials, environmental systems for plant and animal production, and natural resource management systems to improve environmental quality. Advances in biotechnology have created new opportunities for agricultural and biosystems engineers in biological and chemical production and the processing of biological materials.

The educational objectives of this major are to provide students with (a) technical knowledge and problem solving skills that are foundational to engineering, (b) educational experiences that build interpersonal skills and the capacity for productive careers, and (c) disciplinary knowledge and the educational depth and breadth to deal with changing career opportunities. These objectives support the departmental mission of developing and extending knowledge through engineering and technology that advances the productivity of agricultural production, the processing and utilization of agricultural commodities and related biological materials, and the sustainment of environmental resources management.

The curriculum is based on a core of engineering sciences, mathematics, and basic sciences. By selecting appropriate electives, students may emphasize areas such as agricultural systems, environmental systems, biomaterials and food processing systems, or an emphasis area designed by the student and his or her adviser.

Agricultual systems emphasis: This emphasis is focused on courses in machinery, power, structural, electronic, and sensor systems to prepare students for positions related to engineering for improved food, feed, and fiber production.

Biomaterials and food processing emphasis: With this emphasis, students prepare for engineering positions in the rapidly expanding industries that handle and process biomaterials for food and non-food products and that create new applications of sciences in biotechnical, bioresource, and bioenvironmental fields.

Environmental systems emphasis: This emphasis is focused on the preparation of students for positions in environmental engineering, natural resources management, irrigation engineering, watershed management, and waste management.

Electives: Elective opportunities are also available in information and electronic systems and computer-aided design. Students select elective courses with the individualized assistance of faculty advisers.

The faculty also assist with career development and job placement of graduates. Students interested in careers involving 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 offered by the College of Agriculture.

Recommended Curriculum Agricultural and Biosystems Engineering

	Credits	
First Year	**F**	**S**
ABEn 110, Intro Ag and Biosys Engr	2	
ABEn 189, Skills for Academic Success	1	
Chem 121, 122, Gen Chem I, II	3	3
CSci 122 or 126, Program Lang	3	
Engl 110, 120, College Composition I, II	3	3
Math 165, 166, Calculus I, II	4	4
ME 212, Engr Graphics/CADD		3
ME 221, Engineering Mechanics I		3
Totals	16	16
Second Year		
ABEn 255, Comp Aided Anal & Design	3	
ABEn 263, Biomaterials Processing		3
Biol 150, General Biology	3	
CE 309, Fluid Mechanics		3
Math 228, Intro Linear Algebra	1	
Math 259, 266, Univ Calc III, Diff Eq	3	3
ME 222, Engr Mech II	3	
ME 223, Mech of Materials	3	
Phys 252, 252L, Univ Phys II, Lab		4,1
Biological Science Elective		3
Totals	16	17
Third Year		
ABEn 377, Modeling in ABEn		3
CE 310, Fluid Mechanics Lab	1	
Comm 110, Fund of Pub Speaking	3	
ECE 301, Electrical Engineering I	3	
IME 440, Engineering Economics	2	
ME 350, Thermodynamics & Heat Trns		3
ABEn Electives[1]	3	3
Biological Science Elective	3	
Social/Behavioral Sciences Elective		3
Statistics Elective	3	
Technical Electives[2]		6
Totals	18	18
Fourth Year		
ABEn 482, Instrument & Measurement		3
ABEn 486, 487, Design Project I, II	1	2
ABEn 491, Seminar	1	
Engr 402, Professional Ethics		1
ABEn Elective[1]	3	
Business/Communication Elective		3
Humanities/Fine Arts Electives	3	3
Social/Behavioral Sci Elective	3	
Technical Electives[2]	6	3
Wellness		2
Totals	17	17
Curriculum Total		135

[1]**Agricultural and Biosystems Engineering Electives:**
ABEn 358 - 3, Electrical Energy Applications
ABEn 383 - 3, Structural Design for Biosystems
ABEn 452 - 3, Bioenvironmental Systems Design
ABEn 458 - 3, Food Process Engineering
ABEn 464 - 4, Resource Conservation and Irrigation Engineering
ABEn 473 - 3, Agricultural Power
ABEn 478 - 2, Machinery Analysis and Design

[2]**Technical Electives:**
Students consult their adviser for approved courses according to their career interests or one of the following emphases.

Agricultural Systems: Focused on engineering for advancing productivity of food, feed, and fiber production. Emphases may include power and machinery systems, machine design, manufacturing, structures and environment control, computer-aided design, electrical and electronic systems, and instrumentation and measurements.

Biomaterials and Food Processing Systems: Focused on engineering for quality maintenance, new uses, or enhanced utilization of agricultural and related biological materials. Emphases may include engineering properties of biological materials, biological materials processing, food process engineering, waste management, and bioprocessing.

Environmental Systems: Focused on engineering for responsible use and sustainable management of environmental resources. Emphases may include hydrology, soil and water resource conservation, irrigation engineering, water and wastewater engineering, and water quality management.

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 workday requirements need to be satisfied; but there must be beauty to house the human spirit. All of this requires a creative thought process that can balance and organize needs that are quite different 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 visual effects.

In addition to required courses that relate closely to architecture itself, 20 percent of the credits required for the Bachelor of Architecture degree are electives. There are courses that the student chooses, either within categories or with little restriction, except for the requirement that a portion of them be selected to pursue a single special interest. With the remainder of the elective credits, a student is encouraged to gain the broad general education that is needed for the architectural profession.

Central to the study of architecture is the sequence of architectural studio courses. Students are assigned or select 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

Selective admission into the architecture program at NDSU takes place through a two-step process. Step one: High school students entering as freshmen are evaluated on the basis of their high school record and test scores, while transfer students are evaluated on the basis of courses taken and grades received. Step two: Upon completion of the first year a selected number of students are admitted to the second year of the program on the basis of overall GPA attained and performance in first-year architecture courses.

The Program

A five-year undergraduate program leading to the Bachelor of Architecture degree is offered through the department. This program is fully accredited by the National Architectural Accrediting Board and the degree is recognized by the National Council of Architectural Registration Boards as a first professional degree. At the end of four years a student may elect to receive a Bachelor of Science in Environmental Design (non-professional degree).

The total number of credits required for the professional degree is 160 and the four-year degree requirement is 128.

In the United States, most state registration boards, require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes two types of degrees: the Bachelor of Architecture and the Master of Architecture. A program may be granted a five-year, three-year, or two-year term of accreditation, depending on its degree of conformance with established educational standards.

Master's degree programs may consist of a pre-professional undergraduate degree and a professional graduate degree, which, when earned sequentially, comprise an accredited professional education. The pre-professional degree, however, is not, by itself, recognized as an accredited degree.

The four-year pre-professional degree, where offered, is not accredited by NAAB. The pre-professional degree is useful for those wishing a foundation in the field of architecture as preparation for either continued education in a professional degree program or for employment options in architecturally related areas.

Special Notice

Students who are admitted into 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 admitted students prior to purchase.

Recommended Curriculum Bachelor of Architecture

	Credits	
First Year	**F**	**S**
Anth 111, Intro to Anthro	3	
Arch 132, Graphics		2
Arch 171, 172, Envir Design I, II	3	3
Art 130, Drawing I		3
Comm 110, Fund Public Speaking	3	
Engl 110, 120, College Composition I, II	3	3
Math 104, 105, Finite Math, Trig	3	3
Soc 110, Intro to Sociology		3
Univ 189, Skills for Academic Success	1	
Totals	16	17
Second Year		
Arch 271, 272, Arch Design I, II	4	4
Arch 321, 322, Arch History I, II	3	3
Arch 326, Design Process and Methods		2
Phys 120, Fund of Physics		3
Psyc 111, Intro to Psyc	3	
Computer Science Elective	3	
Humanities Electives	3	3
Wellness		2
Totals	16	17
Third Year		
Arch 341, 342, Arch Structure I, II	3	3
Arch 351, Materials and Const.	4	
Arch 352, Envir Cont Sys		4
Arch 371, 372, Arch Design III, IV	4	4
LA 341, Site Dev and Det I	3	
Natural Science Elective	3	
Physical Science Elective		4
Totals	17	15
Fourth Year		
Arch 451, Envir Cont Sys II	3	
Arch 452, Constr Detailing.		3
Arch 471, 472, Adv Arch Design I, II	5	5
Arch 521, 522, 523, 524, 525, 526, 527, 528, Hist/Theory Seminar		2
300 - 500 Level Electives	7	6
Totals	15	16
Fifth Year		
Arch 561, Arch Programming	2	
Arch 571, 572, Adv Arch Design III, IV	6	8
Arch 582, Prof Practice	2	
Arch 589, Prof Seminar	2	
300 - 500 Level Electives	4	7
Totals	16	15
Curriculum Total		160

Note: Electives must include 6 credits of humanities, a science with lab, and 27 credits at the 300 - 500 level.

Recommended Curriculum B.S. with a Major in Environmental Design

	Credits	
First Year	**F**	**S**
Anth 111, Intro to Anthro	3	
Arch 132, Graphics		2
Arch 171, 172, Envir Design I,II	3	3
Art 130, Drawing I		3
Comm 110, Fund Public Speaking	3	
Engl 110, 120, College Composition I, II	3	3
Math 104, 105, Finite Math, Trig	3	3
Soc 110, Intro to Sociology		3
Univ 189, Skills for Academic Success	1	
Totals	16	17
Second Year		
Arch 271, 272, Arch Design I, II	4	4
Arch 321, 322, Arch History I, II	3	3
Arch 326, Design Process and Methods		2
Phys 120, Fund of Physics		3
Psyc 111, Intro to Psyc	3	
Computer Science Elective	3	
Humanities Electives	3	3
Wellness		2
Totals	16	17
Third Year		
Arch 341, 342, Arch Structure I, II	3	3
Arch 351, Materials and Const.	4	
Arch 352, Envir Cont Sys I		4
Arch 371, 372, Arch Design III, IV	4	4
LA 341, Site Dev and Det I	3	
Natural Sciences Elective	3	
Physical Science with Lab Elective		4
Totals	17	15
Fourth Year		
Arch 451, Envir Cont Syst II.	3	
Arch 452, Const Detailing		3
Arch 471, 472, Adv Arch Design I, II	5	5
Arch 521, 522, 523, 524, 525, 526, 527, 528, Hist/Theory Seminar		2
300 - 500 Level Electives	7	6
Totals	15	16
Curriculum Total		129

Landscape Architecture

The landscape architecture program is one of approximately 50 accredited programs in the United States and Canada. The curriculum is reviewed periodically by the nationally organized Landscape Architecture Accreditation Board and was fully accredited in 1991.

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

Master planning of parks, zoos, golf courses, playgrounds, and recreation areas are familiar projects for landscape architects. They may also design multi-functional 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 other architects.

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

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

the profession of landscape architecture is broad; therefore, the courses required of students include many fields of study options. A student may specialize by selecting one of the options provided: Land Reclamation, Natural Resources Management, Landscape Construction and Technology, or Rural Community Development. Students may also tailor their own option area with their academic adviser.

Selective Admission

Selective admission in the landscape architecture program at NDSU takes place through a two-step process. Step one: High school students entering as freshmen are evaluated on the basis of their high school record and test scores, while transfer students are evaluated on the basis of courses taken and grades received. Step two: Upon completion of the first year, a selected number of students are admitted to the second year of the program. The basis for selection is overall GPA and performance in first-year landscape architecture courses.

Special Notice

Students entering 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.

Recommended Curriculum Landscape Architecture

	Credits	
First Year	**F**	**S**
Anth 111, Intro to Anthro	3	
Art 130, Drawing I	3	
Comm 110, Fund of Public Speaking		3
CSci 147, Microcomp Packages		3
Engl 110, 120, College Composition I, II	3	3
LA 132, Intro to LA		2
LA 171, Envir Design I	3	
LA 172, Envir Design II		3
Math 104 or 146, Fin Math or Applied Calc I	3	
Univ 189, Skills for Academic Success	1	
Wellness		2
Totals	16	16
Second Year		
ARSc 225, Natural Resources	3	
Biol 150, Gen Biology		4
CE 113, Surveying		2
Geol 105, 105L, Physical Geol I, Lab	3,1	
LA 231, LA Graphics	1	
LA 271, 272, LA Design I, II	4	4
LA 331, Intro to Planting	3	
Psyc 111 or Soc 110, Intro to Psyc or Intro to Soc		3
Computer Science Elective		3
Totals	15	16
Third Year		
Arch 321, Arch History I	3	
Engl 320, Practical Writing	3	
LA 322, LA History I		4
LA 341, 342, 344, Site Dev & Det I, II, Lab	3	3,2
LA 371, 372, LA Design III, IV	4	4
PlSc 355, Woody Plants	3	
Elective/Option Area		3
Totals	16	16
Fourth Year		
LA 441, Site Dev and Det III	3	
LA 471, 472, Adv Arch Design I, II	6	6
LA 491, Contemp Issues		2
LA 531, Planting Design	4	
Electives	3	3
Option Area		6
Totals	16	17
Fifth Year		
Arch 582, Prof Practice	2	
LA 552, Landscape Planning		2
LA 571, 572, Adv LA Design III, IV	8	8
LA 590, Prof Seminar	2	2
Elective/Option Area	4	4
Totals	16	16
Curriculum Total		160

Civil Engineering

The mission of the civil engineering program is to provide quality education to prepare nationally competitive undergraduate students for a successful career in civil engineering; to provide advanced skills and knoweledge in state-of-the-art research and design in sub-areas of civil engineering for graduate students; and to provide service to the University, engineering profession, and the public. The educational objectives of the program are to provide students with (a) technical knowledge, design capability, and problem solving skills fundamental to a career in civil engineering, (b) knowledge and skills necessary for comparative evaluation of design alternatives, (c) necessary communication skills to successfully practice the civil engineering profession, and (d) awareness of the need for professionalism, teamwork, life-long learning, and understanding the broader societal implications of civil engineering projects.

Civil engineering includes the planning, design, construction, maintenance, and operation of the large and permanent engineering projects of our civilization. Civil engineers are in demand wherever there are people. The major subdivisions of civil engineering are structural, geotechnical, environmental, sanitary, water resources, and transportation engineering.

The civil engineer is responsible for such projects as bridges and large buildings, dams, and other river and harbor work, municipal water supply and sanitation facilities, streets, highways, and other transportation facilities. On many projects the civil engineer works in close cooperation with engineers and scientists from other fields.

The civil engineering curriculum is designed to give the student a thorough mathematical and scientific background in all of the subdivisions of the field. At the same time it provides the student with an opportunity for a degree of specialization in his/her chosen subdivision.

Twelve credits of the curriculum are available for technical electives. 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, which is designed to bring fundamental concepts to play in a major design experience.

Students interested in structural engineering may choose courses like frame analysis, numerical methods in structural engineering, advanced reinforced concrete, advanced steel design, timber design, plastic design in steel, prestressed concrete, foundation engineering, structural mechanics, and dynamics of structures.

Students interested in water resources, sanitary, or environmental engineering may choose courses like solid waste management, applied hydraulics and hydrology, ground water and seepage, water and wastewater laboratory practices, properties of open channels, air pollution, hazardous waste management, water quality management, and sanitary engineering problems.

Students interested in transportation engineering may choose courses like 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.

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.

Graduate programs leading to the Master of Science degree are available in specialized fields.

Recommended Curriculum Civil Engineering

All civil engineering students at NDSU are required to have a minimum cumulative grade-point average of 2.0 and to have received a grade of C or better in Math 165, 166, 228, 259, 266, ME 221, 222, 223, before enrolling in CE 309, 316, 332, and 418.

	Credits	
First Year	**F**	**S**
CE 111, Intro Civil Engr	1	
Chem 121, 121L, 122, 122L Chemistry I, II, Labs	3,1	3,1
CSci 128, CSci Problem Solving		2
Engl 110, 120, College Composition I, II	3	3
Math 165, 166, Calc I, II	4	4
ME 221, Engr Mech I		3
Univ 189, Skills for Academic Success	1	
General Education Elective	3	
Wellness		2
Totals	16	18
Second Year		
CE 204, Surveying	4	
Comm 110, Fund of Public Speaking		3
Engr 311, Impact of Tech I		3
Geol 105, Physical Geology	3	
IME 460, Eval Engr Data		3
Math 228, 259, Linear Alge, Univ Calc III	1,3	
Math 266, Diff Equa		3
ME 212, Graphics and CADD	3	
ME 222, Engr Mech II	3	
ME 223, Mech of Matls		3
Phys 252, University Physics II		4
Totals	17	19

Third Year	Credits F	S
CE 303, Civ Engr Mat		3
CE 309, Fluid Mechanics	3	
CE 316, Soil Mechanics	3	
CE 332, Intro Struct Engr	3	
CE 343, Structural Anal		3
CE 370, Intro Environ Engr		3
CE 371, Environ Engr Lab		1
CE 408, Water Resources and Supply		3
CE 418, Transp Engr		4
ECE 301, Elec Engr I	3	
Engr 312, Impact of Tech II	3	
Engr 402, Prof Ethics	1	
Totals	16	17

Fourth Year		
CE 310, Fluids Lab	1	
CE 404, Reinforced Concrete	3	
CE 444, Steel Design	3	
CE 483, Cont and Spec		3
CE 489, Capstone Design		2
IME 440, Engr Economics		2
ME 350, Ther/Heat Trans	3	
General Education Electives	3	3
Technical Electives	4	8
Totals	17	18

Curriculum Total 138

Construction Management and Engineering

The mission of the Division of Construction Managment and Engineering at North Dakota State University is to provide quality programs for preparing nationally competitive undergraduate and graduate students for a successful careeer in construction. The programs are designed to provide education, research, and outreach opportunities that serve both the needs of students and those of the construction industry.

The educational objectives of the programs are to provide students with (a) basic skills necessary to plan, organize, and control resources to manage the overall construction process, (b) technical knowledge, design, and problem solving skills for a career in construction, (c) knowledge and skills necessary to identify, define, and compare design alternatives, (d) necessary communication skills for successful practice of the construction profession, and (e) opportunities to learn the need for professionalism and life-long learning and the need to understand the broader societal implications of construction projects.

The continued rapid growth of the construction industry demands new kinds of professionals, the construction engineer and manager. These professional constructors will be required to integrate new and high level technology into all aspects of the design and construction process.

All the aspects that contribute to the finished construction project—from the initial planning stage through the final project turnover—require close and careful attention. An individual with management and technical ability to oversee an entire project is essential to the industry.

To fill the need for qualified professionals, Bachelor of Science degree programs in Construction Management, Construction Engineering, and Construction Technology are offered. Graduates of construction programs may look forward to careers with salaries among the highest in the country.

The construction programs are very practical in nature and are designed to prepare the graduate for entry into the construction industry on a professional level. Construction graduates build homes, highways, bridges, power plants, dams, tunnels, skyscrapers, and many other facilities of benefit to society.

Construction Engineering

The construction engineering program is a blend of engineering, construction, business, and management courses. This program is designed for those who want to work in the construction industry and enjoy the status of a professional engineer. It is somewhat similar to the construction management program, but has more emphasis on engineering and technical courses. The construction engineering program is accredited by the Accreditation Board for Engineering and Technology.

Recommended Curriculum Construction Engineering

First Year	Credits F	S
Chem 121, 121L, Gen Chem I, Lab	3,1	
CM&E 111, Intro to CM&E	1	
Econ 201, Prin of Microeconomics	3	
Engl 110, 120, College Composition I, II	3	3
Math 165, 166, Calc I, II	4	4
ME 212, Graphics and CADD		3
ME 221, Engr Mech I		3
Psyc 111, Intro Psychology		3
Univ 189, Skills for Academic Success	1	
Wellness	2	
Totals	18	16

Second Year		
CE 204, Surveying	4	
CM&E 385, Const Safety		2
Comm 110, Fund of Public Speaking		3
Geol 105, Physical Geol	3	
Math 265, Calc III	4	
Math 266, Diff Eqn		3
ME 222, Engr Mech II	3	
ME 223, Mech of Matls		3
Phys 251, 252, University Physics I, II	5	4
Humanities/Cultural Diversity Elective		3
Totals	19	18

Third Year		
CE 303, Materials		3
CE 309, Fluid Mechanics	3	
CE 316, Soil Mechanics	3	
CE 332, Intro Struc Engr	3	
CE 343, Structural Analysis		3
CM&E 301, Const Tech & Equip		4
CM&E 310, Quality Contr		2
CM&E 315, Specs and Contracts	3	
CM&E 370, Intro Cost Estimating	2	
CM&E 411, Const Cost Estimating		2
IME 440, Engr Econ		2
Stat 330, Intro Statistics	3	
Totals	17	16

Fourth Year	Credits F	S
Busn 431, Busn Law I		3
CE 404, Reinf Concrete	3	
CE 430, Timber Design		3
CE 444, Steel Design	3	
CM&E 403, Sched & Proj Control	4	
CM&E 409, Highway Const		2
CM&E 412, Const Mgt		3
CM&E 489, Const Design		3
ECE 301, Elec Engr I	3	
Engr 311, Tech and Soc I	3	
Engr 402, Prof Ethics		1
IME 455, Mgt People System	2	
Technology Elective		3
Totals	18	18

Curriculum Total 140

Construction Management

Construction management is a combination of engineering technology, construction techniques, and management to meet the needs of the rapidly growing construction industry. The program is designed to prepare students for the art of achieving maximum profit by efficient use of people, machines, materials, and money to complete a construction project on time and to the satisfaction of the owner.

A meld of engineering, construction, management, and business gives the student a background and understanding of management's point of view in the construction industry. The construction management program is accredited by the American Council for Construction Education.

Recommended Curriculum Construction Management

First Year	Credits F	S
Chem 121, 121L, Gen Chemistry I, Lab	3,1	
CM&E 111, Intro to CM&E	1	
Comm 110, Fund of Public Speaking		3
Engl 110, 120, College Composition I, II	3	3
Math 146, Applied Calculus I	4	
ME 212, Engr Graph CADD		3
Phys 211, 212, College Physics I, II	3	3
Univ 189, Skills for Academic Success	1	
Humanities/Cultural Diversity Elective		3
Wellness		2
Totals	16	17

Second Year		
Acct 102, Fundamentals of Acct		3
CE 204, Surveying	4	
CE 309, Fluid Mechanics		3
CM&E 205, Building Const		3
CM&E 385, Const Safety		2
Econ 201, Prin of Micro	3	
Engr 311, Imp of Tech I	3	
Geol 105, Physical Geol	3	
ME 221, Engr Mechanics I	3	
ME 223, Mechanics of Materials		3
Psyc 111, Intro to Psyc		3
Totals	16	17

Third Year		
Busn 350, 351, Prin Mgt, Org Behav	3	3
Busn 431, Busn Law I		3
CE 303, Materials		3
CM&E 301, Const Tech & Equip		4
CM&E 310, Quality Control		2
CM&E 315, Specs and Contracts	3	
CM&E 320, Soils and Found	4	
CM&E 370, Intro to Cost Estimating	2	
CM&E 411, Const Cost Estimating		2
IME 440, Engr Economy	2	
Stat 330, Intro Statistics	3	
Totals	17	17

Fourth Year	Credits F	S
CM&E 403, Sched & Proj Control	4	
CM&E 412, Const Mgt.		3
CM&E 413, Const Spec Res		2
CM&E 420, Labor Productivity		3
CM&E 421, Mech and Elec Equ	3	
CM&E 430, Land Development		3
CM&E 450, Steel Design	3	
CM&E 453, Conc Design Const	3	
Busn Elective	3	
Technical Elective		3
Totals	16	14

Curriculum Total 130

Construction Technology

The construction technology program consists of the third and fourth years of a four-year program leading to a Bachelor of Science degree in construction technology. The entrance requirement is an associate degree from an approved two-year technology program. The program consists of courses in engineering technology, construction, business, and management. This program is designed to complement two-year technology programs and prepare graduates to accept more responsible positions in the construction industry.

Recommended Curriculum Construction Technology

Third Year	Credits F	S
Chem 121, 121L, Gen Chemistry I, Lab	3,1	
CM&E 111, Intro to CM&E	1	
CM&E 315, Code and Specs	3	
CM&E 370, Intro Cost Est	2	
CM&E 385, Const Safety		2
CM&E 411, Estimating.		2
Comm 110, Fund of Public Speaking		3
Engr 311, 312, Imp Tech I, II	3	3
ME 221, Engr Mechanics I.	3	
ME 223, Mechanics of Materials		3
Phys 211, 212, College Physics I, II	3	3
Stat 330, Intro Stat		3
Totals	19	19

Fourth Year		
CE 303, Materials		3
CM&E 301, Const Tech & Equip		4
CM&E 310, Quality Control		2
CM&E 320, Soils and Foundations	4	
CM&E 403, Sched & Proj Control	4	
CM&E 412, Const Mgt.		3
CM&E 413, Const Capstone		2
CM&E 421, Elec/Mech Const	3	
CM&E 450, Steel Design	3	
CM&E 453, Concrete Design & Const		3
IME 440, Engr Economy	2	
IME 455, Mgt People Systems.	2	
Totals	18	17

Electrical and Computer Engineering

The mission of the Department of Electrical and Computer Engineering is to provide quality educational opportunities for undergraduate and graduate students through teaching, research, and professional service and to provide specialized support to the greater community. Departmental objectives:
1. Prepare students to become competent engineers.
2. Promote life-long learning practice through continuous curriculum review, research, design, and other scholarly activities.
3. Stimulate student and faculty professional development through publications, participation in professional meetings and societies, and research involvement.
4. Maintain and enhance a positive departmental environment conducive to teamwork, discovery, and professional development.
5. Promote public awareness, interest, and respect for science, engineering, and technology.
6. Provide specialized services to the region, industrial partners, and the professional community.

Electrical and computer engineers create products and services for society out of materials that exist in nature by using principles of science and creativity. The profession is broad, encompassing products valued by society in many technical specialties from electric power and energy utilization to those for current and future information transmission. Career employment opportunities within the profession range over design, development, manufacturing, sales, management, teaching, and research for industry and government.

Selective Admission

Departmental admission requirements for freshmen are an ACT (or equivalent) math test score of 23, or a top 30 percent class standing with a math ACT of 20. Transfer students from U.S. institutions must have a 2.3 GPA; international students a 3.0 GPA.

Further, the department policy is that transfer credits with grades of D in mathematics, science, or engineering courses are not accepted for the electrical engineering curriculum.

Prior to registration in junior- and senior-level courses, majors must have a grade of "C" or better in the following courses: all required mathematics courses; ECE 111, 173, 270, and EE 206. Further, an overall GPA of 2.0 or above is required.

The Program

The electrical engineering program at NDSU is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Major components of the undergraduate program are basic science and mathematics, humanities and social sciences, communication, engineering science, engineering design and ethics, and both breadth and depth in electrical and computer engineering.

Graduate studies leading to the Master of Science degree are offered in the department. The Doctor of Philosophy degree in engineering is available through the college with specialization in electrical and computer engineering. Refer to the Graduate Bulletin for details.

Specialization

The electrical and computer engineering curriculum is designed to reflect the broad nature of the field, and students may tailor their studies within broad parameters. Students are encouraged to develop an individual program of study in close consultation with their advisers. Examples are available to illustrate how specialization may be obtained in a number of different technical areas. Students may mix and match from the examples to suit their particular interests. Technical areas include the following:

Biomedical Engineering: This area is firmly based in engineering and the life sciences. The integration of medicine and engineering serves to provide appropriate products, tools, and techniques for research diagnosis and treatment by health care professionals. Some important products are artificial hearts, medical imaging (MRI, ultrasound, CT scans), prosthetic devices, and computer aids to diagnosis. Biomedical engineers help identify the problems and needs that can be solved using engineering technology and systems methodology to provide high-quality health care at reasonable cost.

Communication and Signal Processing: These are closely related fields within electrical engineering. Communication is the process of transferring information from one point in time and space to another point. Signal processing involves signal representation, as well as signal design and filtering. Students with this specialization find challenging opportunities worldwide to meet the need for more convenient, inexpensive, and reliable communication and signal processing.

Computer Engineering: This area involves hardware and software for small and large computers and for the increasing number of products that have dedicated computers within the product, such as many microwave ovens and automobiles.

Control Engineering: This is the design and implementation of algorithms for controlling physical systems. Examples include active suspension for cars, auto pilots for aircraft, and robot motion control.

Electromagnetics: This area includes electromagnetic compatibility, fiber optics, antennas, microwave devices, radar, sonar, satellite systems, power and communication transmission lines, grounding, shielding, and propagation.

Electronics and Microelectronics: Examples are integrated circuits, VLSI, transistors, lasers, consumer electronics, defense electronics, and electronic materials.

Power Systems: This area includes the generation, transmission, distribution, and utilization of electric energy subject to safety, environmental, and economic concerns.

Cooperative Education Program

The Cooperative Education Program allows students to alternate classroom study with a series of paid professional work experiences related to electrical and computer engineering. These experiences increase in complexity as the student's background increases.

The program provides opportunity for pre-graduation experience in the profession, exploration of several career opportunities, money for education, an enriched degree, and enhanced opportunities for employment following graduation.

Recommended Curriculum Electrical Engineering

	Credits	
First Year	**F**	**S**
Chem 121, General Chem	3	
Comm 110, Fund of Public Speaking	3	
ECE 111, Intro to Electrical Engr	3	
ECE 270, Digital Systems I		3
Engl 110, 120, College Composition I, II	3	3
Math 165, 166, Calculus I, II	4	4
Phys 251, University Physics I		5
Univ 189, Skills for Academic Success	1	
Wellness		2
Totals	17	17
Second Year		
ECE 173, Intro to Computing	3	
EE 206, Circuit Analysis I		4
Math 229, Basic Linear Algebra	2	
Math 265, 266, Calc III, Diff Eq	4	3
ME 221, Engr Mechanics I	3	
Phys 252, University Physics II	4	
Physical Science Lab	1	
Engr Sci Elective		3-4
Humanities/Social Science Electives		3
Math/Science Elective		3-4
Totals	17	16-18
Third Year		
ECE 311, Circuit Analysis II	3	
ECE 312, Dig An Circuits Lab	1	
ECE 314, Mach Electromag Lab		1
ECE 321, 323, Electronics I, II	3	3
ECE 322, 324, Electronics/Signals Lab	1	1
ECE 331, Energy Conversion		3
ECE 343, Signals and Systems		3
ECE 351, Applied Electromagnetics	3	
ECE 376, Microcomputer Interfacing	3	
ECE 441, Random Processes		3
Humanities, Soc Sci Electives	3	3
Totals	17	17
Fourth Year		
ECE 401, 403, Design I, II	3	3
ECE 402, Comm Control Lab	1	
ECE 443, Communications I	3	
ECE 461, Control Systems	3	
Engr 402, Ethics and Soc Resp		1
ECE Electives	3	6
ECE or Engr Science Electives	2-3	3
Humanities, Soc Sci Elective		3
Totals	15-16	16
Curriculum Total		132-135

Curriculum Electives

The curriculum includes elective courses of the following types: humanities, social/behavioral sciences, math/science, engineering science, and ECE electives.

Engineering Science Electives	**Credits**
CE 309, 310, Fluid Mechanics, Lab	3,1
CSci 161, Comp Science II	4
CSci 366, Files for Database Sys	3
CSci 372, Comparative Prog Lang	3
CSci 426, Intro to Artificial Intelligence	3
CSci 458, Microcomputer Graphics	3
CSci 459, Local Area Networks	3
CSci 467, Algorithm Analysis	3
CSci 474, Operating Systems Concepts	3
CSci 475, Operating Systems Design	3
CSci 477, Obj Oriented Sys	3
IME 440, Engineering Economy	2-3
IME 456, Prog and Proj Mgt	3
IME 461, Quality Assur and Control	3
ME 222, Engr Mechanics II	3
ME 223, Mechanics of Materials	3
ME 350, Thermodynamics/Heat	3
ME 351, Thermodynamics I	3
ME 411, Nuclear Engineering	3
Math/Science Electives	
Biol 150, General Biology	3
Chem 122, General Chemistry II	3
Chem 341, Organic Chemistry I	3
Chem 364, Physical Chemistry I	4
CSci 222, Discrete Mathematics	3
CSci 235, 236, Theoretical Comp Sci I, II	3,3
Math 270, Intro to Abstract Math	3
Math 329, Linear Algebra	3
Math 420, 421, Abstract Algebra I, II	3,3
Math 450, 451, Real Analysis I, II	3,3
Math 452, Complex Analysis	3
Math 480, Applied Dif Eq	3
Math 481, Fourier Analysis	3
Math 483, Partial Dif Eq	3
Math 488, 489, Numerical Analysis I, II	3,3
Phys 350, Modern Physics	3
Phys 401, Fund Prop of Solids	3
Phys 402, Optical Electronics	3
Phys 485, Modern Physics I	3
Zoo 170, General Zoology	3
ECE Electives	
ECE 370, Dig Sys Design and Implem	3
ECE 373, Assembly Lang/CPU Arch	3
ECE 374, Computer Organization	3
ECE 404, Advanced EE Laboratory	1
ECE 421, Communication Circuits	3
ECE 423, Digital Electronics	3
ECE 425, Intro to Semi-Cond, Devices	3
ECE 431, Power Systems	3
ECE 433, Power Systems Design	3
ECE 437, Power Electronics	3
ECE 445, Communications II	3
ECE 455, Electromagnetic Compatibility	3
ECE 457, Optical Signal Transmission	3
ECE 463, Digital Control	3
ECE 470, Digital Systems II	3
ECE 471, Comp Sys Des and Implem	3
ECE 483, Instrumentation for Engineers	3
ECE 485, Biomedical Engineering	3
ECE 496, Field Experience	3

For students interested in pursuing one of the areas of specialization, lists of recommendations are available from the ECE Department.

Industrial and Manufacturing Engineering

Two majors are offered within the Department of Industrial and Manufacturing Engineering: the industrial engineering and management major and the manufacturing engineering major with options for aero, electronics, plastics, and composite processes.

Most of the basic courses in each major are the same. A small number of elective courses enhance the whole curriculum for those who are interested in specialty industries.

Graduates are prepared for careers that begin with the design and development of systems and devices that manufacture, construct, and service products, plants, and facilities conceived by graduates from other engineering majors. Graduates form indispensable links between the paper designs and prototypes of other majors to the deliverable, usable, and supportable results of production, construction, and service teams needed by customers.

For decades, graduates of the industrial engineering and management major have contributed successfully to a broad spectrum of enterprise groups: health care, information, manufacturing, and service.

Practice in these professions results in the design, installation, and improvement of integrated systems of people, materials, equipment, information, energy, and processes. Activities performed include sizing, selecting, and laying out of equipment for production and service. Features include optimizing materials handling, facility interfaces, inventory and quality control, operational planning of computers and software for simulation and optimization, integrated formation handling, ergonomics and human factors, work methods and work station design, manuals and training for use and maintenance.

Students in both majors are urged to take advantage of cooperative education and summer intern positions whenever possible to gain experience and enhance employment opportunities.

Graduate work leading to the M.S. and Ph.D. degrees is offered. Details are in the Graduate Bulletin.

Industrial Engineering and Management Major

The industrial engineering and management curriculum includes course work and project experience for students with the aptitude and interest in engineering and leadership. Graduates have demonstrated success across a spectrum of industries: product and process development; operations and production; material handling, distribution, and warehousing; computing, information

networks, and communications; people, project, and organizational management; accounting, economics, and financial modeling; logistics and training; systems and service analysis and design.

Students draw upon general and specialized knowledge and skills in communications, mathematics, physical and social sciences and mechanical, electrical, and computer engineering. They use the principles and methods of engineering analysis and design to specify, predict, evaluate, and prove capability, cost effectiveness, operability, supportability, and environmental compatibility.

The faculty emphasizes the integration of verbal and written communication across the curriculum. Students become proficient in the use of business software (word processing, spreadsheets, data bases, graphics, projects, and e-mail) and system modeling software that simulates, demonstrates, and validates design logic and verifies configurations capability, limitations, and restrictions.

Students work alternately in groups of functional specialists and cross-discipline project teams. First-year students team with third-year students working on systems engineering projects for industrial clients. As second-year students, they team with fourth-year students working on large products for industrial clients. Formal reports, plans, and presentations are carried out for capstone projects. In capstone courses, students work in matrix organizations much like duties performed by graduates in top-level consulting firms. They determine client needs, engineering requirements, design and development of fabricated parts, assembly cells, lines, plants, and facilities.

Recommended Curriculum Industrial Engineering and Management

	Credits	
First Year	**F**	**S**
Chem 121, 121L, 122, 122L, Gen Chem I, II, Labs	3,1	3,1
ECE 173, Intro to Computing	3	
Engl 110, College Composition I	3	
IME 111, Intro to IME	1	
IME 112, Comp Applic IE		2
Math 165, 166, Univ Calc I, II	4	4
ME 212, Engr Graphics		3
ME 221, Engr Mech		3
Univ 189, Skills for Academic Success	1	
Wellness		2
Totals	16	18
Second Year		
Comm 110, Fund of Pub Speaking		3
Engl 120, College Composition II	3	
IME 310, Survey of IE	3	
IME 311, Work Design		3
Math 229, Basic Linear Algebra	2	
Math 265, Calculus III	4	
Math 266, Diff Equations		3
ME 222, Engr Mech II	3	
ME 223, Mech of Matls		3
Phys 252, 252L, Univ Phys II, Lab		4,1
Social Sci Elective	3	
Totals	18	17
Third Year		
ECE 301, 303, Elect Engr I, II	3	3
ECE 306, Lab		1
IME 330, Process Engr	3	
IME 440, Engr Econ	4	
IME 450, Syst Engr	2	
IME 460, Eval of Data	3	
IME 461, Quality Ctrl		4
IME 470, Operation Res		3
IME 472, Simulation		3
ME 350, Thermodynamics/Heat		3
Elective	3	
Totals	18	17
Fourth Year		
CE 309, Fluid Mech	3	
Engr 402, Engr Ethics		1
IME 452, Integrated Info Systems		3
IME 455, Mgt of People	2	
IME 456, Program Mgt		3
IME 480, Prod Inv Cont	3	
IME 482, Autom Mfg Syst	3	
IME 485, Ind and Mfg Design		3
Humanities Electives	3	3
Technical Electives	3	3
Totals	17	16
Curriculum Total		137

Industrial Engineering and Management Minor

A minor in industrial engineering and management is offered for other engineering majors. Specific knowledge and integration skills are emphasized to better function in the complex people and machine systems present in today's global enterprises and market.

This minor prepares engineers who seek careers in industry to function better as team members in industrial settings through added understanding of the organization and management of business and industrial processes.

Minor requirements consist of a 16-credit minimum including Survey of Industrial Systems Applications (310) and Work/Station Design and Measurement (311). Also required are ten additional credits selected from IME 300- and 400-level major courses, except IME 460. (IME 460, Evaluation of Engineering Data, does not count toward the minor.)

Students must complete degree requirements with another engineering major before the minor in Industrial Engineering and Management will be placed on their transcript.

Management Sequence for Non-Majors

Industrial engineering and management practices are universally accepted in all kinds of private and public enterprise. Courses are available as electives to students majoring in areas such as computer science, cereal science, mathematics and science, business administration, agricultural economics, and facility management. The courses recommended are IME 310, 311, 440, 452, 453, 455, 456, and 462.

Other courses in the curriculum are not recommended unless the student has the necessary mathematical or engineering background.

Industrial Engineering and Management Options

A student may prepare for one or more of the following areas in the field of industrial engineering by careful selection of a coherent group of technical and other elective courses.

- Automation and robotics
- Health care management engineering
- Industrial management
- Integrated information systems
- Manufacturing and process engineering
- Operations research and simulation
- Production and inventory control
- Reliability and quality assurance
- Systems engineering and project management

When considering an option (emphasis area), the student, with the assistance of an adviser, should evaluate the factors involved. For example, an industrial engineer with a manufacturing process emphasis must have a working knowledge of the production environment to do process planning, development, and work in computer integrated manufacturing operations.

The department offers graduate work leading to the Master of Science degree, the Ph.D. degree, and course work for graduate students majoring in other departments. Details are in the Graduate Bulletin.

Manufacturing Engineering Major

Manufacturing engineers make things or make them better, faster, and at lower cost. Examples include computer disk drives, circuit boards, switches, tractors, windows, airplanes, missiles, and space craft. They configure factories to produce components and assemble deliverable products.

Career employment opportunities include design and development, manufacturing support equipment and processes, quality control and assurance, and functional management. Companies large and small, within the region and beyond, provide a wide range of opportunities for graduates.

Recommended Curriculum Manufacturing Engineering

	Credits	
First Year	**F**	**S**
Chem 121, 122, General Chem I, II	3	3
Chem 121L, 122L, General Chem Lab I, II	1	1
ECE 173, Intro to Computers	3	
Engl 110, 120, College Composition I, II	3	3
IME 111, Intro to IME	1	
Math 165, 166, Calculus I, II	4	4
ME 212, Engineering Graphics		3
ME 221, Engr Mechanics I		3
Univ 189, Skills for Academic Success	1	
Totals	16	17

Second Year	Credits F	S
IME 311, Workstation Design		3
IME 330, Manufacturing Process I	3	
IME 380, CAD/CAM for Manufacturing	3	
Math 229, Basic Linear Algebra	2	
Math 259, Univ Calculus III	3	
Math 266, Intro Diff Equations		3
ME 222, Engr Mechanics II	3	
ME 223, Mechanics of Materials		3
Phys 252, 252L, University Physics II, Lab		4,1
Engineering Materials		3
Social/Behavioral Sciences Elective	3	
Totals	17	17
Third Year		
Comm 110, Fund of Public Speaking		3
ECE 301, Electrical Engineering I	3	
IME 430, Manufacturing Processes II	3	
IME 432, Composite Materials Manuf		3
IME 440, Engr Econ/Cost Est		3
IME 460, Eval of Engineering Data	3	
ME 350, Thermodynamics/Heat	3	
Elective[1]	3	3,3
Wellness		2
Totals	15	17
Fourth Year		
Engr 402, Engr Ethics	1	
IME 431, Design for Production		3
IME 461, Statistical Quality Control		4
IME 480, Product/Inventory Control	3	
IME 482, Automated Manufacturing	3	
IME 489, Manuf Engr Capstone		3
Humanities Elective[1]	3	
Technical Elective/Elective[2]	3,3	3,3
Totals	16	16
Curriculum Total		131

[1] Lists of approved social and behavioral sciences and humanities and fine arts electives are available in the department office.
[2] Lists of technical elective recommendations are available in the department office.

The first two years of the curriculum include fundamental courses in English, chemistry, mathematics, engineering science, and manufacturing. Courses in statics, dynamics, and strength of materials provide understanding of how mechanical components interact and how industrial processes fabricate and assemble products. The last two years focus on advanced content in engineering science, manufacturing, and materials. Students interested in aircraft may pursue the aero specialty option beginning in their third year.

The program has a practice-based approach and uses both laboratories and industry-based projects to provide students with real manufacturing experiences. In addition, students are urged to take advantage of cooperative education and summer intern positions whenever possible to gain professional experience.

Students interested in the manufacture of aircraft parts, electronic parts, circuit board assemblies, plastics and injection molding will have the opportunity to select options that begin in the third or fourth years of study. These options involve some collaborative work with mechanical engineering and electrical and computer engineering faculty and students.

Courses on devices for manufacturing and tooling provide hands-on experience with manufacturing processes. Computer-aided design and manufacturing (CAD/CAM), computer-numerical control (CNC), and computer integrated manufacturing (CIM) are integrated across the curriculum. Machine, manufacturing, and management information systems are studied and used. Tooling, cutting, forming (discrete and composite), and assembly are related to materials and fixture design requirements. A composite materials course involves design and manufacturing as practiced in industry. A Boeing Process Standard is used as a guide. Non-destructive inspection principles and practices are also incorporated in the curriculum.

Courses in manufacturing systems are an integral component of the program. Evaluation of engineering data, design of experiments, and statistical quality control (SQC) techniques are part of the curriculum, including an introduction to reliability and quality engineering. The fundamentals of manufacturing systems are provided through work and workstation design, production and inventory control, facility design, systems engineering, and simulation courses.

Technical elective courses available to enhance learning for integration with other systems (information, people, and materials handling/movement) common in modern industry include the following: Logistics Engineering and Management (451), Integrated Industrial Information Systems (452), Management of People Systems (455), Program and Project Management (456), and Operations Research I (470).

The Aero Option course work includes the following: Aircraft Corrosion: Theory and Control (320), Aircraft Design for Manufacturing Engineers (420), Aircraft Structural Repair and Overhaul (422), and Aircraft Component Failure Analysis (425). Additional device and systems courses are also included in this option.

Mechanical Engineering

Mechanical engineering is a broad field primarily concerned with the principles of motion, energy, and force. Mechanical engineers are called upon to design machinery, mechanisms, and systems that function safely, reliably, and efficiently to serve needs of society. To accomplish this, mechanical engineers apply scientific principles to problems that involve the motion of heat, gases, fluids, and solid materials.

Mechanical engineers may be found in nearly all segments of society. They work in industry, consulting practices, government facilities, and universities. In industry, mechanical engineers work for equipment manufacturers, utilities, material processing plants, environmental firms, and companies that deal with aerospace, transportation, petroleum, biomedical products, and others. Mechanical engineers employed by the government and universities contribute to the betterment of society by conducting research to solve present and future problems. As technology becomes more prevalent in daily life, mechanical engineers are increasingly called upon to apply that technology to develop devices that improve the standard of living.

The goal of the mechanical engineering curriculum at NDSU is to produce baccalaureate-level graduates who are well prepared to accept engineering positions in industry and government or to pursue advanced degree studies. Our mission is to educate undergraduate and graduate students in the fundamentals of the discipline and to prepare graduates who effectively function in society in the field of their choice while also having the learning skills to adapt to evolving personal and professional goals. To accomplish this mission, the educational program objectives are the following:

1. Graduates must possess a fundamental understanding of the basic engineering sciences in the three core areas of the curriculum: mechanical sciences, thermal/fluid sciences, and materials sciences.
2. Graduates must possess the ability to apply fundamental concepts and utilize modern engineering tools in the analysis, design, and testing of components, systems, or processes relevant to the field of mechanical engineering.
3. Graduates must have the ability to work in a team environment and effectively communicate their ideas and designs in a manner that is consistent with the technical expertise of their audience.
4. Graduates must possess a broad background in the humanities and social sciences and understand the context in which their designs will be implemented along with the corresponding impact on society, both locally and globally.

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

Students in mechanical engineering are strongly encouraged to participate in the cooperative education program to enhance their classroom education with practical experience in engineering-related positions in industry.

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.

All students must complete all required engineering courses and their prerequisites with a grade of C or better.

Graduate programs leading to the Master of Science degree are offered by the department. The Doctor of Philosophy degree in engineering is available through the college with specialization in mechanical engineering. Refer to the Graduate Bulletin for more specific information.

Curriculum Options

Mechanical engineering majors may choose one of four options to complete their program of study.

All mechanical engineering majors have a common curriculum during the first two years. At the beginning of the third year, students choose one of the following curriculum options.

Standard: Students who are interested in exploring a spectrum of technical electives may follow the standard curriculum and choose a minimum of two technical elective courses. These courses cover a wide range of topics and students may tailor their choices to reflect their special interests.

Injection Molding: This curriculum option provides students with an opportunity to acquire a working knowledge of plastics and plastics processing with an emphasis on injection molding technology.

Polymers and Coatings: This option is for students wishing to prepare for a career as a mechanical engineer in the plastics and coatings industries, or for a career in a manufacturing industry as a mechanical engineer with expertise in the fields of plastics and coatings. The polymers and coatings option in mechanical engineering at NDSU is a unique program offered nowhere else in the United States.

Numerous career opportunities for mechanical engineers with this specialized training are available in the coatings industry, which manufactures paints and coatings to enhance and preserve such items as automobiles, ships, steel structures, machines, and household appliances. Many other opportunities are available in various manufacturing industries where more and more components previously fabricated from metals are now made from plastics and fiber-reinforced composite materials.

Due to the unique nature of this program, the demand for graduates far exceeds the supply.

Power: The power option curriculum is designed to prepare the student for a career in the broad field of energy production. In addition to a well-rounded background in mechanical engineering design, the student receives a thorough education in power plant design and in those areas of electrical engineering that are related to the production of electrical energy. There is a need for mechanical engineers with this particular background and training for carreers in the electrical power production and coal gasification industries in North Dakota and surrounding states. Electromechanical equipment manufacturers and consulting engineering firms also have a great demand for graduates who complete the power option curriculum.

Cooperative Education

Students in mechanical engineering may participate in the Cooperative Education program at NDSU starting in their sophomore year. Students gain valuable industrial experience to complement their academic studies. Internships may last from one to three semesters.

Wages and benefits for co-op students are determined by the employer and are influenced by such factors as established wage scales, the co-op student's responsibilities, and the nature of the employer's business.

Aviation Program

A program of flight training is available, which prepares students for the FAA examinations for the Private Pilot's License. Three courses are offered under this program: ME 311 Introduction to Aviation, ME 312 Introduction to Flight, and ME 313 Commercial Instrument Ground School.

Any student enrolled at NDSU or one of the other two Tri-College institutions may enroll in this program. No other courses are required as prerequisites.

Recommended Curriculum Mechanical Engineering

All Options

First Year	Credits F	Credits S
Chem 121, 122, Gen Chem I, II	3	3
Engl 110, 120, College Composition I, II	3	3
Math 165, 166, Calculus I, II	4	4
ME 189, Skills for Academic Success	1	
ME 221, Engr Mechanics I		3
Humanities/Soc Sci Electives[1]	6	3
Wellness		2
Totals	17	18
Second Year		
Comm 110, Fund of Public Speaking		3
IME 330, Process Engineering	2	
Math 229, 259, Basic Lin Alg/Univ Calc III	2,3	
Math 266, Intro Diff Equations		3
ME 212, Fund of Visual Communication	3	
ME 213, Modeling Engr Systems		3
ME 222, Engr Mechanics II	3	
ME 223, Mech of Materials	3	
ME 351, Thermodynamics I		3
Phys 252, 252L, Univ Physics II, Lab		4,1
Totals	16	17

Standard Option

Third Year	Credits F	Credits S
ECE 301, 303, 306, Elec Engr I, II, Lab	3	3,1
Engr 320, Technical Communication	3	
IME 460, Eval of Engr Data		3
ME 331, 332, Engr Materials I, II	4	3
ME 341, Mech of Machinery	3	
ME 352, Fluid Dynamics	3	
ME 353, Thermodynamics II		3
ME 442, Machine Design I		3
ME 455, Mech Systems Lab I		1
Totals	16	17
Fourth Year		
Engr 402, Prof Ethics	1	
IME 440, Engr Economy		2
ME 411, Intro to Nuclear Engr		3
ME 412, Engr Measurements		3
ME 421, Theory of Vibrations	3	
ME 443, Machine Design II	2	
ME 454, Heat and Mass Transfer	3	
ME 456, Mech Systems Lab II	1	
ME 461, 462, Design Project I, II	3	3
Humanities, Soc Sci Electives[1]		3
Technical Electives[2]	3	3
Totals	16	17
Currriculum Total		134

Injection Molding Option

Third Year	Credits F	Credits S
ECE 301, 303, 306, Elec Engr I, II, Lab	3	3,1
Engr 320 Technical Communication		3
IME 435, Adv Process Engr		3
ME 291, Injection Molding Lab/Seminar	1	
ME 331, Engr Materials I	4	
ME 341, Mech of Machinery	3	
ME 352, Fluid Dynamics	3	
ME 353, Thermodynamics II		3
ME 442, Machine Design I		3
ME 455, Mech Systems Lab I		1
ME 473, Engr Plastics for Design	3	
Totals	17	17
Fourth Year		
Engr 402, Prof Ethics	1	
IME 440, Engr Economy		2
IME 460, Eval of Engr Data		3
ME 332, Engr Materials II		3
ME 411, Intro to Nuclear Engr		3
ME 412, Engr Measurements		3
ME 421, Theory of Vibrations	3	
ME 443, Machine Design II	2	
ME 454, Heat and Mass Transfer	3	
ME 456, Mech Systems Lab II	1	
ME 463, 464, Plastics Design Project I, II	3	3
Humanities, Soc Sci Electives[1]	3	
Totals	16	17
Curriculum Total		135

Polymers and Coatings Option

Third Year	Credits F	Credits S
Chem 341, 341L, 342, Organic Chem I, Lab, II	3,1	3
ECE 301, 303, 306, Elec Engr I, II, Lab	3	3,1
Engr 320, Technical Communication		3
ME 331, 332, Engr Materials I, II	4	3
ME 341, Mech of Machinery	3	
ME 352, Fluid Dynamics	3	
ME 353, Thermodynamics II		3
ME 442, Machine Design I		3
Total	17	19
Fourth Year		
Engr 402, Prof Ethics	1	
IME 440, Engr Economy		2
ME 412, Engr Measurements		3
ME 421, Theory of Vibrations		3
ME 454, Heat and Mass Transfer	3	
ME 455, Mech Systems Lab I	1	
ME 456, Mech Systems Lab II		1
ME 463, 464, Plastics Design Project I, II	3	3
ME 473, Engr Design with Plastics	3	
ME 474, Mech of Composite Materials		3
P&C 474, 475, 484, Coatings I, II, Lab	3,2	3
Humanities, Soc Sci Elective[1]	3	
Total	19	18
Curriculum Total		141

Power Option

	Credits	
Third Year	**F**	**S**
ECE 301, 303, 306, Elec Engr I, II, Lab	3	3,1
Engr 320, Technical Communication	3	
IME 460, Eval of Engr Data		3
ME 331, 332, Engr Materials I, II	4	3
ME 341, Mech of Machinery	3	
ME 352, Fluid Dynamics	3	
ME 353, Thermodynamics II		3
ME 442, Machine Design I		3
ME 455, Mech Systems Lab I		1
Humanities, Soc Sci Electives[1]	3	
Totals	19	17
Fourth Year		
ECE 431, Power Systems	3	
ECE 433, Power Systems Design		3
Engr 402, Prof Ethics	1	
IME 440, Engr Economy		2
ME 411, Intro to Nuclear Engr		3
ME 412, Engr Measurements		3
ME 421, Theory of Vibrations	3	
ME 443, Machine Design II		2
ME 454, Heat and Mass Transfer	3	
ME 456, Mech Systems Lab II	1	
ME 465, 466, Power Systems Design Proj I, II	3	3
ME 481, Energy Conversion	3	
Total	17	16
Curriculum Total		137

1A listing of approved elective courses in humanities and social sciences is available in the department office.

2Technical electives: Student must select two of the following courses: ME 471, 473, 474, 475, 477, 481, 484, 485, 486, 487, and 489 or other as approved.

Military Science (Army ROTC)

The Army Reserve Officers Training Corps (Army ROTC) program is conducted by the Department of Military Science. Army ROTC gives students the opportunity to become involved in a unique program that adds a dimension to their education. It also provides several financial assistance options. Students, regardless of their majors, are eligible to participate in this program. The primary objective of the program is to provide the knowledge and skills required for men and women to serve as commissioned officers in the active Army, Army Reserve, or Army National Guard.

The Army ROTC program is a four-year program of instruction in the military sciences that is taken in conjunction with a normal curriculum. Advanced placement credit may be received for previous or current military service. The program, totaling 22 credit hours, can lead to a minor in military science. The program is divided into two parts: the basic course and the advanced course.

The basic course is normally taken during the freshman and sophomore years. Students participating in the basic course incur no military obligation or commitment. Courses offered in the basic course include fundamentals of rifle and pistol marksmanship, military leadership and management, land navigation, U.S. military history, first aid, tactics, and drill and ceremonies. Military skills laboratories are also offered. These include adventure activities such as rappelling, rope bridging, survival techniques, and more.

Students entering the advanced course must have a minimum of two years of academic work remaining in a curriculum leading to either a baccalaureate or graduate degree. Students may qualify for entry into the advanced course by one of the following: completing the basic course, attending a basic five-week ROTC summer camp, or having prior military service in any of the Armed Forces of the United States. Members of the Army National Guard or Army Reserve may qualify for direct entry into the advanced course and can maintain membership in their Guard/Reserve Unit by enrolling for the Simultaneous Membership Program (SMP) option.

Advanced course students receive a monthly monetary allowance of $150 for a total up to approximately $3,000 over the two-year period and receive $225 per semester for fees and materials.

Advanced course students receive instruction in advanced leadership and management and are afforded the opportunity to apply their acquired knowledge to practical situations. Military skills laboratories are also offered. In addition to the listed military science curriculum, advanced course students must complete an approved course in written communication skills, military history, and computer literacy.

Students also attend a five-week summer camp at Fort Lewis, Washington, near Seattle between the first and second year of the advanced course. The advanced camp is designed to develop a student's judgment and decision-making abilities, build physical endurance and self-confidence, and allow a student to apply leadership skills.

Leadership positions are rotated among the students so that each person experiences first-hand what it takes to develop and lead a military team.

Four-, three-, and two-year scholarships are available. Army ROTC scholarships provide for payment of tuition and fees, receive $225 per semester for books and equipment, and an allowance of up to $1,500 a year for each year the scholarship is in effect. Generally, four-year scholarships are awarded to high school students who wish to compete during their senior year for a scholarship.

Students who do not qualify for the ROTC program or who do not wish to pursue an officers commission may audit courses in the advanced ROTC program, if approved by the professor of military science. Auditing students' participation is limited to the classroom and they are not eligible for monetary allowances.

For detailed information on the Army ROTC program, contact the Department of Military Science, 1-800-798-7575 or 231-7575 (collect calls are accepted), visit Room 103 in the Bentson/Bunker Fieldhouse on the NDSU campus, or e-mail (ndsu_armyrotc@badlands.nodak.edu).

Natural Resources Management

The natural resources management major is a multidisciplinary program and is available in the College of Engineering and Architecture through the following departments: Agricultural Engineering, Civil Engineering, and Landscape Architecture. For a description of the program, refer to the College of Agriculture section.

College of Human Development and Education

E. Morrow Lebedeff Hall 255 (701) 231-8211
Virginia L. Clark, Dean

The College of Human Development and Education was established July, 1992. There are five units in the college: Apparel, Textiles, and Interior Design; Child Development and Family Science; Education; Food and Nutrition; and Health, Physical Education, and Recreation. Students are prepared for careers in education, colleges and universities, business and industry, community services, hospitals and health care facilities, and public and private programs concerned with design, human welfare, fitness, and recreation.

Mission

The mission of the College of Human Development and Education is to provide educational programs and conduct research and other scholarly activities that focus on the lives of individuals and their families as they interact in work, educational, and living environments.

Opportunities are provided to broaden the student's understanding and appreciation of the aesthetic, cultural, economic, physical, psychological, and social elements that influence individual and family well-being. Programs are designed to help each student develop professional competencies, attain a liberal education, and relate the learnings from the basic disciplines to various applications.

Accreditation

The Center for Child Development is accredited by the National Association for the Education of Young Children. The marriage and family therapy program is accredited by the Council on Accreditation for Marriage and Family Therapy Education. The athletic training program is certified by the National Athletic Training Association. The School of Education is accredited by the National Council for Accreditation of Teacher Education. The school counseling and community counseling programs are accredited by the Council for the Accreditation of Counseling and Related Educational Programs. The dietetics program is accredited by the American Dietetic Association. The interior design program is accredited by the Foundation for Interior Design Education Research and the facility management curriculum meets guidelines set by the International Facility Management Association. The food science program (offered with the College of Agriculture) is approved by the Institute of Food Technologists.

Degree Programs

Undergraduate programs in the college lead to a Bachelor of Science or a Bachelor of Arts degree. Recommendation of candidates for teacher certification also rests within this college through the School of Education.

Graduate study leading to a Master of Science degree is offered in Child Development and Family Science, Counseling and Guidance, Educational Administration, Food and Nutrition, Physical Education, and Teacher Education. A Master of Education degree may be earned through Health, Physical Education, and Recreation and the School of Education. A graduate minor also is available in several of the preceding units. Refer to the Graduate Bulletin for details.

Degree Requirements

Students enrolled in major programs in the college are required to follow curriculum guidelines available in the Student Services Office of the college (260 EML) or department offices for each of the curriculum options and majors. Course requirements in each program fulfill university, college, and departmental requirements. Refer also to graduation requirements and related information listed earlier in the Academic Policies section.

All undergraduate degree candidates must apply for graduation through the Office of the Registrar according to University procedures and deadlines.

Courses to fulfill the major requirements in the college may not be taken pass/fail. Other courses, however, not specified by name or number may be taken pass/fail. Departments may have additional restrictions. Approval must be obtained and processed during the first three weeks of the regular semester. Once processed, a course cannot be changed back to regular grading.

Mathematics 100 and 102 are developmental courses and will not count toward credits for graduation in any program.

General college requirements for the two undergraduate degrees extend beyond the minimum University general education requirements. An adviser should be consulted for specific courses. Students are also encouraged to follow their own interests in choosing electives that go beyond the minimum requirements. Minimum requirements for each degree include the following.

Bachelor of Science Degree

General Education:	Credits
First-year experience	1
Communication	9
Comm 110	(3)
Engl 110, 120	(6)
Quantitative Reasoning	3
Math 104 or CSci: programming course or Stat 330	
Science and Technology	10
A laboratory course is included in this requirement.	
Humanities and Fine Arts	6
Social and Behavioral Sciences	6
Wellness	2

Requirements also include a course in Cultural Diversity, a course in Global Perspectives, and integration of the following within existing courses: computer usage, communication activities in upper-division major courses, comprehension of personal and professional ethics, and a capstone experience.

These courses, professional courses for the major, and electives must total a minimum of 122 credits to meet degree requirements.

Bachelor of Arts Degree

In addition to all of the preceding requirements listed for the Bachelor of Science degree, Bachelor of Arts degree requirements also include the following:

- Six (6) additional credits of humanities and social behavioral sciences
- Two years of one modern foreign language at the college level or equivalent

Students with two units/years of a foreign language in high school should enter the second year college-level language course. Students with four or more units/years of a foreign language in high school or college will be considered to have completed the language requirement.

Curriculum Majors and Options

- Apparel and Textiles
- Athletic Training
- Child Development and Family Science
- Dietetics Option
- Facility Management
- Food and Nutrition
- Food Science
- Hotel, Motel, Restaurant Management
- Human Performance and Fitness
- Interior Design
- Physical Education
- Recreation Management
- Retail Merchandising Option
- Secondary Education:
  - Agricultural Education
  - Biological Sciences
  - Chemistry
  - Comprehensive Science
  - English
  - Family and Consumer Sciences Education
  - French
  - German
  - History
  - Mathematics
  - Music (K-12)
  - Physical Education (K-12)
  - Physics
  - Social Science
  - Sociology
  - Soils (Earth Science)
  - Spanish
  - Speech Communication

An elementary education program is available through the cooperation of Valley City State University, the degree-granting institution for this program.

Minors and Options

A minimum of 18 credits is required for a minor in child development and family science; 23 credits in food and nutrition; 24-26 credits in health education; 19 credits in hotel, motel and restaurant management; 16 credits for an individual and family wellness minor; 21 credits in retail merchandising; 22 credits in consumer textiles; 17 credits in facility management; 22-25 credits in interior design, 22 credits for a nutrition minor, and 29 credits for a physical education minor. Information on specific minor requirements may be obtained from unit chairs and/or the Office of Student Services within the college. Minors may also be taken in other departments within the University.

Special Opportunities

Special opportunities available to students in the college include the following.

Professional Organizations

Student chapters of professional organizations are available for membership in accordance with their respective bylaws:

American Association of Family and Consumer Sciences (AAFCS)
American Society of Interior Designers (ASID)
Association for Leisure and Recreation
Child Development and Family Science Club
Eta Sigma Delta (honorary)
Fit for Life Club
Fashion, Apparel, and Business Organization (FABO)
International Facility Management Association (IFMA)
International Food Service Executives Association (IFSEA)
Phi Upsilon Omicron (honorary)
Student Dietetic Association (SDA)
Student North Dakota Education Association (SNDEA)

Additional information is available from the student services office in the college (260 EML).

Dean's Student Advisory Council

The Dean's Student Advisory Council acts as a liaison organization between the student body, the faculty, and the Dean of the College of Human Development and Education. The council assists in the promotion of the college. The students are recommended by the Director of Student Services and Development to the Dean. Their selection is based on academics and a willingness to participate. Each of the five units in the college is represented by student members.

Student Advisers

Although each student in the college is assigned a faculty adviser, selected students supplement and complement the existing faculty advisory system. The student adviser program is designed to help incoming and transfer students make the best possible academic and social adjustments to the college and the University. Applications for student advisers are reviewed and selected each spring. Information is available in the student services office of the college (260 EML).

Cooperative Education Program

Several programs in the college participate in the Cooperative Education program to help students find suitable professional experiences in their academic areas during their college preparation. Students earn academic credit for these experiences.

ROTC Programs

Up to 18 elective credits may be earned by participation in the Army or Air Force ROTC program. Men and women may take these programs for elective credit, and in addition they may complete either program and receive a commission upon graduation. Students receiving commissions may have the opportunity to serve as officers in the active service or in army reserve components. An additional opportunity for dietetic internships is offered through this program. For more complete details of the ROTC programs and scholarships available, consult the Department of Military Science (Army) or the Department of Aerospace Studies (Air Force).

Interdisciplinary Minors

Interdisciplinary study involves an integration of more than one perspective on a topic. Programs in two interdisciplinary minors are available: gerontology and women's studies.

Gerontology Minor

The College of Human Development and Education and the College of Arts, Humanities, and Social Sciences at NDSU sponsor this program. Tri-College University resources are used to provide 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.

Note: CC = Concordia College
MSUM = Minnesota State University-Moorhead
NDSU = North Dakota State University

Area 1: Social Gerontology	**Credits**
Select one of the following courses:	
Soc 351, Aging in Society (CC)	Full course
Soc 308, Intro to Gerontology (MSUM)	3
Soc 440, Sociology of Aging (NDSU)	3

Area 2: Developmental Psychology of Aging	
Select one of the following courses:	
CDFS 460, Adult Development and Aging (NDSU)	3
Psyc 403, Adulthood and Aging (MSUM)	3
Psyc 471, The Psychology of Aging (NDSU)	3

Area 3: Aging and Health	
Select one of the following courses:	
Anth 302, Cultural Aspects of Aging (MSUM)	3
F&N 452, Nutrition, Health and Aging (NDSU	3
Soc 442, Current Issues in Medicine (NDSU)	3

Area 4: Macrosystems	
Select one of the following courses:	
CDFS 478, Financial and Consumer Issues of Aging (NDSU)	3
CDFS 482, Family Dynamics of Aging (NDSU)	3
Soc 410, Gerontology: Policy and Practice (MSUM)	4

Area 5: Internship/Practicum
Each student must complete the equivalent of 4 semester credits of internship-practicum. Gregory Sanders, Ph.D., coordinates gerontology internships in the department.

Area 6: Electives	
One additional elective course is required for the minor. Select this course from the following list.	
Anth 302, Cultural Aspects of Aging (MSUM)	3
Biol 303, Biomedical Ethics (CC)	Full course
CDFS 491, Seminar/Aging related (NDSU)	Var
H&CE 468, Family Life and Adult Education Programs (NDSU)	3
HPER 427, Leisure and Society (NDSU)	3
Phil 211, Morals and Medicine (MSUM)	3
Soc 441, Sociology of Death (NDSU)	3
Soc 442, Current Issues in Medicine (NDSU)	3
Soc 491, Seminar/Aging related (NDSU	Var
Total minimum	19

Women's Studies Minor

The women's studies minor is an interdisciplinary program appropriate as a complement to various majors. This minor is particularly useful in acquiring perspectives that complement traditional studies for developing leadership roles or for pursuing careers that involve women's concerns. A student selecting this minor must complete the following requirements:

Required core courses:	**Credits**
Univ 350, Perspectives in Women's Studies	3
AND	
Three of the following courses:	
ATID 382, Women in Management	3
CDFS 242, Marriage and the Family	3
CDFS 468, Women in Economic Systems	3
Engl 330, British and American Women Writers	3
Engl 331, Contemporary Women Writers	3
Hist 260, Women in America	3
PolS 351, Women in Politics	3
Soc 412, Sociology of Sex Roles	3
Soc 413, Sociology of Work	3
Soc 424, Feminist Theory and Discourse	3

Elective courses (Additional credits, for a total of 18 credits including any course(s) listed above, but not taken for core credit)

	Credits
CDFS 230, Life Span Development	3
CDFS 353, Children, Families, and Public Policy	3
CDFS 462, Family Crisis	3
CDFS 475, Children and Families Across Cultures	2
Hist 265, Families in America	3
Psyc 210, Human Sexuality	3
Psyc 250, Developmental Psychology	3
Soc 202, Minorities and Race Relations	3
Soc 417, Sociology of the Family	3
Soc 439, Social Change	3
Univ 491, Women's Week of Awareness	1
494 Independent Study in appropriate area	1-3
Total minimum	18

At least 3 credits must be taken in each of the two colleges offering the minor—the College of Human Development and Education and the College of Arts, Humanities, and Social Sciences.

Apparel, Textiles, and Interior Design

Students graduating with majors in apparel and textiles or interior design have a general education and specialized career preparation. Interdisciplinary curricula in the Department of Apparel, Textiles, and Interior Design may build upon economics and business, art, behavioral sciences, or natural sciences. The department offers three majors: apparel and textiles, facility management, and interior design. Two options are available within apparel and textiles: apparel studies and retail merchandising. The retail merchandising option offers two emphasis areas: interior retail merchandising and textile product retail merchandising.

Minors consisting of a minimum of 22 credits are also available. For more information about any of the programs, contact the department. New students are advised to contact the department prior to beginning their college work.

Apparel and Textiles Major

Students are prepared for a variety of careers in the apparel and textile industry that range from product conception through distribution to the consumer. The apparel and textiles program focuses on both national and international aspects of the apparel and textile industry. This includes product development, manufacturing, quality control, wholesaling, retail merchandising, marketing, and product preservation.

Note: Apparel and textiles transfer credits from other institutions must have grades of C or better to be accepted for the apparel and textiles program at NDSU.

Apparel Studies Option: This option prepares students for careers in theatre costuming, costume curatorship, fashion journalism, apparel production, and other aspects of the fashion industry, depending on their focus. Students who choose this option must earn a minor from another department. For example, to pursue a museum position as costume curator, a minor in history should be chosen.

Retail Merchandising Option: This option prepares students for buying, promotion, and retail or human resource management in retail stores. A minor in business and a field experience to reinforce classroom instruction is required with this option. Students have flexibility in creating a program focus by selecting one of the following emphasis areas:

Interior Retail Merchandising Emphasis Area: This emphasis prepares students for career opportunities in retail and wholesale home and office furnishing businesses.

Textile Product Retail Merchandising Emphasis Area: This emphasis prepares students for introductory management or buying positions in retail.

Facility Management Major

Students are prepared to coordinate the physical work place with the people and work of an organization by learning to integrate concepts from the disciplines of environmental design, specifically in relation to building systems, space planning, and textile product specification; business administration; and behavioral and engineering sciences as they relate to project and construction management. Facility managers are an important link in the integration of telecommunications, information management systems, maintenance, security, and general administrative services for hospitals, hotels, financial institutions, school systems, and large corporations. Planning, management, and decision-making skills are strongly emphasized. In addition, each student is required to complete a full-semester field experience in a professional work setting between the junior and senior year. This provides students with practical experience sought by prospective employers.

The curriculum for this major meets guidelines set by the International Facility Management Association.

Note: Transfer credits in facility management from other institutions must have grades of C or better to be accepted for the facility management program at NDSU.

Interior Design Major

The course of study in interior design leads to a first professional interior design degree. Students gain knowledge and experience in identifying, researching, and designing projects relative to the function and quality of the near environment. Courses in aesthetic awareness, visual communication, and technical skills prepare students to successfully complete studio projects in residential and commercial design (e.g., institutional, educational, hospitality, corporate, retail, health care). Students learn several approaches to the design process, but all involve the following steps: problem identification, gathering and analyzing facts, specifying needs, concept development, organizing and deciding on a solution, and implementation. Students participate in an

internship during the summer between their third and fourth year. This internship may or may not include a stipend to support that student while living away from campus or home.

The interior design major has four years of sequenced studio work. Admission into the third-year studio is based upon demonstrated professional interest, a portfolio review completed during the spring semester of the student's sophomore year, a 3.0 cumulative grade-point average, and a minimum grade of C in all major core requirements. Senior interior design students complete a capstone course that culminates the professional design educational experience.

The interior design program is accredited by the Foundation for Interior Design Education Research (FIDER).

Enrichment Opportunities

The department supplements classroom learning through structured field experiences to fashion and design centers. Field trips to Minneapolis, New York City, and cities in Europe are scheduled at least biannually; others are scheduled as needed.

Professional enrichment is possible through departmental affiliation with the Fashion Institute of Technology, New York City, or the Philadelphia School of Textiles and Science, Philadelphia, Pennsylvania. NDSU students who attend these institutions as visiting students for a semester or a year gain valuable experience in a fashion environment. Students should prepare to do this experience during their junior and/or senior year. Additional information about these programs is furnished upon request.

Fashion Institute of Technology Affiliation

The department has an arrangement with the Fashion Institute of Technology (F.I.T.), New York City, whereby a qualified student may attend that institution for a semester or a full year as a visiting student. The credits earned at F.I.T. will transfer to NDSU and will count toward graduation requirements. Students participating in the one-year visiting student program earn an associate degree from F.I.T.

During the second year of study at NDSU, interested students should consult with their advisers to ensure full consideration of their application for the F.I.T. visiting student program. Application should be made at least one year in advance. Students who participate in this program spend their last year of study attending F.I.T.

Philadelphia School of Textiles and Science Affiliation

To provide an expanded experience for students in the textile sciences and related industries, the department has established an affiliation with the Philadelphia School of Textiles and Science. A qualified student may attend this school during the senior year as a visiting student and transfer credits to NDSU to apply toward graduation. Students should make plans through the department and their advisers at least one year in advance to ensure consideration of the application for study at the Philadelphia School of Textiles and Science.

Recommended Curriculum
Apparel and Textiles Major
Apparel Studies Option

	Credits	
First Year	**F**	**S**
ATID 155, Apparel Construction and Fit OR ATID 270, Eval Ready-to-Wear	3	
ATID 181, Aesthetic Analysis	3	
Comm 110, Fund of Public Speaking		3
CSci 146, Busn Use of Computers OR CSci 147, Microcomputer Packages	3	
Engl 110, 120, College Composition I, II	3	3
HD&E 120, Orientation to HD&E	1	
HD&E 189, Skills for Academic Success	1	
Math 104, Finite Mathematics		3
Soc 110, Intro to Sociology		3
Humanities and Fine Arts		3
Totals	14	15
Second Year		
ATID 150, Design Fundamentals—Lecture	3	
ATID 265, 266, Intro to Textiles, Lab	3,1	
Econ 201, Prin of Microeconomics	3	
Engl 215, Writing for Work OR Engl 320, Practical Writing OR Comm 200, Intro to Media Writing		3
ATID Electives	3	3
Social and Behavioral Science		3
Science and Technology, Lab		3,1
Electives	3	3
Totals	16	16
Third Year		
ATID 310, Evolution of Fashion		3
ATID 371, Visual Merchandising		3
ATID 385, Fashion Economics	3	
ATID 465, Textile Product Analysis		3
Comm 308, Busn and Prof Speaking	3	
HD&E 320, Professional Issues		1
ATID Electives	3	3
Humanities and Fine Arts	3	
Science and Technology		3
Minor Courses	3,3	
Totals	18	16
Fourth Year		
ATID 410, Dress in World Cultures	3	
ATID 481, Apparel and Textiles Capstone		3
ATID 486, Dress and Human Behavior	3	
ATID 491, Seminar	1	1
ATID 496, Field Trip	1	
ATID Elective, Elective	3	
Minor Courses	3,3	3,3
Wellness	2	
Totals	16	16
Curriculum Total		127

Retail Merchandising Option
Interior Merchandising

	Credits	
First Year	**F**	**S**
ATID 150, 151, Design Fundamen-Lec, Studio	3,3	
ATID 160, Interior Design Careers	1	
ATID 161, Interior Graphics I		3
ATID 170, Intro to Retail Merchandising	3	
Comm 110, Fund of Public Speaking		3
CSci 146, Busn Use of Computers OR CSci 147, Microcomputer Packages		3
Engl 110, 120, College Composition I, II	3	3
HD&E 120, Orientation to HD&E	1	
HD&E 189, Skills for Academic Success	1	
Math 104, Finite Mathematics		3
Totals	15	15
Second Year		
Acct 102, Fundamentals of Accounting	3	
ATID 250, 251, Int Design I-Lec, Studio	3,3	
ATID 265, 266, Intro to Textiles, Lab	3,1	
ATID 315, 316, History of Interiors I, II	3	3
Econ 201, Prin of Microeconomics OR Econ 202, Prin of Macroeconomics		3
Engl 215, Writing for Work OR Engl 320, Practical Writing OR Comm 210, Intro to Media Writing		3
Soc 110, Intro to Sociology		3
Science and Technology		3
Totals	16	15
Third Year		
ATID 371, Visual Merchandising		3
ATID 465, Textile Product Analysis.		3
ATID 470, Retail Financial Management		4
Busn 350, 360, Prin of Mgt, Mktg.	3	3
Comm 308, Busn and Prof Speaking	3	
HD&E 320, Professional Issues		1
Psyc 111, Intro to Psychology OR Soc 110, Intro to Sociology	3	
Stat 330, Introductory Statistics	3	
Business Elective		3
Elective		3
Totals	15	17
Summer Session		
ATID 496, Field Experience	1-5	
Fourth Year		
ATID 372, Global Retailing.	3	
ATID 382, Women in Management		3
ATID 481, Apparel and Textiles Capstone		3
ATID 491, Seminar	1	1
ATID 496, Field Trip.	1	
Business Electives	3	3
Humanities and Fine Arts.	3	3
Science and Technology, Lab		3,1
Wellness	2	
Totals	13	17
Curriculum Total		124-128

Retail Merchandising Option
Textile Product Merchandising

	Credits	
First Year	**F**	**S**
ATID 170, Intro to Retail Merchandising	3	
ATID 181, Aesthetic Analysis in Busn	3	
Comm 110, Fund of Public Speaking	3	
CSci 146, Business Use of Computers OR CSci 147, Microcomputer Packages		3
Engl 110, 120, College Composition I, II	3	3
HD&E 120, Orientation to HD&E	1	
HD&E 189, Skills for Academic Success	1	
Math 104, Finite Mathematics		3
Psyc 111, Intro to Psychology OR Soc 110, Intro to Sociology		3
Humanities and Fine Arts		3
Totals	14	15
Summer Session		
ATID 196, Field Experience	1-2	
Second Year		
Acct 102, Fundamentals of Accounting	3	
ATID 150, Design Fundamentals—Lecture	3	
ATID 265, 266, Intro to Textiles, Lab	3,1	
ATID 270, Eval of Ready-to-Wear		3
Econ 201, Prin of Microeconomics OR Econ 202, Prin of Macroeconomics		3
Engl 215, Writing for Work OR Engl 320, Practical Writing OR Comm 200, Intro to Media Writing	3	
Science and Technology, Lab	3	3,1
Wellness		2
Elective		3
Totals	16	15

Third Year	Credits F	S
ATID 310, Evolution of Fashion		3
ATID 371, Visual Merchandising		3
ATID 372, Global Retailing	3	
ATID 465, Textile Product Analysis		3
ATID 491, Seminar		1
Busn 350, 360, Principles of Mgt, Mktg	3,3	
Comm 308, Busn and Prof Speaking	3	
HD&E 320, Professional Issues		1
Stat 330, Introductory Statistics	3	
Business Elective		3
Totals	15	14

Summer Session

ATID 496, Field Experience	1-5

Fourth Year	F	S
ATID 382, Women in Management		3
ATID 385, Fashion Economics		3
ATID 410, Dress in World Cultures	3	
ATID 470, Retail Financial Mgt		4
ATID 481, Apparel and Textiles Capstone		3
ATID 486, Dress and Human Behavior	3	
ATID 491, Seminar	1	
ATID 496, Field Trip	1	
Business Electives	3	3
Humanities and Fine Arts	3	
Totals	14	16

Curriculum Total 121-126

Facility Management Major

First Year	Credits F	S
Acct 102, Fundamentals of Accounting		3
ATID 161, Interior Graphics I		3
Comm 110, Fund of Public Speaking	3	
CSci 146, Busn Use of Computers OR CSci 147, Microcomputer Packages		3
Econ 201, Prin of Microeconomics	3	
Engl 110, 120, College Composition I, II	3	3
HD&E 120, Orientation to HD&E	1	
HD&E 189, Skills for Academic Success	1	
Math 104, Finite Mathematics	3	
Psyc 111, Intro to Psychology	3	
Humanities and Fine Arts		3
Wellness		2-3
Totals	17	17-18

Second Year		
ATID 252, 253, Int Design II-Lec, Studio		3,3
ATID 263, 363, Interior Technology I, II	3	3
ATID 265, 266, Intro to Textiles, Lab	3,1	
ATID 491, Seminar	1	
Biol 202, 202L, Intro to Microbiol, Lab		2,1
Busn 350, Principles of Management	3	
Busn 430, Business Ethics	3	
Comm 212, Interpersonal Communication	3	
Engl 215, Writing for Work		3
Business Elective		3
Totals	17	18

Third Year		
ATID 365, CADD for Interiors		3
ATID 368, Quality Assur and Mtnce		3
ATID 380, Facility Operations and Anal	3	
ATID 491, Seminar: Marketing Yourself	1	
Busn 347, Principles of Real Estate		3
CM&E 315, Specifications and Contracts	3	
Comm 483, Organizational Comm I	3	
HD&E 320, Professional Issues		1
Science and Technology, Lab	3,1	
Electives		3,3
Totals	14	16

Summer Session

ATID 496, Field Experience	6

Fourth Year	F	S
ATID 480, Facility Design and Mgt	3	
IME 311, Work/Station Design and Meas	3	
IME 456, Program and Project Mgt		3
Stat 330, Introductory Statistics	3	
Business Elective	3	
Humanities and Fine Arts		3
Electives	3	3,3,3
Totals	15	15

Curriculum Total 135-136

Interior Design Major

First Year	Credits F	S
ATID 150, 151, Design Fundamentals I, Studio	3,3	
ATID 160, Interior Design Careers	1	
ATID 161, Interior Graphics I		3
Comm 110, Fund of Public Speaking	3	
CSci 146, Bus Use of Computers OR CSci 147, Microcomputer Packages		3
Engl 110, 120, College Composition I, II	3	3
HD&E 120, Orientation to HD&E	1	
HD&E 189, Skills for Academic Success	1	
Math 104, Finite Mathematics		3
Social/Behavioral Sciences		3
Totals	15	15

Second Year		
ATID 250, 251, Design Process I, Studio	3,3	
ATID 252, 253, Interior Design II, Studio		3,3
ATID 261, Interior Graphics II	3	
ATID 263, 363, Interior Technology I, II	3	3
ATID 265, 266, Intro to Textiles, Lab	3,1	
Comm 212, Interpersonal Comm		3
Science and Technology, Lab		3,1
Totals	16	16

Third Year		
ATID 315, 316, Hist of Interiors I, II	3	3
ATID 350, 352, Inter Design-Lec III, IV	3	3
ATID 351, 353, Inter Design-Stud III, IV	3	3
ATID 365, CADD for Interiors		3
ATID 491, Seminar		1
HD&E 320, Professional Issues		1
Science, Social and Behavioral Science	3	3
Wellness	2	
Elective	3	
Totals	17	17

Summer Session

ATID 496, Field Experience	6

Fourth Year		
ATID 450, 451, Inter Design V-Lec, Studio	3,3	
ATID 452, Design Project		6
ATID 460, Professional Practice	3	
ATID 491, Seminar: Marketing Yourself	1	
Humanities and Fine Arts	3	3
Electives	3	3
Totals	16	12

Curriculum Total 130

Child Development and Family Science

The mission of the Department of Child Development and Family Science (CDFS) is to provide comprehensive, integrated knowledge of families and individuals across the life span that will equip students for careers in the helping professions and to enter graduate programs. The curriculum emphasizes practical application, acknowledging individuals and families as developing and changing entities within a larger societal context.

Child Development and Family Science Major

At the undergraduate level, the department offers a curriculum leading to a Bachelor of Science degree through two options: (a) child development and (b) family science. Child development and family science majors are prepared to work in a variety of areas related to children and families. Employment opportunities include early childhood professionals, parent and family life educators, extension agents, child protection service professionals, financial counselors, nursing home activity directors, credit specialists, probation agents, and directors of child care licensing.

Course work 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. Flexibility is provided by allowing students to select electives within the department to specialize in careers of interest.

CDFS Core: All majors are required to complete the following set of common core courses.

	Credits
CDFS 135, Family Science	3
CDFS 230, Life Span Development	3
CDFS 353, Children, Families, and Public Policy	3
CDFS 485, Capstone Experience	3

A field experience/internship is required for both options. All students are given the opportunity to work in a professional placement during their undergraduate program. This requirement enables students to apply their course work to a professional position as they prepare to move into important careers with children and families.

Note: Transfer credits in child development and family science from other institutions must have grades or C or better to be accepted for the child development and family science program at NDSU.

Child Development Option: This option prepares students for careers involving direct and support services for children. Course work may be focused on preparation for educating and caring for young children, on promoting child health and protection, or on understanding and meeting the needs of older children and adolescents.

Child development option requirements

All of the following:	Credits
CDFS Core	12
CDFS 330, Child Development	3
CDFS 341, Parent-Child Relations	3
CDFS 425, Children and Stress	3
CDFS 450, Middle Childhood/Adolescent Dev	
CDFS 475, Children and Fam Across Cultures	3
CDFS 487, Practicum in CDFS OR CDFS 496, Field Experience	8
CDFS 488, Exceptional Child and Family	3
CDFS Electives	18
Total	56

Family Science Option: This option allows students to take a concentration of courses in human development, family science, or family economics in preparation for careers in direct and support services for families.

Family science option requirements

All of the following:	**Credits**
CDFS Core	12
CDFS 357, Personal and Family Finance	3
CDFS 496, Field Experience	8
CDFS Electives	18
And six credits from the following family science courses:	
CDFS 341, Parent-Child Relations	3
CDFS 448, Issues in Sexuality	3
CDFS 462, Family Crisis	3
CDFS 475, Children/Families Across Cultures	3
CDFS 482, Family Dynamics of Aging	3
CDFS 483, Family Wellness	3
And six credits from the following human development courses:	
CDFS 330, Child Development	3
CDFS 450, Middle Childhood/Adolescent Dev	3
CDFS 460, Adult Development and Aging	3
And three credits from the following family economics courses:	
CDFS 247, Creative Family Management	3
CDFS 377, Families/Financial Difficulties	3
CDFS 478, Fin/Consumer Issues of Aging	3
Total	56

Licensure and Certification

Students completing the child development option qualify under North Dakota Department of Human Services regulations for the position of operator, director, or teacher in a preschool educational facility. In addition, students qualify under human services regulations for the positions of director and teacher in child care centers.

CDFS Minor

The child 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 18-credit minor consists of CDFS 135, 230, and 12 credits of CDFS electives. At least 9 credits must be upper division, and no more than 3 credits may be in field experience, practicum, or student teaching. Some CDFS courses also apply to interdisciplinary minors in women's studies and gerontology.

Recommended Curricula	**Option** Child Devel.	Fam. Sci.
First Year		
CDFS 135, Family Science	3	3
CDFS 230, Life Span Development	3	3
Comm 110, Fund of Public Speaking	3	3
Engl 110, 120, College Composition I, II	3,3	3,3
HD&E 120, Orientation to HD&E	1	1
HD&E 189, Skills for Academic Success	1	1
Psyc 111, Intro to Psychology	3	3
CDFS Core		3
CDFS Electives	6	3
Social Science Elective	3	3
Wellness	2	2
Totals	31	31
Second Year		
CDFS 330, Child Development	3	
CSci 146, Busn Use of Computers or CSci 147, Microcomputer Pkgs	3	3
Soc 110, Intro to Sociology	3	3
CDFS Core		3
CDFS Electives	6	12
Humanities and Fine Arts	3	3
Quantitative Reasoning	3	3
Science and Tech, Lab	3,1	3,1
Electives	9	3
Totals	34	34
Third Year		
CDFS 341, Parent-Child Relations	3	
CDFS 353, Children, Fam/Public Policy	3	3
CDFS 357, Personal and Family Finance		3
CDFS 425, Children and Stress	3	
CDFS 450, Adolescent Development	3	
CDFS 475, Child/Fam Across Cultures	3	
HD&E 320, Professional Issues	1	1
CDFS Electives	3	9
Humanities and Fine Arts	3	3
Science and Technology	3-4	3-4
Social/Behavioral Sci	3	
Electives	3	6
Totals	31-32	28-29
Fourth Year		
CDFS 485, Capstone Experience	3	3
CDFS 487, Child Devel Practicum OR CDFS 496, Field Experience	8	
CDFS 488, Exceptional Child/Family	3	
CDFS 496, Field Experience		8
CDFS Electives	3	6
Social/Behavioral Sci		3
Electives	9	9
Totals	26	29
Curriculum Totals	122	122

Graduate Program

The department offers graduate study leading to the Master of Science degree with two options: child development and family science or marriage and family therapy.

The child development and family science option is a two-year program including core and elective course work and the completion of a master's thesis or paper. Students are prepared for careers in community, family, and government agencies, in research, and in teaching and administration.

The marriage and family therapy option is designed for students interested in working in clinical settings as a family therapist. It is a three-year program, which involves intensive course work and an on-campus clinical practicum the first two years, and thesis work and an off-campus clinical practicum the third year.

Food and Nutrition

Public interest is increasing in both the fundamental and applied aspects of food and nutrition. Professionals must be able to integrate and apply principles of the biological, chemical, physical, and social sciences in the solution of human nutrition and food problems. Teaching and research are focused on the application of scientific knowledge to the maintenance of health and well-being of individuals throughout life. Relationships between food and nutrition and the social-psychological aspects of health and development are stressed. This encompasses an understanding of the role and meaning of food in different geographic, cultural, economic, and social settings. The increasingly varied demands for food and nutrition services in the community and in industry are reflected in the choice of study options offered within the major. Work with medical centers, businesses, service institutions, and other agencies and organizations is an integral part of the student's program.

Students are prepared for careers in human nutrition, dietetics, and hotel, motel, restaurant management. Graduates have excellent career opportunities associated with the largest industry in the world—the food industry. Students with majors in food and nutrition are employed in many settings such as hospitals, clinics, community health programs, hotels, motels, restaurants, catering firms, 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. Students who major in hotel, motel, restaurant management are employed in a variety of positions within the hospitality industry. All options within the department prepare students for graduate study and for service with domestic or foreign government agencies.

Two majors are offered within the Department of Food and Nutrition: food and nutrition (F&N) and hotel, motel, restaurant management (HMR). A third major in food science is offered jointly by the College of Human Development and Education and the College of Agriculture.

Minor programs in food and nutrition and hotel, motel, restaurant management consisting of 19-22 credits are also available. Graduate study leading to a Master of Science degree in food and nutrition is available. Faculty in the department are associated with the interdisciplinary Cellular and Molecular Biology program, which leads to a Ph.D. degree. Further details regarding a graduate degree are in the Graduate Bulletin.

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

Food and Nutrition Major

There are two options within the food and nutrition major: (a) coordinated program in dietetics and (b) didactic program in dietetics. Both programs include all didactic courses required for membership in The American Dietetic Association.

Coordinated Program in Dietetics (CP) Option: This option prepares professional dietetic practitioners for work in entry-level positions in hospitals, nursing homes, out-patient clinics, businesses, and community agencies.

Acceptance into CP is competitive, and enrollment is limited. Students who have completed the prerequisite courses apply for admission in March. The CP is accredited by The American Dietetic Association/Council on Education Accreditation/Approval for dietetic education. Graduates are eligible to take the registration exam for dietitians upon completion of the program.

Didactic Program in Dietetics (DPD) Option: This option meets requirements for entrance into an accredited dietetic internship and prepares graduates for internships in hospitals, as well as in health care related organizations. The DPD is approved by The American Dietetic Association/Council of Accreditation/Approval, a specialized accrediting body recognized by the United States Department of Education.

Food Science Major

The College of Human Development and Education and the College of Agriculture jointly offer an undergraduate Bachelor of Science degree in food science. For a description of the program, refer to the College of Agriculture section.

Hotel, Motel, Restaurant Management Major

As the nation's number one retail employer, the hospitality industry needs thousands of new employees each year. Along with the rising demand for hospitality services is a growing emphasis on comfort, good service, and nutrition, all of which increase the need for skilled professionals to manage people and meet the needs of today's consumers.

In the hotel, motel, restaurant management major, students prepare for a variety of careers in the hospitality industry. Administrative and management positions in restaurants, hotels, motels, resorts, club management, industrial food services, catering facilities, and college food services are a few of the choices available to these majors.

Supervised, on-the-job experience is required of all students enrolled in the program. Students are placed in hotels, motels, and restaurants in the local community, as well as in other parts of the country including Minneapolis, Chicago, and several western national parks.

Recommended Curriculum Coordinated Program in Dietetics

	Credits	
First Year	**F**	**S**
Anth 111, Intro to Anthropology	3	
Chem 121, 121L, General Chem I, Lab	3,1	
Chem 122, 122L, General Chem II, Lab		3,1
Econ 201, Prin of Microeconomics OR Econ 202, Prin of Macroeconomics		3
Engl 110, 120, College Composition I, II	3	3
HD&E 120, Orientation to HD&E	1	
HD&E 189, Skills for Academic Success	1	
Math 104, Finite Math or Math 103, College Algebra	3	
Psyc 111, Intro to Psychology		3
Humanities and Fine Arts		3
Totals	15	16
Second Year		
Biol 202, 202L, Intro Microbiology, Lab		2,1
Chem 240, Survey of Organic Chem	3	
Comm 110, Fund of Public Speaking		3
CSci 146, Busn Use of Computers or CSci 147, Microcomputer Pkgs	3	
F&N 250, Nutrition Science		3
F&N 261, 262, Food Select/ Prep Prin, Lab	4,3	
F&N 362, Food Sanitation		3
Stat 330, Intro Statistics		3
Zoo 120, 120L, Anatomy/Physiology, Lab	4,1	
Elective		2
Totals	18	17
Third Year		
Bioc 460, Found of Biochem	4	
Busn 350, Principles of Mgt	3	
F&N 351, Metabolic Basis of Nutri	4	
F&N 352, Nutri/Growth and Devel		3
F&N 354, Intro to Nutri Care	4	
F&N 355, Super Pract Coordinated Prog		1
F&N 361, Food Production Mgt		4
F&N 450, Nutri Educ/Community		4
F&N 462, Food Production Lab		3
HD&E 320, Professional Issues		1
Humanities and Fine Arts	3	
Totals	18	16
Fourth Year		
F&N 458, 459, Clinical Nutrition, Lab	4,3	
F&N 460, 461, Foodservice Systems, Lab	3,3	
F&N 480, Dietetics Practicum		10
F&N 481, Capstone Course		2
Elective	3	
Totals	16	12
Curriculum Total		128

Recommended Curriculum Didactic Program in Dietetics

	Credits	
First Year	**F**	**S**
Anth 111, Intro to Anthropology	3	
Chem 121, 121L, General Chem I, Lab	3,1	
Chem 122, 122L, General Chem II, Lab		3,1
Econ 201, Prin of Microeconomics OR Econ 202, Prin of Macroeconomics		3
Engl 110, 120, College Composition I, II	3	3
HD&E 120, Orientation to HD&E	1	
HD&E 189, Skills for Academic Success	1	
Math 104, Finite Mathematics OR Math 103, College Algebra	3	
Psyc 111, Into to Psychology		3
Humanities and Fine Arts		3
Totals	15	16
Second Year		
Biol 202, 202L, Intro Microbiology, Lab		2,1
Chem 240, Survey of Organic Chem	3	
Comm 110, Fund of Public Speaking		3
CSci 146, Busn Use of Computers OR CSci 147, Micro Computer Packages	3	
F&N 250, Nutrition Science		3
F&N 261, 262, Food Select/Prep Prin, Lab	4,3	
F&N 362, Food Sanitation		3
Stat 330, Introductory Statistics		3
Zoo 120, 120L, Anatomy/Physiology, Lab	4,1	
Elective		2
Totals	18	17
Third Year		
Bioc 460, Found Biochem/Molecular Biol	4	
F&N 351, Metabolic Basis of Nutri	4	
F&N 352, Nutri, Growth and Dev		3
F&N 354, Intro to Nutri Care	4	
F&N 361, Food Production Mgt		4
F&N 462, Food Production Lab		3
HD&E 320, Professional Issues		1
Humanities and Fine Arts		3
Electives	3	2
Totals	15	16
Fourth Year		
Busn 350, Principles of Mgt		3
F&N 450, Nutri Educ/Community		4
F&N 452, Nutri Health and Aging		3
F&N 458, Clinical Nutrition	4	
F&N 460, Foodservice Systems	3	
F&N 481, Dietetics: Capstone		2
F&N 491, Seminar: Dietetic Intern Appli	1	
Electives	8	3
Totals	16	15
Curriculum Total		128

Recommended Curriculum Hotel, Motel, Restaurant Management Major

	Credits	
First Year	**F**	**S**
Chem 117, 117L, Chem Concepts/Appli, Lab		3,1
Engl 110, 120, College Composition I, II	3	3
F&N 170, Intro to Hospitality Industry	3	
F&N 171, Tourism and Travel Mgt		3
HD&E 120, Orientation to HD&E	1	
HD&E 189, Skills for Academic Success	1	
Math 104, Finite Mathematics	3	
Nutr 240, Principles of Nutrition		3
Psyc 111, Intro to Psychology		3
Anth 111, Intro to Anthropology	3	
Totals	14	16
Second Year		
Acct 102, Fundamentals of Acct	3	
Biol 202, 202L, Intro Microbiol, Lab		2,1
Comm 110, Fund of Public Speaking		3
CSci 147, Microcomputer Pkgs		3
Econ 201, Prin of Microeconomics OR Econ 202, Prin of Macroeconomics	3	
F&N 261, 262, Food Select/ Prep Prin, Lab	4,3	
Business Elective	3	
Humanities and Fine Arts		3
Electives		5
Totals	16	17
Third Year		
Busn 350, Principles of Mgt	3	
Busn 351, Organizational Behavior		3
Busn 360, Principles of Mktg	3	
F&N 361, 462, Food Prod Mgt, Lab	4	3
F&N 362, Food Sanitation		3
F&N 370, Hospitality Controllership	3	
F&N 371, Front Office Mgt		3
F&N 491, Seminar	1	
HD&E 320, Professional Issues		1
Business Elective		3
Humanities and Fine Arts	3	
Totals	17	16
Fourth Year		
Busn 450, Human Resource Mgt		3
Busn 454, International Mgt	3	
F&N 460, Food Service Systems	3	
F&N 465, Prof Catering Mgt		3
F&N 467, Innkeeper's Liability	3	
F&N 470, Hospitality Mktg/Sales	3	
F&N 471, Strat Beverage Oper Mgt		3
F&N 479, Hospitality Ind Mgt Strat		3
F&N 491, Seminar	1	
F&N 496, Field Experience	2	2
Business Elective		3
Totals	15	17
Curriculum Total		128

Minors

A minor is an organized way for students majoring in other areas to pursue personal interests or expand their professional opportunities. Three minors are offered.

Food and Nutrition: A minor in food and nutrition consists of the following courses.

	Credits
F&N 111, Wellness	3
F&N 261, Food Select and Prep Prin	4
F&N 262, Food Select and Prep Prin Lab	3
F&N 319, Consumer Issues in F&N	3
F&N 361, Food Production Mgt OR F&N 362, Food Sanitation	3-4
Nutr 240, Principles of Nutrition OR F&N 250, Nutrition Science	3

Hotel, Motel, and Restaurant Management: This 23-credit minor consists of the following courses.

F&N 170, Intro/Hospitality Industry	3
F&N 171, Tourism/Travel Mgt	3
F&N 261, Food Select and Prep Prin	4
F&N 262, Food Select and Prep Prin Lab	3
F&N 370, Hospitality Controllership	3
F&N 371, Front Office Mgt	3
F&N 196 or 496, Field Experience	1

Nutrition: This 22-credit minor, recommended for human performance and fitness majors, consists of the following courses.

F&N 111, Wellness	3
F&N 250, Nutrition Science	3
F&N 319, Consumer Issues in F&N	3
F&N 351, Metabolic Basis of Nutrition	4
F&N 352, Nutrition, Growth, and Devel	3
F&N 435, Nutr in Disease/Health Prof	2
F&N 450, Nutrition Educ/Community	4

Health, Physical Education, and Recreation

This department offers all students an opportunity to develop skills and knowledge that are vital in developing a personal, lifetime wellness concept and to serve as teachers, leaders, and administrators of health, physical education, recreation, and athletics training. Majors are available in physical education (teaching and non-teaching), human performance and fitness, recreation management, and athletic training. Minors offered are physical education, and health education.

Athletic Training Major

A sequence of eight courses forms the basic framework for student academic experiences in athletic training. This format provides continuity through the introduction of new knowledge and skills and the reinforcement of them each semester. Students interested in athletic training begin in the fall and enter the observation phase. During the second semester of the observation phase, students submit an application of admission to the curriculum phase. Enrollment is limited according to the number of students entering the curriculum phase of the program. Courses required for acceptance into the curriculum phase include the following: HPER 180 (Athletic Trainers Profession), HPER 181 (Practical Application for Protective Devices and Taping), HPER 240 (First Aid and CPR for the Professional Rescuer), and Zoo 120, 120L (Human Anatomy and Physiology, Laboratory).

The Athletic Training curriculum meets the standards of the Commission on Accreditation of Allied Health Education Programs (CAAHEP). This curriculum provides students with a combination of academic course work and supervised clinical opportunities necessary to qualify as candidates for the National Athletic Trainers Association (NATA) certification examination. Students have opportunities to apply classroom learning to actual situations by taking an active role in the prevention, recognition, and management of injury with NDSU intercollegiate athletic teams.

The completion of a major in athletic training and NATA certification provides career opportunities in high schools, colleges, professional sports programs, and other athletic health care agencies. Examples of health care agencies include corporate health programs, sports medicine clinics, and athletic training curriculum programs.

Recommended Curriculum Athletic Training

	Credits	
First Year	**F**	**S**
Comm 110, Fund of Public Speaking		3
Engl 110, 120, College Composition I, II	3	3
HD&E 120, Orientation to HD&E	1	
HD&E 189, Skills for Academic Success	1	
HPER 110, Intro to HPER	1	
HPER 180, Athletic Training Profession	2	
HPER 181, Pract Appli/Protec Devices		2
HPER 217, Pers and Community Health		3
Math 104, Finite Mathematics		3
Psyc 111, Intro to Psychology	3	
Zoo 120, 120L, Anatomy/Physiology, Lab	4,1	
Humanities and Fine Arts		3
Totals	16	17
Second Year		
Chem 117, Chem Concepts & Appli	3	
CSci 147, Microcomputer Packages	3	
F&N 250, Nutrition Science		3
HPER 260, Athletic Train Obser	2	
HPER 281, 286, Injury Recognition, Lab		3,1
HPER 282, Athletic Training Equip	2	
HPER 284, 285, Athletic Training Pract I	3	3
Phrm 170, Common Medicines/Diseases		2
Phys 120, Fund of Physics	3	
Global Perspectives		3
Totals	16	15
Third Year		
HPER 240, First Aid and CPR	2	
HPER 365, 366, Kinesio/Biomechan Lab	3,1	
HPER 380, Emergency Response	3	
HPER 384, Field Eval/Ath Inju	3	
HPER 385, Therapeutic Modalities		3
HPER 386, 387, Athletic Training Pract II	3	3
HPER 465, 466, Physiol/Exer, Lab		3,1
Cultural Diversity		3
Totals	15	13
Fourth Year		
HPER 430, Psycho-Social/Phys Act	3	
HPER 440, Health/Safety Services		3
HPER 486, Rehab and Reconditioning	3	
HPER 487, Admin/Athletic Train Prog		3
HPER 488, 489, Athletic Training Pract III	3	3
Psyc 350, Research Methods I	3	
Stat 330, Introductory Statistics	3	
Humanities and Fine Arts		3
Elective		3
Totals	15	15
Curriculum Total		122

Human Performance and Fitness Major

The major in human performance and fitness (HPF) is designed to prepare students for entry-level positions in fitness, wellness, and health promotion programs in corporate, business, resort, or community settings. Completion of the major in HPF will also prepare the exceptional student for graduate education in exercise physiology, food and nutrition, sports medicine, preventive and rehabilitative cardiovascular health, wellness management, or behavioral health.

The HPF program includes the study of physical activity, program implementation, and behavioral and health sciences. Majors are required to complete a nutrition minor, and are encouraged to select an additional area such as business, psychology, or gerontology, depending on their interests. The internship required at the end of the HPF program offers the student the opportunity to select an area of interest in the field in sites available throughout the country. Essential skills cited by corporate fitness directors include knowledge of health and fitness, expertise in exercise prescription and nutrition counseling, communication and public relations, the ability to motivate, and administrative talent.

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.

Recommended Curriculum Human Performance and Fitness

	Credits	
First Year	**F**	**S**
CSci 147, Microcomputer Pkgs		3
Engl 110, 120, College Composition I, II	3	3
HD&E 120, Orientation to HD&E	1	
HD&E 189, Skills for Academic Success	1	
HPER 110, Intro to HPER	1	
HPER 170, Intro Human Perform/Fit	2	
HPER 217, Personal/Commun Health		3
Math 104, Finite Mathematics OR CSci 150, Programming in BASIC	3	
Zoo 120, 120L, Anatomy/Physiology, Lab	4,1	
Electives		3,3
Totals	16	15
Second Year		
Chem 117, Chem Concepts & Appli OR Chem 121, Gen Chem I	3	
Comm 110, Fund of Public Speaking		3
F&N 250, Nutrition Science		3
HPER 280, Sport Safety Train		3
Humanities	3,3	
Social and Behavioral Sciences	3	3
Electives	3	5
Totals	15	17
Third Year		
F&N 319, Consumer Issues/F&N	3	
F&N 435, Nutri/Disease/Health		2
HPER 365, 366, Anat/Kinesiol, Lab	3,1	
HPER 465, 466, Physiol/Exer, Lab		3,1
HPER 470, Activity Benefits/Exercise		3
HPER 491, Seminar		1
Electives	9	6
Totals	16	16

Fourth Year	Credits F	S
HPER 467, EKG Monitor/Adv Physiology	2	
HPER 471, Program Implementation	3	
HPER 472, Exercise Testing/Appli	2	
HPER 475, HPF Internship		12
HPER 496, Field Experience	1,1	
Electives	6	
Totals	15	12

Curriculum Total 122

Physical Education Programs

The degree programs in physical education are four-year curricula designed to prepare students for teaching or leadership roles in schools, sports, business, community fitness programs, and related fields.

A well-prepared physical educator is knowledgeable and skilled in the natural and behavioral sciences, humanities, symbolic systems, and learning theories. The major field stresses contemporary knowledge, history, philosophy, and principles related to physical education. Course work in multicultural education and education of the developmentally disabled is included. Students are urged to choose a second major or several minors to qualify for emerging occupational opportunities.

Physical Education: Teaching Major

Students who wish to become certified grade 7-12 physical education teachers enroll for 41 general education credits and a minimum of 29 professional education credits that include student teaching (see School of Education requirements). An additional 7 credits of education and child development courses (Educ 300 and 481, CDFS 130) must be elected for K-6 certification. The teacher education program is a selective enrollment program that leads to a B.S. degree. Students must apply to the School of Education for admission.

Recommended Curriculum Physical Education: Teaching

First Year	Credits F	S
Comm 110, Fund of Public Speaking		3
Engl 110, 120, College Composition, I, II	3	3
HD&E 120, Orientation to HD&E	1	
HD&E 189, Skills for Academic Success	1	
HPER 110, Intro to HPER	1	
HPER 150, Foundations of Phys Ed	2	
HPER 151, Prof Activ/Rec Activ/Sports		3
HPER 155, Prof Prep/Ind/Dual Sports	3	
HPER 217, Personal/Commun Health		3
Psyc 111, Intro to Psychology	3	
Soc 110, Intro to Sociology		3
Science and Technology	2	
Totals	16	15
Second Year		
HPER 152, Prof Activ/Team Sports	3	
HPER 153, Prof Prep/Dance		3
HPER 154, Prof Prep/Aquatics	3	
HPER 250, Movement Analysis		3
HPER 280, Sport Safety Training		3
Zoo 120, 120L, Anatomy/Physiology, Lab	4,1	
Humanities	3	3
Quantitative Reasoning	3	
Science and Technology		3
Totals	17	15
Third Year		
Educ 321, Intro to Teaching	3	
Educ 322, Educational Psychology	3	
Educ 381, Early Experience	1	
Educ 451, Inst Plan/Strategies		3
Educ 481, Methods of Teaching I		3
HPER 350, Fitness Edu/Act/Mat		3
HPER 351, Elem Phys Ed/Act/Mat	3	
HPER 352, Sec Phys Ed/Act/Mat		3
HPER 367, Prin of Conditioning	3	
Minor/Electives	2	3
Totals	15	15
Fourth Year		
Educ 389, Native Am/Inst Pract	3	
Educ 485, Student Teaching Seminar		1
Educ 486, Classroom Mgt		3
Educ 487, Student Teaching		10
HPER 430, Psycho-Social/Phys Act	3	
HPER 460, Prog Admin/Curr Design	3	
Minor	6	
Totals	15	14

Curriculum Total 122

Physical Education: Non-Teaching Major

Students who wish to major in physical education and not become teachers may select the liberal arts program of the College of Human Development and Education. Concurrently with the major, the student will take a minimum of 58 general education credits including a foreign language (B.A. degree) or published minor (B.S. degree).

Recommended Curriculum Physical Education: Non-Teaching

First Year	Credits F	S
Comm 110, Fund of Public Speaking		3
Engl 110, 120, College Composition I, II	3	3
HD&E 120, Orientation to HD&E	1	
HD&E 189, Skills for Academic Success	1	
HPER 110, Intro to HPER	1	
HPER 150, Foundations of Phys Ed	2	
HPER 151, Prof Activ/Rec Activ/Sports		3
HPER 155, Foundations/Phys Educ	3	
HPER 217, Personal/Commun Health		3
Psyc 111, Intro to Psychology	3	
Soc 110, Intro to Sociology		3
Science and Technology	2	
Totals	16	15
Second Year		
HPER 152, Prof Prep/Team Sports	3	
HPER 153, Prof Prep/Dance		3
HPER 154, Prof Prep/Aquatics	3	
HPER 250, Movement Analysis		3
HPER 280, Sport Safety Training		3
Zoo 120, 120L, Anatomy/Physiology, Lab	4,1	
Humanities	3	3
Quantitative Reasoning	3	
Science and Technology		3
Totals	17	15
Third Year		
HPER 350, Fitness Edu/Act/Mat		3
HPER 351, Elem Phys Ed/Act/Mat	3	
HPER 352, Sec Phys Ed/Act/Mat		3
HPER 367, Prin of Conditioning	3	
Electives	9	8
Totals	15	14
Fourth Year		
HPER 430, Psycho-Social/Phys Act	3	
HPER 460, Prog Admin/Curr Design	3	
Electives	9	15
Totals	15	15

Curriculum Total 122

Recreation Management Major

The major in recreation management is a four-year curriculum designed to prepare students for professional administration and leadership positions in parks and recreation. Students learn and develop skills for employment in federal, state, municipal, hospital, and private recreation settings.

The major area course work in the recreation management curriculum includes 47 credits, 12 of which are taken during the senior year as an internship at an approved recreation agency. Students are advised to pursue supporting minors (e.g., business administration, sociology, gerontology, environmental studies, language) to enhance their career opportunities. Students may also seek appropriate professional certifications as a C.L.P. (Certified Leisure Professional), and/or R.S.S. (Recreational Sports Specialist) upon graduation.

Recommended Curriculum Recreation Management

First Year	Credits F	S
Comm 110, Fund of Public Speaking		3
CSci 147, Microcomputer Packages		3
Engl 110, 120, College Composition I, II	3	3
HD&E 120, Orientation to HD&E	1	
HD&E 189, Skills for Academic Success	1	
HPER 100, Concepts of Fitness/Activities	2	
HPER 110, Intro to HPER	1	
HPER 151, Prof Activ/Rec Activ/Sports		3
HPER 153, Prof Prep/Dance		3
HPER 155, Prof Prep/Ind/Dual Sport	3	
HPER 196, Field Experience	1	
HPER 200, Foundations of Recrea	2	
Totals	14	15
Second Year		
Art 200 Series, Studio Art Elective	3	
CDFS 230, Life Span Development	3	
HPER 196, Field Experience		1
HPER 225, Camp Mgt/Outdoor Rec	2	
HPER 280, Sport Safety Training		3
Humanities	3	
Science and Technology (one with lab)	4,1	6
Social and Behav/Cultural Diversity		3
Electives		5
Totals	15	15
Third Year		
HPER 326, Recreation Prog		3
Thea 160, Intro to Acting OR Thea 161, Acting I	3	
Humanities	3	
Quantitative Reasoning		3
Social/Behavioral Science		3
Electives	6	6
Totals	12	15
Summer Session		
HPER 429, Recreation Internship	12	

Fourth Year	Credits F	S
HPER 426, Parks and Rec Admin		3
HPER 427, Leisure and Society	3	
HPER 491, Seminar		1
Soc 440, Sociology of Aging	3	
Electives	6	8
Totals	12	12

Curriculum Total 122

Recommended Curriculum Health Education Minor

Recommended with a teaching major.

	Credits
CDFS 135, Family Science	3
HPER 210, First Aid Resp/Emergencies OR HPER 280, Sport Safety Training	2-3
HPER 217, Pers/Community Health	3
HPER 345, Meth/Mat/Compre/Schl Hlth	3
HPER 445, Org/Admin/Coord Schl Hlth	3
NUTR 240, Prin of Nutrition OR F&N 250, Nutrition Science	3
Psyc 212, Psychol Aspects/Drug Use/Abuse	3
Zoo 120, 120L, Anatomy and Physiology, Lab	4,1
Total	25-26

Recommended Curriculum Physical Education Minor

Required:	**Credits**
HPER 110, Introduction to HPER	1
HPER 150, Foundations of Phys Ed	2
HPER 153, Prof Prep/Dance	3
HPER 250, Movement Analysis	3
HPER 280, Sport Safety Training	3
HPER 336, Methods of Coaching	3
HPER 367, Principles of Conditioning	3
HPER 460, Prog/Admin/Curric Design	3
Choose one of the following:	
HPER 151, Prof Activ/Rec Activ/Sports	3
HPER 152, Prof Prep/Team Sports	3
HPER 154, Prof Prep/Aquatics	3
HPER 155, Prof Prep/Indiv/Dual Sports	3
Choose one of the following:	
HPER 350, Fitness Edu Activ/Matls	3
HPER 351, Elem Phys Ed Activ/Matls	3
HPER 352, Sec Phys Ed/Activ/Matls	3
Choose one of the following:	
Educ 481, Methods/Teach Sec Phys Ed	2
Educ 482, Methods/Teach Elem Phys Ed	2
Total	29

Satisfactory completion of this minor meets Minnesota Coaching Certification requirements. Students who wish to enter the coaching profession should consider taking a sport specific coaching course (HPER 330, 331, 332, 333, 334, or 335) and choosing HPER 430, 435, and 496 as electives.

Graduate Program

The Master of Education degree in education with a physical education option is offered jointly by the Department of Health, Physical Education, and Recreation and the School of Education. Two options are offered: (a) Physical Education-Pedagogy places emphasis on development of the master teacher of physical education by improving knowledge and understanding of teaching and the practice of physical education; (b) Physical Education-Athletic Administration prepares students for careers in athletic administration by providing knowledge and concepts of administrative principles and practices. Contact the School of Education for entrance requirements.

School of Education

Students contemplating careers in education may be encouraged to learn there is a shortage of teachers in certain academic and geographical areas. This trend, together with the knowledge that preparation in teaching may also lead to successful careers in business, industry, and the public sector, may make education an excellent choice for versatile careers.

Programs in education at North Dakota State University are administered by the School of Education. The School of Education is accredited at the undergraduate and graduate levels by the National Council for Accreditation of Teacher Education (NCATE). NCATE accreditation assures that graduates of the program may be certified as teachers in other states, and also indicates that the programs offered through the School of Education are of high quality.

Through the School of Education, students are prepared to be teachers, counselors, and school administrators capable of working effectively with diverse populations. Through course work and field experiences, students come to an appreciation of and commitment to cultural diversity and to the elimination of inequitable instructional and institutional practices.

Note: Transfer credits in education from other institutions must have grades of C or better to be accepted for the education program at NDSU.

Admission to the School of Education

Application forms and instructions for admission to the School of Education are available at the Teacher Education Office, 155 E. Morrow Lebedeff Hall.

Students should make application for admission to the School of Education during or immediately following the introductory professional education course. Late application may delay completion of program and graduation requirements. All applications to the school will remain valid for five years from the date of approval or until completion of the baccalaureate degree, whichever comes first.

The Council for Teacher Education reviews and acts upon completed applications. The council is the body within the School of Education with jurisdiction over such matters as admission, retention, student teaching, and certification. The council informs the students of its action. For questions about admission policies, contact the teacher education office.

Admission of Undergraduate Students

Undergraduate students may gain admission to the School of Education by meeting the following requirements:

1. Provide evidence of maintaining a minimum grade-point average of 2.50 in the student's total academic program. Transfer students shall complete a minimum of one semester's work and obtain a 2.50 grade-point average at North Dakota State University before their applications are processed.

2. Complete the following:
   - Provide evidence of achieving passing scores on the Praxis I test of basic skills. (The student is responsible for registering for the test and paying the appropriate fee.)

3. Complete a speech and hearing screening. If results are not satisfactory, the student must provide evidence that the recommendations resulting from the examination will have been complied with by the beginning of the student teaching experience.

4. Provide evidence of competence in English through any one of the following:
   - minimum ACT English test standard score of 20.
   - minimum PSAT verbal test score of 45.
   - minimum SAT verbal test score of 450.
   - minimum grade-point average of 2.50 in English 110 and 111 or equivalent.
   - minimum of a B grade in English 358 or equivalent writing course.

5. Achieve a grade of B or better in Speech Communication 110 or equivalent.

Students should submit a completed application for admission as soon as all of the preceding requirements have been satisfied. The application must be accompanied by up-to-date transcripts of all college-level work.

Admission of Post-Baccalaureate Students

Students with college degrees seeking teacher certification should contact the School of Education certification officer for more information.

North Dakota State University students who continue in school after graduation or who resume their education within one year following graduation will be considered on the same basis as undergraduates.

Students whose undergraduate academic average was below 2.50 shall increase their overall undergraduate grade-point average to 2.50 or achieve and maintain an average of 3.00 on post-baccalaureate course work while meeting the following conditions:

a. Obtain 24 approved credits in two contiguous semesters, or equivalent.
b. Take each course for a grade other than pass/fail.
c. Obtain approval of all courses from the teacher education program.

Post-baccalaureate students must submit an application showing evidence of meeting the requirements listed under "Admission of Undergraduate Students."

Note: These policies refer to admission to teacher education for purposes of certification and are not recommendations for admission to Graduate School.

Student Teaching Policies

Prior to student teaching, all student teachers must meet all School of Education requirements including completion and submission of the verification of requirements form (available from the teacher education office). Because student teaching is a full-time experience, students shall not participate in extracurricular activities on campus or participate in employment that detracts from student teaching and shall not be registered for course work other than student teaching (Educ 487) and Educ 485 and 486.

Program Exit Requirements

1. Students must complete one of the following (a or b):
   a. Provide evidence of achieving a minimum score on the PK to be recommended for teacher certification.
   b. Present a portfolio developed throughout the professional education courses in an interview setting with program faculty.

2. Students must earn a minimum GPA of 2.50 in each of the following programs:
   - total academic programs.
   - teaching specialties.
   - professional education courses consisting of a minimum of 27 credits.

3. Students may complete an application for state certification and pay the appropriate fee to the state upon completion of the program. Application forms for some states are available from the certification officer.

Special Notice

New certification requirements and accreditation standards may result in revised course work requirements. Students should contact the School of Education to keep abreast of possible developments in curriculum areas.

NDSU Student Education Association

Students in teacher education are encouraged to join the NDSU Student North Dakota Education Association, which is affiliated with the Student North Dakota Education Association and the National Education Association Student Program. Members of this organization receive a number of benefits including workshops, publications, and liability insurance, and are involved with many of the committees that govern the teacher education program at NDSU.

Persons interested in membership details should contact the School of Education or the SNDEA Student Program adviser.

Students are also encouraged to join the professional organization(s) relevant to their teaching specialties.

Graduation Requirements

Graduation requirements for all students desiring teacher certification, secondary or K-12, include four basic parts: general education requirements, college requirements, professional education requirements, and teaching specialty requirements.

1. General Education (Minimum 36-37 Credits)

	Credits
Skills for Academic Success	1
Communication	9
Quantitative Reasoning	3
Science and Technology	10
Humanities and Fine Arts	6
Social and Behavioral Sciences	6
Wellness	2

2. College Requirement

HD&E 120, Orientation to Human Development and Education (1 credit).

3. Professional Education

The required common professional education sequence of 30 credits includes the following:

	Credits
Educ 321, Intro to Teaching	3
Educ 322, Educational Psychology	3
Educ 381, Early Experience`	1
Educ 389, Nat Am/Multicultural Instr Prac	3
Educ 451, Instr Planning, Meth, and Assessment	3
Educ 481, Classroom Prac/Methods of Teaching	2-3
Educ 485, Student Teaching Seminar	1
Educ 486, Classroom Mgt of Diverse Learners	3
Educ 487, Student Teaching	5-10

Additional credits are required for programs in agricultural education, English education, family and consumer sciences education, music education, and physical education.

4. Teaching Specialty

See the Teacher Education Office for requirements for the following:

Agricultural Education
Biological Sciences
Chemistry
Comprehensive Science
English
Family and Consumer Sciences Education
French
German
History
Mathematics
Music
Physical Education
Physics
Social Science
Sociology
Soils (Earth Science)
Spanish
Speech Communication

Teaching minors are generally available in each of the teaching major areas. See respective department for details.

Human and Community Education

State approved programs for the preparation of vocational education teachers are grouped under human and community education. Curricula in two areas are offered: agricultural education and family and consumer sciences education.

Agricultural Education

North Dakota State University is designated by the State Board for Vocational Education as the recognized institution for preparing teachers of agricultural education. Programs are offered to prepare students for teaching agricultural education on the secondary, post-secondary, and adult levels. Graduates also secure employment in other agricultural occupations such as Cooperative Extension, government services, and agribusiness.

Upon completion of the program, students are eligible for certification to teach agricultural education in North Dakota and may be qualified for certification in a number of other states.

Family and Consumer Sciences Education

The family and consumer sciences education program at NDSU has been approved by the State Board for Vocational Education for the preparation of family and consumer sciences teachers. Thus, graduates are qualified to teach family and consumer sciences classes in vocational or non-vocational school programs at junior and senior high school levels.

In addition to fulfilling teacher certification requirements for North Dakota, there are provisions for completing Minnesota teacher licensure requirements. Basic preparation is also available for teaching in family and consumer sciences occupational program areas.

Graduates are also qualified to teach in adult education programs and to serve as extension home economists. Alternate career opportunities include positions with utility companies, health and human service agencies, and retail establishments.

Middle School Endorsement for Grades 5-8

Middle school endorsement is available on a voluntary basis for students who will receive teacher certification for the elementary grades or for grades K through 12. For students who will be certified for grades 7 through 12, but wish to qualify for teaching grades 5 and 6 in their subject fields, middle school endorsement will be mandatory. For more information contact the School of Education.

K-12 Certification for Physical Education and Music Majors

Certification for kindergarten through 12th grade programs (K-12) is available for students majoring in physical education or music. The student must enroll in Educ 300, Orientation to Elementary Education, and either CDFS 230 or Psyc 213, and student teach at both the elementary and secondary levels, as well as meet the specific requirements for each major department.

Elementary and Special Education

A major in elementary education is available on the NDSU campus through a cooperative arrangement with Valley City State University, the degree-granting institution for this program.

Majors in elementary education and in special education are available through the Tri-College consortium. Contact the School of Education office, NDSU, for more information.

Extension Education Minor

The extension education minor provides educational background and presentation skills for individuals who seek careers associated with the Cooperative Extension Service. This minor is offered through the agricultural education and the family and consumer sciences education programs.

	Credits
H&CE 341, Leadership and Presentation Techniques	3
H&CE 345, Extension Education	2
H&CE 444, Planning the Community Program in Agriculture OR H&CE 468, Family Life and Adult Education Programs	3
H&CE 445, Technology Transfer in Agriculture	3
H&CE 481, Methods of Teaching Agriculture OR H&CE 482, Methods of Teaching Family and Consumer Sciences Education	3
H&CE 496, Extension Internship	6-9
Total	20-23

College of Pharmacy

Sudro Hall 123 (701) 231-7456
Charles D. Peterson, Dean

The College of Pharmacy at North Dakota State University has provided an education for men and women in pharmacy and the pharmaceutical sciences since 1902. The most recent change was in the fall of 1990 when a six-year entry-level Doctor of Pharmacy (Pharm.D.) program was implemented.

The college introduced an associate degree nursing program in 1969, which was discontinued in 1987. In 1986, the college initiated a cooperative four-year baccalaureate degree program in nursing with Concordia College.

Degree Programs

The College of Pharmacy offers academic programs in pharmacy and nursing. Admission requirements, curricula, and degree titles differ for the programs.

The pharmacy curriculum consists of a six-year professional program leading to the Pharm.D. degree. Graduates are qualified to apply for licensure as pharmacists. In addition, a two-year post-baccalaureate Pharm.D. program is available through the college, as well as a nontraditional program offered in cooperation with the University of Colorado.

A four-year baccalaureate program with a major in nursing is cooperatively implemented by NDSU and Concordia College through the Tri-College University consortium. The program at NDSU leads to a B.S. degree in nursing. Graduates are eligible to apply for admission to the licensing examination for registered nurses.

Academic and Professional Requirements

All students must complete all required courses with a grade of C or above. Further, transfer credits with grades of D are not accepted for program requirements. All students must maintain a semester GPA of 2.0 or above for each semester in the College of Pharmacy. A student who fails to meet this standard for two successive or three non-successive semesters shall be eligible for termination of registration in the College of Pharmacy.

The faculty of the College of Pharmacy reserves the right to terminate the registration of any student at any time if, in the opinion of the faculty, the student demonstrates that he or she is unsuited for a professional health career and its inherent responsibilities and obligations. Circumstances that may lead to student termination will include, but not be limited to, violation of state or federal statutes or regulations concerning drugs or controlled substances.

Admission

Selection committees will evaluate applicants for admission to the College of Pharmacy professional programs. Evaluations will be based on college records, state residency, PCAT scores, and other pertinent information. A personal visit, which includes an impromptu essay written during the visit, may be part of the evaluation process.

A minimum cumulative GPA of 2.80 in college course work is required for evaluation for admission, with completion of all required prerequisite courses by the end of spring term prior to beginning the professional program. Actual admission "cut off" is generally much higher.

NDSU course work and transfer credits with grades of D are not accepted for program requirements.

Pharmacy. Applications for admission to the professional programs in the college must be made by January 15 of the sophomore year in pre-pharmacy for fall semester admission. The PCAT applicants will receive notice of their status by June 1. Applications for admission to the post-baccalaureate Pharm.D. program must be made by January 15. Applicants will receive notice of their status by April 15.

Nursing. Applications for admission to the professional major should be made by October 1 for the class beginning in the spring semester of the sophomore year. Applicants will receive notification of their status by November 1.

Pharmacy

Pharmacy programs encompass both the basic and clinical sciences and are designed to provide students with the knowledge, skills, and attitudes essential to the practice of pharmacy.

The current mission of pharmacy practice is to render pharmaceutical care. The goal of pharmaceutical care is to improve an individual patient's quality of life through achievement of definite, medication-related therapeutic outcomes. The outcomes sought are (a) cure of a disease, (b) elimination or reduction of a symptoms, (c) arresting or slowing the disease process, or (d) preventing a disease or its symptoms. This, in turn, involves three major functions: (a) identifying potential and actual medication-related problems, (b) resolving actual medication-related problems, and (c) preventing potential medication-related problems. A medication-related problem is an event or circumstance involving medication therapy that actually or potentially interferes with an optimum outcome for a specific patient.

The six-year curriculum in pharmacy is conducted on a 2-4 basis. Students in the first two years of the program are in pre-pharmacy, and students in the final four years are in the professional program. Students entering the program in the first two years must meet general admission standards of the University. Students are admitted to the final four years on a competitive basis, and must meet specific admission requirements of the college. For admission requirements to

the professional program, contact the dean's office of the college. Students attending other institutions must maintain frequent contact with the college to determine appropriate course work. The pre-pharmacy course work, the first two years, may be completed at other institutions if course work has been submitted for formal NDSU review and determined to be equivalent to NDSU requirements.

The current entry-level Pharm.D. curriculum is designed to provide the cultural and humanistic background needed to meet the demands of society today, as well as the professional education required for the practice of pharmacy. Various special areas of study prepare the student to accept positions in community, hospital, managed care, wholesale, and industrial pharmacy. Other opportunities include positions in food and drug inspection and analysis for both the state and federal governments, medical service representatives, and laboratory and administrative positions in pharmaceutical companies and associations. Teaching and research positions in universities and the pharmaceutical industry are excellent opportunities for those with advanced degrees in pharmacy.

The college is a member of the American Association of Colleges of Pharmacy, and is accredited by the American Council on Pharmaceutical Education (ACPE).

Recommended Curriculum Pre-Pharmacy

To be admitted to the Professional Pharmacy program, the applicant must have completed at least 65 semester hours of college or university credits, including the following:

	Credits
Biological Sciences	13
English, Writing and Reading	6
First-Year Experience	1
General Chemistry w/Lab	8
Mathematics, Calculus	8
Microeconomics	3
Organic Chemistry w/Lab	7
Physics/Biophysics	3
Speech Communication	3
Wellness	2
Additional Electives	
Behavior and Social Science/Humanities	12

Students attending other institutions must be aware of the General Education requirements when enrolling in course work.

This curriculum is subject to periodic changes. Students should maintain frequent contact with the college to determine appropriate course work.

Professional Pharm.D. Curriculum

	Credits	
First Year	**F**	**S**
Bioc 460, 461, Biochemistry I, II	4	4
Micr 460/561, Pathogenic, Lab		3,1
Phrm 373, Health Care Systems		2
PSci 368, 369, Pharmaceutics I, II	4	3
PSci 340, 341, Pathophysiology I, II	4	4
PSci 370, Lab Tech PSci		1
Stat 520, Statistical Methods	3	
Totals	15	18
Second Year		
Micr 470, Basic Immunology	3	
Micr 572, Clinical Immunology		1
Phrm 458, Intro to Clinical Practice		2
Phrm 472, Pharmacy Law/Ethics	4	
Phrm 480, Drug Literature Eval		2
Phrm 501, Consultation		2
PSci 401, 403, Pharmacodynamics I, III	5	5
PSci 402, 404, Pharmacodynamics II, IV	4	4
PSci 470, Pharmacokinetics	3	
PSci 471, Clinical Pharmacokinetics		2
Totals	19	18
Third Year		
Phrm 520, Pediatrics-Geriatrics	2	
Phrm 531, Cardiovascular		2
Phrm 532, Infectious Disease	3	
Phrm 533, Pulmonary/Gastrointestinal	2	
Phrm 534, Rheumatology/Endo/Repro	2	
Phrm 535, Hematology/Neoplastic		3
Phrm 536, Neurology/Psychiatry		3
Phrm 537, Renal/Fluid and Electrolyte	2	
Phrm 557, Home Health/Parenteral		3
Phrm 575, Pharmacy Management		3
Phrm 578, Non-Pres Meds	2	
Phrm 579, Dispensing[3]	2	OR 2
PSci 545, Clinical Toxicology	2	
Totals	15-17	14-16
Fourth Year		
48-Week Experiential Training Program[1, 2]		
Phrm 581, Clin Clerkship I		16
Phrm 582, Clin Clerkship II		16
Phrm 583, Clin Clerkship III		16
Total		48
Curriculum Total		148

[1]Students assigned by rotation.
[2]Sites located in Fargo and other areas.
[3]Note: Phrm 579 may be taken either semester.

Baccalaureate Degree Program in Nursing

The nursing program is a four-year program of study leading to a baccalaureate degree with a major in nursing. Upon successful completion of the program, the graduate is eligible to apply for licensure as a registered nurse (R.N.). The baccalaureate degree is required in North Dakota for entry into professional practice. The nursing program is approved by the North Dakota and Minnesota Boards of Nursing, as well as accredited by the National League for Nursing (NLN).

The nursing program is consortium-based through the Tri-College University. The nursing major is offered jointly by North Dakota State University and Concordia College. Nursing classes are taught on an alternate basis on each campus. Students graduate from their respective institutions.

Mission. The mission of the nursing consortium is to promote health by preparing professional nurses and serving as a resource for society.

Philosophy. The curriculum is taught within the context of the program's philosophy, which is embodied in the following set of beliefs.

- Nursing is a profession that serves society by promoting an optimal level of health among individuals, families, and groups.
- Caring is integral to nursing practice. It is protecting and preserving human dignity through knowledge, ethical practice, and a respect for the client.
- Preparation of professional nurses is achieved through collaborative partnerships in which both the teacher and learner are actively involved and accountable. Nursing education contributes to the advancement of the profession through discovery, integration, application, and teaching. The profession is responsive to the changing health care needs of society and is accountable to society for the quality and effectiveness of nursing practice.

Program goals. The mission and philosophy are actualized by the following goals.

- The nursing curriculum prepares professional practitioners by providing sound educational basis for continuing development, for graduate study in nursing, and for accepting professional and community responsibility.
- The nursing program serves as a resource for society through consultation, collaboration, political involvement, scholarship, and clinical practice.

Graduate outcomes. The nursing program provides learning experiences that result in the following outcomes, which have been adapted from those deemed essential by the American Association of Colleges of Nursing:

1. Communicate clearly and effectively to acquire knowledge, exchange ideas, and evaluate information.
2. Appreciate similarities and differences among individuals, families, and communities.
3. Apply concepts from the arts, humanities, and science to enhance understanding of oneself and one's relationships with other people.
4. Think critically using verifiable information and past experience to effect positive change.
5. Provide nursing care in accordance with the Standards of Professional Practice and Code of Nurses set by the American Nurses Association.
6. Assume individual responsibility and accountability for continuing professional and personal development.

Curriculum. The curriculum is organized around four themes: ethical practice, caring, promotion of health, and professional role. These themes flow from the mission/philosophy of the nursing program and provide the core of the curricular content. They can be identified within the course objectives, content outlines, clinical experiences, and graduate outcomes of the nursing program. The content increases in scope and complexity as the student progresses through the nursing major.

Application Procedures

1. The pre-nursing program (first three semesters) is open to all high school graduates and college students who wish to pursue a nursing major. To enter the pre-nursing program, students must be admitted to the University. The nursing major begins the spring semester of the sophomore year.

2. For admission into the professional nursing program, a supplemental application must be submitted by October 1 to the Nursing Office, 136 Sudro Hall. Enrollment to the nursing major is limited. A minimum GPA of 2.5 (4.0 = A) is required in all post high school work to apply.

Admission is competitive and based on all of the following: (a) Selective GPA that incorporates selected prerequisite courses (see recommended curriculum), (b) completion of the prerequisite courses with a passing grade, (c) eligibility for sophomore standing, (d) personal references, (e) impromptu essay, (f) a personal interview may be requested, and (g) submission of the completed application materials. Preference will be given to North Dakota residents and those students who have taken a greater number of credits in the North Dakota State University System.

Students applying for a nursing major (spring semester of the sophomore year) must complete and submit the following:

1. A regular application for admission to NDSU if not a current student
2. A supplemental nursing application
3. Official transcripts from all colleges attended, including NDSU
4. Two reference forms
5. Impromptu essay, written in the nursing department.

The documents must be on file in the Nursing Office by October 1. Application forms may be obtained at the Nursing Office, 136 Sudro Hall, and the Office of Admission, 124 Ceres Hall, North Dakota State University, Fargo ND 58105. You may also call the Office of Admission at (701) 231-8643 or 1-800-488-NDSU(6378). Students will be notified of their admission status by November 1.

Students who are currently enrolled at NDSU in the pre-nursing program should consult with their nursing faculty adviser prior to the application deadline.

For further information contact the following:

Department of Nursing
136 Sudro Hall
North Dakota State University
Fargo, ND 58105
Telephone (701) 231-7395

Recommended Curriculum in Nursing

	Credits	
First Year	**F**	**S**
*Biol 202, 202L, Intro Microbio, Lab		2,1
*Engl 110, 120, College Composition I, II	3	3
*Math 104, Finite Mathematics		3
*Psyc 111, Intro to Psychology		3
*Soc 110, Intro to Sociology OR Anth 111, Intro to Anthropology	3	
Univ 189, Skills for Academic Success	1	
*Zoo 120, Human Anatomy/Physiology	4	
*Zoo 120L, Human Anatomy/Physiology Lab	1	
Humanities and Fine Arts		3
Elective	3	
Totals	15	15
Second Year		
Chem 117, 117L, Chem Concepts, Lab	3,1	
Chem 260, Elements of Biochemistry		4
Comm 110, Fund of Public Speaking	3	
Nutr 240, Principles of Nutrition		3
**Nurs 351, Nursing Concepts		4
Psyc 250, Developmental Psychology	3	
Cultural Div, Global Perspectives	3	3
Electives	2	3
Totals	15	17
Third Year		
Nurs 341, Client Concepts	4	
Nurs 342, Adult Health Nursing I	4	
Nurs 352, Family Nursing I		4
Nurs 361, Health Assessment	4	
Nurs 362, Family Nursing II		4
Nurs 420, Nursing Research		2
Phrm 300, Prin of Clinical Pharmacology		3
Humanities/Fine Arts	3	
Electives		4
Totals	15	17
Fourth Year		
Nurs 401, Community Health	4	
Nurs 402, Mental Health Nursing	4	
Nurs 403, Adult Health Nursing II	4	
Nurs 404, Adult Health Nursing III		4
Nurs 411, 412, Role Development I, II		2,2
Nurs 430, Nursing Management		2
Electives	3	3
Totals	15	13
Curriculum Total		122

* Prerequisite courses that must be completed prior to admission to the major (the selective GPA is calculated on these courses).
** Must be accepted into nursing major to enroll.

Computer proficiency is expected before entering the nursing major.

Students should consult their faculty adviser for electives that may enhance their program of study and meet graduation requirements.

College of Science and Mathematics

Stevens Hall 201 (701) 231-7411
Kevin D. McCaul, Interim Dean

Opportunities in the college reflect the belief that an understanding of the methods and findings of science is best achieved through first-hand experience in the process of conducting, analyzing, and reporting research. Students are encouraged to participate in this process by working closely with faculty and other students in laboratory and field research, thus gaining direct knowledge of the power, limits, and problems in scientific inquiry. These opportunities for direct experience with the tools of the scientist are liberally available to the interested and motivated student.

Departments of the College of Science and Mathematics include the following:

Biochemistry and Molecular Biology
Botany/Biology
Chemistry
Computer Science
Geosciences
Mathematics
Physics
Polymers & Coatings
Psychology
Statistics
Zoology

Degree Programs

The College of Science and Mathematics provides undergraduate programs leading to a Bachelor of Science or Bachelor of Arts degree. Graduate programs at the masters and doctorate levels are also offered. More information about advanced degrees is available in the Graduate Bulletin.

Degree Requirements

All majors are required to complete departmental and general education requirements. Departmental requirements for graduation are those in existence at the beginning of the junior year. Junior standing, in this case, applies only to majors who have satisfied the freshman and sophomore curriculum of a departmental program. Available majors include the following:

Biological Sciences
Biotechnology
Botany
Chemistry
Clinical Laboratory Science (Medical Technology)
Computer Science
Mathematics
Natural Resources Management
Physics
Psychology
Respiratory Care
Soils (Earth Science) (see Geosciences)
Statistics
Zoology

Minors are available in most departments.

The Department of Biochemistry and Molecular Biology and the Department of Polymers and Coatings provide areas of specialization for chemistry majors but do not offer a separate major at the undergraduate level.

Academic credits may be earned within majors due to participation in the Cooperative Education program. Students may obtain one or two semesters of professional work experience related to their studies; however, no more than a total of three credits may be applied to the minimum of 122 credits required for the degree. Each department has specific requirements for earning these credits, which will be graded S or U. The student must have approval by the co-op coordinator and chair of the department prior to beginning the co-op program.

Courses to fulfill the major requirements in the college may not be taken pass/fail. Only elective courses outside the major may be taken pass/fail.

Math 100 and 102 are developmental courses and will not count toward credits for graduation in any program.

General college requirements for the two undergraduate degrees extend beyond the minimum University general education requirements. An adviser should be consulted for specific courses. Students are also encouraged to follow their own interests in choosing electives that go beyond the minimum requirements. Basic requirements for each degree include the following:

Bachelor of Science Degree

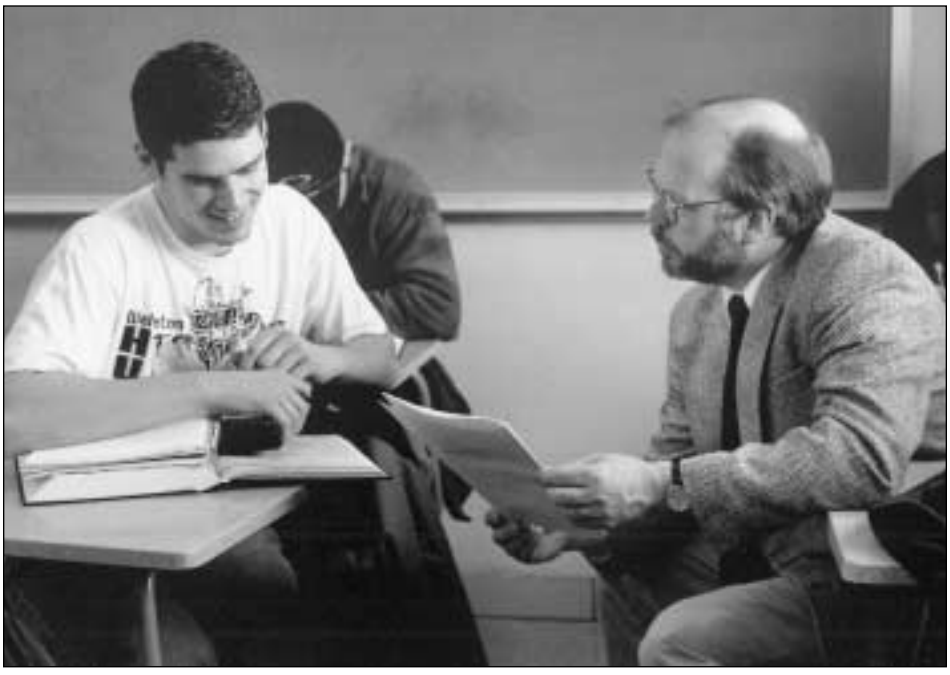
	Credits
Comm 110, Fund of Public Speaking	3
Engl 110, 120, College Composition I, II	6
Univ 189, Skills for Academic Success	1
Humanities and Fine Arts*	6
Humanities and Social Sciences (additional college requirement)*	6
Quantitative Reasoning*	3
Science and Technology*	10
Social and Behavioral Sciences*	6
Wellness*	2
Major and related supporting courses	

*Refer to Courses Approved for General Education listed in the Appendix.

Bachelor of Arts Degree

B.A. degree requirements are the same as the B.S. degree with an additional 6 credits of humanities and social and behavioral sciences and the addition of two years of a modern foreign language. This means completion of the second year of college-level language or the equivalent. For example, students with two years of a foreign language in high school should enter second year college-level language. Students with four or more years of a foreign language in high school will be considered to have completed this requirement.

All degree candidates must apply for graduation through the Office of Student Academic Affairs according to University procedures and deadlines.



Specializations

Specializations are provided for career preparation in a range of areas.

Pre-Professional Programs

Pre-professional curricula are offered by a number of departments for students interested in preparing for careers in medicine, dentistry, mortuary science, chiropractic, optometry, osteopathy, and other health related fields. Some example curricula are included under individual department sections. Most pre-professional programs are flexible and can be developed around many different majors. Departments that have expressed a special interest in advising pre-professional majors include botany, biology, (comprehensive science), biochemistry, chemistry, physics, psychology, and zoology.

In addition to the preceding, a number of departments have developed other specializations to meet today's rapidly changing job markets. These may be found in the individual department sections as follows:

Biochemistry—biotechnology

Botany/Biology—environmental science, biotechnology, biological sciences education, comprehensive science education

Chemistry—biochemistry, chemistry education, pre-professional chemistry, polymers and coatings

Geosciences—geochemistry

Psychology—natural science track, social sciences track, options in behavioral neuroscience, industrial-organizational, human services, experimental

Zoology—wildlife and fisheries biology, cell biology/physiology, biotechnology

Teacher Certification

Several of the majors available through the College of Science and Mathematics lead to careers in teaching.

Students may complete the requirements for a major in the college, then apply for admission to the School of Education in the College of Human Development and Education to undertake the additional requirements necessary to qualify for teacher certification. Alternatively, students may initially select a science and mathematics education curriculum through the School of Education.

Programs leading to teacher certification are available in the following areas: biological sciences, chemistry, comprehensive science, mathematics, physics, and soils (earth science).

ROTC Opportunities

Up to 18 elective credits may be earned by participation in the Army or Air Force ROTC programs. Men or women may take these programs for elective credit. In addition they may complete either program and receive a commission upon graduation. Students receiving commissions will have the opportunity to serve as officers in the active service or in the Army reserve components. For more complete details of the ROTC programs, refer to the Special Programs section.

Biochemistry and Molecular Biology

Biochemistry is an interdisciplinary study of the chemical and physical properties of living matter and the chemical changes that occur during life processes. Careers in biochemistry require preparation in both chemistry and biology as well as biochemistry. A biochemistry option is offered in cooperation with the Department of Chemistry. The option includes biochemistry and electives in the life sciences. Students following this curriculum will have career opportunities in medical, pharmaceutical, food processing, and agricultural laboratories, especially in the areas of molecular biology, genetic engineering, and the newer biotechnologies. A major in chemistry with the biochemistry option is an excellent preparation for graduate school or schools of medicine, dentistry, and veterinary science.

Courses in biochemistry are also of interest to students in other fields such as agriculture, microbiology, botany, and the health sciences.

Electives for the major in chemistry with the biochemistry option leading to the baccalaureate degree include courses in cell biology, botany, zoology, microbiology, genetics, physiology, cereal technology, and entomology. At least 10 credits of these electives must be in upper-division courses. Selection of electives will be made by the student in consultation with an adviser from the biochemistry department faculty.

Graduate work in biochemistry is offered at both the M.S. and Ph.D. levels. Students beginning study in these programs should have a strong chemistry background. Prior training in the life sciences is desirable but not essential. Further details about graduate programs are in the Graduate Bulletin.

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 is also concerned with 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 or the College of Science and Mathematics and leads to the Bachelor of Science degree. Faculty in each of the cooperating life-science departments have been identified to serve as advisers for students who select the biotechnology major. Students elect an area of emphasis from a variety of science and mathematics electives for specialization. A 2.50 cumulative grade-point average is required to remain in the program.

Recommended Curriculum Biotechnology Major

Students entering the biotechnology program should have a strong preparation in mathematics, biology, chemistry, and physics. A composite ACT score above 25 is recommended.

First Year	Credits
Biol 150, 150L, Gen Biology, Lab	4
Bot 170, Plant Form and Diversity OR Zoo 170, 170L, Gen Zoology, Lab.	4
Chem 121, 121L, 122, 122L, Gen Chem I, II, Labs	8
Engl 110, 120, College Composition I, II	6
Math 146, 147, Applied Calculus I, II.	8
Univ 189, Skills for Academic Success	1
Wellness	2
Total	33
Second Year	
Chem 341, 341L, 342, Org Chem I, II, Lab I	7
Micr 350, 350L, Gen Microbiology, Lab	4
Phys 211, 211L, 212, 212L, College Phys I, II, Labs	8
PlSc 315[1], 315L[1], Genetics, Lab	4
Computer Science	3
Behavioral/Soc Sci, Humanities	6
Total	32
Third Year	
Bioc 460[1], 461[1], Found of Biochem I, II	8
Comm 110, Fund of Public Speaking	3
Micr 470[1], Basic Immunology	3
Micr 471[1], Immunology & Serology Lab	2
Stat 330, Intro Statistics	3
Behavioral/Soc Sci, Humanities	9
Biotechnology Elective[1,2]	2-3
Seminar[1]	1
Total	31-32
Fourth Year	
Bioc 465, Prin of Phys Chem	4
Bioc 474[1], Methods in Recomb DNA Tech	3
Bot 380[1], Plant Phys OR Zoo 460[1], Animal Physiology	4
Micr 482[1], Bacterial Genetics and Phage	3
Biotechnology Elec[1,2]	2-3
Senior Research	2-4
Senior Thesis	1
Behavioral/Soc Sci, Humanities	3
General Electives	9
Total	31-34
Curriculum Total	131

[1]Major courses.

[2]Biotechnology electives (2 courses required) include Bioc 473 or PSci 409, Methods of Biochemical Research or Isotope Tracer Techniques; Bioc 485, Industrial Biotechnology; PPth 553, Microscopy; Bot 480, Plant Tissue Culture; PlSc 484, Plant Tissue Culture and Micropropagation; and Micro 445, Animal Cell Culture Techniques.

Botany/Biology

The Department of Botany/Biology offers broad undergraduate preparation in the basic concepts and principles of the life sciences with major emphasis on both plant and animal forms. Various curricular options are available for specific career interests.

Biological Sciences

The biological sciences major is available for the student seeking broad biological training. Required courses for this curriculum include the following:

Biol 150, 150L, 364, 459, 491
Bot 170, 315, 315L
Chem 121, 121L, 122, 122L, 240, and Bioc 260
  OR Chem 341, 341L, 342 and Bioc 460
Math 146
Phys 211, 211L and 212, 212L
Stat 330
Zoo 170, 170L, 370
One course in computer science
Two courses in earth science
Advanced biology electives (12 credits) with at least one course from each of the following areas: systematics, anatomy/morphology, and physiology (1 botany, 1 zoology).

A student is expected to take approximately an equal number of credits in botany and zoology with the distribution of course work in the two fields determined by the student in consultation with his/her adviser.

A list of courses that meet the required categories of systematics, anatomy/morphology, physiology, computer science, and earth sciences may be obtained from the departmental office. Curricula for secondary school comprehensive science education, environmental studies, traditional course sequences, and pre-professional programs are available in the department.

A minor in biological sciences consists of at least 19 credits, including Biology 150, 150L, Botany 170, Zoology 170, 170L, and 6-8 credits selected from 300- and 400-level courses in botany, zoology, or biology.

Students interested in majoring in a specific biological science (animal science, botany, entomology, horticulture, microbiology, plant pathology, zoology) should consult the appropriate discipline.

Environmental Science Option

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.

Biological Sciences Education

Students who intend to teach biology in the secondary schools should make their intentions known to the School of Education and consult with a biology education adviser in the botany/biology department 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.

Comprehensive Science Education

The comprehensive science education major is designed to prepare the secondary general science teacher. This major is an especially good preparation for the student who may find her/himself teaching several different science courses. Information about curriculum and other requirements is available from the School of Education and the education adviser in the botany/biology department.

Recommended Curriculum Biological Sciences Major

	Credits F	S
First Year		
Biol 150, 150L, Gen Biology, Lab	3,1	
Bot or Zoo 170, 170L, Plant Form/Diversity OR General Zoology		4
Chem 121, 121L, 122, 122L, General Chem I, II, Labs	3,1	3,1
Engl 110, 120, College Composition I, II	3	3
Math 146, Applied Calculus I	4	
Univ 189, Skills for Academic Success	1	
Computer Science		2
Wellness		2
Totals	16	15
Second Year		
Biol 364, General Ecology		3
Bot 315, 315L, Genetics, Lab	3,1	
Chem 341, 341L, 342, Organic Chemistry I, II, Lab	3,1	3
Comm 110, Fund of Public Speaking	3	
Stat 330, Intro to Statistics		3
Zoo or Bot 170, Gen Zoo, Lab OR Plant Form/Diversity		4
Social Science	3	3
Totals	14	16
Third Year		
Bioc 460, Elements of Biochem	4	
Phys 211, 211L, 212, 212L, College Physics I, II and Labs	4	4
Zoo 370, Cell Biology		3
Biological Science	3	3
Earth Science	3	3
Humanities and Fine Arts		3
Totals	14	16
Fourth Year		
Biol 459, Evolution		3
Biol 491, Senior Seminar		1
Biological Sciences	6	6
Humanities and fine Arts		3
Humanities or Social Sciences Electives	3	3
Electives	6	
Totals	15	16
Curriculum Total		122

Recommended Curriculum Environmental Science Option

	Credits F	S
First Year		
Biol 150, 150L, General Biol, Lab	3,1	
Bot 170, Plant Form and Diversity OR Zoo 170, 170L, General Zoology, Lab		4
Chem 121, 121L, 122, 122L, Gen Chem I, II, Labs	3,1	3,1
Engl 110, 120, College Composition I, II	3	3
Math 146, 147, Applied Calculus I, II	4	4
Univ 189, Skills for Academic Success	1	
Totals	16	15
Second Year		
Biol 315, 315L, Genetics, Lab	3,1	
Bot 170, Plant Form and Diversity OR Zoo 170, 170L, General Zoology, Lab		4
Chem 341, 341L, 342, Organic Chem I, II, Lab	3,1	3
Geol 105, 105L, Physical Geology, Lab	3,1	
Geol 106, 106L, Earth Through Time, Lab		3,1
Phys 211, 211L, 212, 212L, College Physics I, II, Labs	3,1	3,1
Totals	16	15
Third Year		
Biol 364, General Ecology		3
Comm 110, Fund of Public Speaking	3	
Geol 428, Geochemistry		3
Soil 217, Meteorology/Climatology		3
Stat 330, Introductory Statistics	3	
Biological Sciences	3	3
Computer Science	2-3	
General Education	3,3	3
Totals	17-18	15
Fourth Year		
Bioc 460, Biochemistry	4	
Biol 459, Evolution		3
Biol 491, Senior Seminar		1
Soil 410, Soil and the Environment		2
Biological Sciences	3	3
General Education	3,3	3
Wellness	2-3	
Totals	15-16	12
Curriculum Total		122

Recommended Curriculum Biological Sciences Education

	Credits F	S
First Year		
Biol 150, 150L, General Biol, Lab	3,1	
Bot 170, Plant Form and Diversity OR Zoo 170, 170L, General Zoology, Lab		4
Chem 121, 121L, 122, 122L, Gen Chem I, II, Labs	3,1	3,1
Engl 110, 120, College Composition I, II	3	3
HD&E 120, Orientation to HD&E	1	
HD&E 189, Skills for Academic Success	1	
Math 146, Applied Calculus I	4	
Computer Science		2
Wellness		2
Totals	17	15

Second Year	Credits F	Credits S
Biol 315, 315L, Genetics, Lab	3,1	
Bot 170, Plant Form and Diversity OR Zoo 170, 170L, General Zoology, Lab		4
Chem 240, Survey of Organic Chem	3	
Chem 260, Elements of Biochemistry		4
Comm 110 Fund of Public Speaking		
Educ 321, Intro to Teaching	3	
Educ 322, Educational Psychology		3
Educ 381, Early Experience	1	
Phys 211, 211L, 212, 212L, College Physics I, II, Labs	3,1	3,1
Humanities or Social/Behavioral Sci		3
Totals	18	18

Third Year		
Biol 364, General Ecology		3
Biol 459, Evolution		3
Educ 389, Native Am/Inst Pract		3
Educ 451, Inst Planning/Strategies	3	
Geol 105, 105L, Physical Geol, Lab	3,1	
Geol 106, 106L, Earth Through Time, Lab	3,1	
Stat 330, Introductory Statistics	3	
Zoo 120, 120L, Anatomy/Physiology, Lab	4,1	
Zoo 370, Cell Biology		3
Social and Behavioral Sci	3	
Totals	18	16

Fourth Year		
Biol 491, Seminar	1	
Educ 481, Classroom Pract/Sci Methods	3	
Educ 485, Student Teaching Seminar		1
Educ 486, Classroom Mgt		3
Educ 487, Student Teaching		10
Biology Electives	3,3	
Humanities and Fine Arts	3	
Humanities or Social/Behavioral Sci	3	
Totals	16	14

Curriculum Total 132

Recommended Curriculum Comprehensive Science Education

First Year	Credits F	Credits S
Biol 124, Environmental Science		3
Chem 121, 121L, 122, 122L, Gen Chem I, II, Labs	3,1	3,1
Engl 110, 120, College Composition I, II	3	3
Geol 105, 105L, Physical Geol, Lab	3,1	
Geol 106, 106L, Earth Through Time, Lab		3,1
HD&E 120, Orientation to HD&E	1	
HD&E 189, Skills for Academic Success	1	
Humanities and Fine Arts	3	
Social and Behavioral Sci		3
Wellness	2	
Totals	18	17

Second Year		
Biol 150, 150L, General Biol, Lab	3,1	
Bot 170, Plant Form and Diversity		4
Chem 341, 341L, 342, 342L, Organic Chemistry I, II, Labs	3,1	3,1
Educ 321 Intro to Teaching		3
Educ 322, Educational Psychology		
Math 165, 166, Calculus I, II	4	4
Educ 381, Early Experience		1
Totals	15	16

Third Year		
Chem 260, Elements of Biochemistry		4
Comm 110, Fund of Public Speaking	3	
Educ 389, Native Am/Inst Pract		3
Educ 451, Inst Planning/Strategies	3	
Phys 251, 251L, 252, 252L, Univ Phys I, II, Labs	5,1	4,1
Zoo 170, 170L, General Zoology		3,1
Biol, Bot, or Zoo Elective (300+ level)	3	
Computer Science	2	
Totals	17	16

Fourth Year		
Educ 481, Classroom Pract/Sci Methods	3	
Educ 485, Student Teaching Seminar		1
Educ 486, Classroom Mgt		3
Educ 487, Student Teaching		10
Phys 110, Introductory Astronomy	3	
Stat 330, Introductory Statistics	3	
Biol, Bot, or Zoo Elective (300+ level)	3	
Humanities and Fine Arts	3	
Social and Behavioral Sci	3	
Totals	18	14

Curriculum Total 131

Botany

Departmental instruction is offered in the major areas of botany for students in all colleges of the University, but botany courses and instructional procedures are specially designed for undergraduate and graduate students in the College of Science and Mathematics and the College of Agriculture. Completion of an undergraduate major prepares the students for graduate work or for professional employment. Botany joins with zoology in offering an undergraduate major in biological sciences. Graduate work in botany is offered at both the M.S. and Ph.D. levels.

Majors in botany are required to take a minimum of 25 credits in botany, plus additional credits in related fields. Required courses include the following:
Biol 150/150L, 315/315L, 459
Bot 170, 314, 380, 452, 460, 471 or 472, 491
Chem 121/121L, 122/122L, 240 and 260 OR Chem 341/341L, 342 and Bioc 460
Math 146
Micr 350/350L
Phys 211/211L and 212/212L
Stat 330
Zoo 170/170L, 370
One course in computer science

Recommended Curriculum Botany Major

First Year	Credits F	Credits S
Biol 150, 150L, General Biology, Lab	3,1	
Bot 170, Plant Form and Diversity		4
Chem 121, 121L General Chemistry I, Lab	3,1	
Chem 122, 122L General Chemistry II, Lab		3,1
Engl 110, 120, College Composition I, II	3	3
Math 146, Applied Calculus I	4	
Univ 189, Skills for Academic Success	1	
Computer Science		2-3
Wellness		2-3
Totals	16	15-17

Second Year		
Bot 315, 315L, Genetics, Lab	3,1	
Bot 314, Systematic Botany		3
Chem 341, 341L, 342, Organic Chem I, II, Lab	3,1	3
Phys 211, 211L, College Physics I, Lab	3,1	
Phys 212, 212L, College Physics II, Lab		3,1
Zoo 170, 170L, General Zoology, Lab		3,1
Humanities and Fine Arts	3	
Social and Behav Sci		3
Totals	15	17

Third Year	Credits F	Credits S
Bioc 460, Elements of Biochem	4	
Bot 380, Plant Physiology	4	
Bot 452, Plant Structure	3	
Comm 110, Fund of Public Speaking	3	
Stat 330, Intro Statistics		3
Botany Electives		6
Humanities and Fine Arts		3
Social and Behav Sci		3
Totals	14	15

Fourth Year		
Biol 459, Evolution		3
Bot 460, Plant Ecology	3	
Bot 471 or 472, Phycology, Lichenology	3	
Bot 491, Seminar		1
Micr 350, 350L, General Microbiology, Lab	3,1	
Zoo 370, Cell Biology		3
Humanities and Fine Arts		3
Social and Behav Sci	3	
Electives	3	3
Totals	16	13

Curriculum Total 122

Chemistry

Programs leading to the B.S. degree and the B.A. degree are available. For an outline of the general requirements for the B.A. degree, refer to the beginning of the College of Science and Mathematics section.

The principal curricula leading to the B.S. degree are designed to meet the standards set by the Committee on Professional Training of the American Chemical Society (ACS).

Requirements for a chemistry minor are Chem 121, 121L, 122, 122L, plus 11 credits in chemistry, biochemistry, or polymers and coatings at the 300-course level or higher, including at least one laboratory credit.

Graduate study in chemistry may lead to the Master of Science (M.S.) and to the doctorate (Ph.D.) in chemistry. Further information is available in the Graduate Bulletin.

Recommended Curriculum Chemistry Major

The ACS certified chemistry major is the standard program designed for students seeking careers in the chemical industry or careers in law, government, journalism, business, and others, which would benefit from a strong background in the physical sciences and mathematics. Many B.S. graduates pursue M.S. or Ph.D. studies.

Students may apply for scholarships available from the Department of Chemistry and the Department of Polymers and Coatings.

Graduates of the standard chemistry program for the B.S. degree are certified by the American Chemical Society. The curriculum for the polymers and coatings option includes added specialized courses to the standard program. The curriculum for the biochemistry option includes biological sciences courses and substitutions of some upper-division chemistry courses for advanced biochemistry courses. These two options also lead to ACS certification of graduates.

First Year	Credits F	S
Chem 150, 151, Prin of Chem I, II	3	3
Chem 160, 161, Prin of Chem Lab.	1	1
Comm 110, Fund of Public Speaking		3
Engl 110, 120, College Composition I, II	3	3
Math 165, 166, Calculus I, II	4	4
Univ 189, Skills for Academic Success.	1	
General Education*	3	
Wellness		2
Totals	15	16
Second Year		
Chem 341, 342, Organic Chem	3	3
Chem 353, 354, Majors' Org Chem Labs	1	2
Math 228, Intro Linear Algebra.	1	
Math 265, Calculus III	4	
Math 266, Intro Diff Equations		3
Phys 251, 252, Univ Physics	5	4
Phys 251L, 252L, Univ Physics Lab.	1	1
General Education*		3
Totals	15	16
Third Year		
Chem 431, 431L, Analytical Chem I, Lab	3,2	
Chem 364, 365, Physical Chem I, II.	4	4
Chem 380, Seminar in Chem		1
Chem 471, Physical Chem Lab		2
General Education*	6	8
Totals	15	15
Fourth Year		
Bioc 460, Found/Biochem/Molec Biol	4	
Chem 425, 429, Inorganic Chem, Lab.	3,2	
Chem 432, 432L, Analytical Chem II. Lab		3,1
Chem 491, Seminar in Chem		2
General Education*	6	9
Totals	15	15
Curriculum Total		122

*General education credits must be selected from approved courses and include 18 credits in humanities and social sciences; 6 of these must be in humanities and fine arts and 6 in social/behavioral sciences. Also, 3 credits must be from the global perspectives category and 3 from cultural diversity.

Recommended Curriculum Biochemistry Option

The curriculum for the biochemistry option is derived from the ACS certified chemistry major. The following arrangement of courses is presented as a model and may be restructured to meet individual needs.

First Year	Credits F	S
Biol 150, 150L, Gen Biol, Lab	3,1	
Chem 150, 151, Principles of Chem I, II.	3	3
Chem 160, 161, Principles Lab I, II	1	1
Comm 110, Fund of Public Speaking		3
Engl 110, 120, College Composition I, II	3	3
Math 165, 166, Calculus I, II	4	4
Univ 189, Skills for Academic Success.	1	
Zoo 170, 170L, Gen Zoology, Lab OR Bot 170, Plant Form/Diversity		4
Totals	16	18
Second Year		
Chem 341, 342, Org Chem I, II	3	3
Chem 353, 354, Org Chem, Lab	1	2
Math 228, Intro Linear Algebra.	1	
Math 265, Calculus III	4	
Math 266, Intro Diff Eqns.		3
Phys 251, 252, Univ Physics I, II	5	4
Phys 251L, 251L, Univ Physics Lab I, II	1	1
General Education*		3
Wellness	2	
Totals	17	16
Third Year		
Bioc 460, 461, Biochem/Mol Biol I, II	4	4
Chem 431, 431L, Analytical Chem I, Lab	3,2	
Chem 380, Seminar		1
Biol Sciences	3	3
General Education*	3	9
Totals	15	17
Fourth Year		
Bioc 473, Meth Biochem Res.	3	
Bioc 474, Meth Recomb DNA Tech		3
Chem 364, 365, Phys Chemistry I, II	4	4
Chem 425, Inorganic Chem.	3	
Chem 471, Phys Chem Lab.		2
Chem 491, Senior Seminar** OR Bioc 491, 494, Seminar, Res		2
Micr 350, 350L, Gen Micro, Lab	3,1	
General Education*		3
Totals	14	14
Curriculum Total		127

*General education credits must be selected from approved courses and include 18 credits in humanities and social sciences; 6 of these must be in humanities and fine arts and 6 in social/behavioral sciences. Also, 3 credits must be from the global perspectives category and 3 from cultural diversity.
**Biochemistry option students may substitute Bioc 491 plus Bioc 494 for Chem 491.

Recommended Curriculum Polymers and Coatings Option

This program is for students who wish to prepare for a career as a chemist in polymers and coatings industries or for graduate school in polymer chemistry. This is the only program in the U.S. that combines an ACS-accredited program in chemistry with a polymers and coatings curriculum. Students have numerous opportunities to participate in the summer research programs and cooperative programs sponsored by industry. For students who elect the Polymers and Coatings option to the chemistry major, substantial scholarship support is available.

First Year	Credits F	S
Chem 150, 151, Prin of Chem I, II	3	3
Chem 160, 161, Prin of Chem I, II Labs	1	1
Comm 110, Fund of Public Speaking	3	3
Engl 110, 120, College Composition I, II	3	3
Math 165, 166, Calculus I, II	4	4
Univ 189, Skills for Academic Success	1	
General Education*	3	
Wellness		2
Totals	15	16
Second Year		
Chem 341, 342, Organic Chem I, II	3	3
Chem 353, 354, Majors' Org Chem I, II Labs	1	2
Math 228, Intro to Linear Algebra	1	
Math 265, 266, Cal III, Intro/Diff Eqns	4	3
Phys 251, 252, Univ Physics I, II	5	4
Phys 251L, 252L, Univ Physics I, II Labs	1	1
General Education*		3
Totals	15	16
Third Year		
Chem 364, 365, Physical Chem I, II	4	4
Chem 380, Chemistry Junior Seminar		1
Chem 431, 431L, Analytical Chem I, Lab	4,1	
Chem 471, Physical Chem Lab		2
P&C 474, 475, Coatings I, II	3	3
P&C 484, 485, Coatings I, II Labs	2	2
General Education*	3	3
Totals	17	15
Fourth Year		
Bioc 460, Found/Biochem/Molec Biol	4	
Chem 425, 429, Inorg Chem, Lab	4,1	
Chem 432, 432L, Analytical Chem II, Lab		3,1
Chem 491, Chemistry Senior Seminar		2
P&C 472, Environ/Chem Industries**	2	
P&C 473, Polymer Synthesis	3	
General Education*		8
Totals	14	14
Curriculum Total		122

*General education credits must be selected from approved courses and include 18 credits in humanities and social sciences; 6 of these must be in humanities and fine arts and 6 in social/behavioral sciences. Also, 3 credits must be from the global perspectives category and 3 from cultural diversity.
**Offered alternate years. Students may enroll in junior or senior year.

Recommended Curriculum Pre-Professional Chemistry Option

This option is designed for students interested in medical, dental, optometry, or veterinary professional school, but who wish an alternative career path to careers in industry, law, government, journalism, business, and others, which 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.

ACS certification may be earned by choosing Chem 425, 429, 471, and either Bioc 461 or Chem 432/432L as electives.

First Year	Credits F	S
Biol 150, 150L, Gen Biology, Lab	3,1	
Chem 150, 151, Prin of Chem I, II	3	3
Chem 160, 161, Prin of Chem I, II Labs	1	1
Engl 110, 120, College Composition I, II	1	1
Math 165, 166, Calculus I, II	4	4
Univ 189, Skills for Academic Success	1	
Zoo 170, 170L, General Zoology, Lab		3,1
Totals	16	15
Second Year		
Chem 341, 342, Organic Chem I, II	3	3
Chem 353, 354, Majors' Org Chem I, II Labs	1	2
Math 228, Intro to Linear Algebra	1	
Math 265, 266, Calcu III, Intro/Diff Eqns	4	3
Phys 251, 252, Univ Physics I, II	5	4
Phys 251L, 252L, Univ Phys I, II Lab	1	1
General Education*		3
Wellness	2	
Totals	17	16
Third Year		
Chem 364, 365, Physical Chem I, II	4	4
Chem 380, Chemistry Junior Seminar		1
Chem 431, 431L, Analytical Chem I, Lab	4,1	
Comm 110, Fund of Public Speaking		3
Biological Science**		3
General Education*	6	3
Totals	15	14
Fourth Year		
Bioc 460, Found/Biochem/Molec Biol I	4	
Chem 491, Chemistry Senior Seminar		2
Biological Science**	3	
General Education*	3	3
Electives	6	8
Totals	16	13
Curriculum Total		122

*General education credits must be selected from approvedcourses and include 18 credits in humanities and social sciences; 6 of these must be in humanities and fine arts and 6 in social/behavioral sciences. Also, 3 credits must be from the global perspectives category and 3 from cultural diversity.
**Must be 300-400-level biological sciences courses. Bioc 461 recommended for a fourth year elective.

Recommended Curriculum 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 course work 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 to enroll in the additional requirements, which include Educ 389, 451, 481, 485, 486, and 487, taken post-baccalaureate.

ACS certification may be earned by taking Chem 471 and 432/432L as additional courses and choosing Bioc 460 instead of 260.

Scholarships starting in the sophomore year are available for students in the chemical education option.

	Credits	
First Year	**F**	**S**
Chem 150, 151, Prin of Chem I, II	3	3
Chem 160, 161, Prin of Chem I, II Labs	1	1
Comm 110, Fund of Public Speaking		3
Engl 110, 120, College Composition I, II	3	3
Math 165, 166, Calculus I, II	4	4
Phys 110, Introductory Astronomy	3	
Univ 189, Skills for Academic Success	1	
Totals	15	14
Second Year		
Chem 341, 342, Organic Chem I, II	3	3
Chem 353, 354, Majors' Org Chem I, II Labs	1	2
Math 228, Intro to Linear Algebra	1	
Math 265, 266, Calcu III, Intro/Diff Eqns	4	3
Phys 251, 252, Univ Physics I, II	5	4
Phys 251L, 252L, Univ Physics I, II Labs	1	1
General Education*		3
Wellness	2	
Totals	17	16
Third Year		
Chem 364, 365, Physical Chem I, II	4	4
Chem 380, Chemistry Junior Seminar		1
Chem 431, 431L, Analytical Chem I, Lab	4,1	
Educ 321, Intro to Teaching		3
Educ 322, Educational Psychology	3	
Educ 381, Early Experience		1
General Education*	3	3
Physics Elective		3
Totals	15	15
Fourth Year		
Chem 260, Elements of Biochem**		4
Chem 425, 429, Inorganic Chem, Lab	4,1	
Chem 491, Chemistry Senior Seminar		2
General Education*	6	3
Physics Elective		3
Electives***	4	3
Totals	15	15
Curriculum Total		122

*General education credits must be selected from approved courses and include 18 credits in humanities and social sciences; 6 of these must be in humanities and fine arts and 6 in social/behavioral sciences. Also, 3 credits must be from the global perspectives category and 3 from cultural diversity.
**Bioc 460, offered fall semesters, may be substituted for Bioc 260.
***A course in earth sciences and in biology may be required for certification in some states. Geol 105/105L and Biol 150/150L are recommended electives.

Clinical Laboratory Science

To become a certified medical technologist or a clinical laboratory scientist a student must complete three years (92 semester credits) of university work, one year of professional training at an accredited school of medical technology, and pass a certifying examination. The clinical laboratory science (CLS) (formerly medical technology) curriculum leading to the Bachelor of Science degree includes both the general education requirements for the University and the minimum entrance requirements for schools of medical technology (16 credits each of biological sciences and chemistry and a course in mathematics). Organic and biochemistry must be included. Microbiology is required; immunology must be included either as a part of microbiology or as a separate course. The content of chemistry and biological science courses must be acceptable toward a major in those fields or in clinical laboratory science, or be certified by the University as generally equivalent. Survey courses qualify as fulfillment of chemistry and biological science prerequisites only under exceptional circumstances and subject to the prior approval of the program director.

During the 12 months of professional training, students register for 30-34 credits. These apply toward the degree, which is granted after satisfactory completion of the professional training. Descriptions of professional courses and registration procedures for the year of professional training are available from the CLS academic director. Grades submitted by the clinical institution for each of the courses taken during the professional training are attached to the student's official university transcript, but they do not enter into the calculations for grade-point average.

North Dakota State University has affiliation agreements with various schools of medical technology. The academic director will provide a list of these schools and information in regard to application procedures upon request.

Criteria for admission to the year of professional training are established by each of the schools of medical technology, and students are not guaranteed admission. Those not admitted to a school of medical technology are advised to discuss alternative majors with the academic director.

Recommended Curriculum Clinical Laboratory Science

	Credits	
First Year	**F**	**S**
Biol 150, 150L, Gen Biology, Lab	3,1	
Chem 121, 122, Gen Chemistry I, II	3	3
Chem 121L, 122L, Gen Chem Lab I, II	1	1
CLS 111, Intro to Clinical Lab Sci	1	
Comm 110, Fund of Public Speaking		3
CSci 147, Microcomp Pkgs		3
Engl 110, 120, College Composition I, II	3	3
Math 103, College Algebra	3	
Univ 189, Skills for Academic Success	1	
Wellness		2
Totals	16	15
Second Year		
Chem 341, 341L, Org Chem I, Lab	3,1	
Chem 342, Organic Chem II		3
Micr 350, 350L, Gen Micro, Lab	3,1	
Micr 363, Clinical Parasitology		2
Micr 435, Hematology		2
Micr 460, 460L, Pathogenic Micro, Lab		3,2
Zoo 120, 120L, Anatomy/Physiology, Lab	4,1	
General Education	3	3
Totals	16	15
Third Year		
Bioc 460, Found of Biochemistry	4	
Micr 470, 471, Immunology, Lab	3,2	
Stat 330, Introductory Statistics		3
Zoo 315, 315L, Genetics, Lab		3,1
General Education	6	6-9
Totals	15	13-16
Fourth Year		
Credits earned at an accredited school of medical technology	15-17	15-17
Curriculum Total		122-126

Computer Science

The Department of Computer Science and Operations Research at North Dakota State University provides course work leading to the following degrees: Bachelor of Arts or Bachelor of Science with a major in computer science or management information systems, Master of Science and Ph.D. in computer science. The B.S. program is nationally accredited by the Computing Sciences Accreditation Board. Minors in computer science and computer science education are also offered. Advisers will provide students with personal attention in drawing up programs tailored to their interests and abilities. For students with no computer experience, introductory courses are offered in the standard curriculum for majors. It is possible for advanced undergraduate students to take graduate courses while completing their undergraduate programs.

Graduates in computer science might choose a job in business, agriculture, industry, teaching, research, or government. Their work might be in any of these areas: systems analysis, management information processing, data base management, software systems, computer operating systems, systems for process control, special automation systems, simulation models, technical support, design and development of new computer systems, or management.

Graduates of the computer science program have recently accepted employment in major national businesses and industries. Many have

chosen positions in North Dakota and adjoining states. With the wide use of microcomputers there is a growing need for computer specialists within North Dakota. In recent years, graduates have been offered attractive starting salaries. Every graduate who has actively sought a job has been offered full-time employment in computer science.

To be prepared to enter the computer science program, a student should have the usual college preparatory courses including at least three years of mathematics. Courses that develop the ability to think logically, to organize, and to analyze are especially important and require a background in mathematics (e.g., algebra, geometry, trigonometry). Experience with a computer is not necessary.

If a student has a background of college-level work or computer experience, the department will evaluate his/her work or experience and arrange for advanced placement.

The computer science 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. All courses in the B.S. program are taught by regular faculty. In the core, students are offered an opportunity to study concepts, applications, and implementation techniques that provide a broad and practical base both for further study and for 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, system simulation, computer communications networks, office automation, software development, combinatorial optimization, systems programming, 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.

Recommended Curriculum Computer Science

	Credits	
First Year	**F**	**S**
CSci 160, 161, Computer Science I, II	4	4
Engl 110, 120, College Composition I, II	3	3
Math 165, 166, Calculus I, II	4	4
Univ 189, Skills for Academic Success	1	
Humanities/Social Science Electives	6	6
Totals	18	17
Second Year		
Comm 110, Fund of Public Speaking		3
CSci 222, Discrete Math	3	
CSci 235, 236, Theory Comp Sci I, II	3	3
CSci 373, 374, Assembl Prog, Comp Org	3	3
Stat 367, 368, Probability Stats	3	3
Lab Science	3,1	3,1
Wellness	2	
Totals	18	16
Third Year		
CSci 366, 372, File/Data Sys, Comp Lang	3	3
CSci 467, Algorith Analysis		3
Computer Science Elective	3	
Humanities/Social Science Elective	3	
Science Electives	3	3
Free Electives	3	6
Totals	15	15
Fourth Year		
CSci 474, Operating Systems	3	
CSci 475, Operating Systems II OR CSci 466, Database Management		3
CSci 489, Social Implications		3
Computer Science Electives	3	3
Free Electives	9	6
Totals	15	15
Curriculum Total		129

Choose electives that satisfy the general requirements for the B.S. or B.A. degree, including the general education requirements (q.v.). There must be a total of 18 credits in computer science courses numbered 300 or higher approved for the major by your adviser. See the document "Requirements for a Bachelor's degree in Computer Science at NDSU" for distribution requirements that must be satisfied in choosing electives. This document is available from the department office, 258 IACC, or on the World Wide Web (http://www.cs.ndsu.nodak.edu).

Geosciences

Geology, hereafter referred to as soils (earth science), and geography are the sciences of the Earth, its environments, peoples, and cultures.

Geography Minor

Geography is the study of places, spaces, and spatial relationships on the Earth. There are two major thrusts in the geography program: (a) gaining an understanding of the geographic perspective, and (b) acquiring skills in the use of spatial analysis tools (such as geographic information systems, computer mapping, and other computer applications). Using the four broad themes in geography (earth-science, culture-environment, locational analysis, and area analysis), courses fit into a wide variety of programs and aid in preparation for both academic and non-academic professional careers.

The geography program does not offer a major. However, a minor is offered, and may be taken in conjunction with a variety of majors such as social science and secondary education. The minor consists of 22 credits in geography selected in consultation with the geography adviser. Students preparing for teaching geography in the secondary schools should follow the School of Education curriculum.

Soils (Earth Science) Major

The soils (earth science) major is an interdisciplinary curriculum in which knowledge from chemistry, physics, mathematics, soil science, and engineering is applied to obtain a better understanding of the Earth's environment. This is an excellent major to follow for a career in the environmental sciences. Completion of an undergraduate degree with a soils (earth science) major leads to a variety of career opportunities in industry, government, teaching, or to continuing studies in graduate research. Typical professional careers are involved with the development, management, or regulation of the Earth's resources. Curriculum requirements include a departmental core of 46 credits, including year-long sequences in calculus, chemistry, and physics, as well as skills courses in technical writing and computer science.

A typical first year for all geology majors includes physical geology, the history of life on Earth, and year-long sequences in English, mathematics, and chemistry.

A minor in geology consists of at least 18 credits of geology, geography, and soil science courses selected in consultation with a minor adviser.

Optional Curricula

Pre-Professional Option: Curriculum emphasis is on preparation for graduate study leading to a profession in geology or related earth sciences.

Geochemistry Option: Curriculum emphasis is on the chemistry of earth materials.

Environmental Option: Curriculum emphasis is on a career in the environmental sciences.

Teaching Option: Curriculum emphasis is on the teaching of earth science. Students preparing for teaching earth science in the secondary schools must follow the School of Education curriculum.

Soils (Earth Science) Core Requirements[1]

Geosciences and Soil Science Courses[2]

	Credits
Geog 161, World Regional Geography	3
Geol 105, 105L, Phys Geology, Lab	4
Geol 106, 106L, Earth Through Time, Lab	4
Geol 350, Invertebrate Paleontology	3
Geol 457, Structural Geology	4
Geol 410, Sedimentology/Stratigraphy	4
Geol 412, Geomorphology	3
Geol 420, 421, Mineralogy, Lab	6
Geol 422, 423, Petrology/Petrography	6
Geol 450, Field Geology[3]	3
Geol 491, Seminar	2
Soil 444, Soil Genesis and Survey	4
Total	46

	Credits
Chemistry Courses	
Chem 121, 121L, General Chem I, Lab OR Chem 150, 160, Prin Chem, Lab	4
Chem 122, 122L, General II, Chem, Lab[4] OR Chem 151, 161, Prin Chem, Lab	4
Total	8
Mathematics Courses	
Math 103, 105, College Algebra, Trig[5]	6
Math 146, 147, Applied Calculus I, II[6] OR Math 165, 166, Calculus I, II	8
Total	8-14
Physics Courses	
Phys 211, 211L, College Physics I, Lab OR Phys 251, 251L, Univ Physics I, Lab[7]	4-6
Phys 212, 212L, College Physics II, Lab OR Phys 252, 252L, Univ Physics II, Lab.	4-5
Total	8-11
Skills Courses	
CSci 122 or 126, BASIC or FORTRAN	3
Engl 320, Practical Writing	3
Total	6
Total Core Requirements	77-86

[1]The departmental requirements for graduation are those in existence at the beginning of the junior year of the major. In addition, all University requirements must be met.

[2]The following courses are strongly recommended: Soil Science 210, 217, Geology 300, 301, 302, 303, 304, 413, 426, 427, 428, and Geography 455.

[3]A fee will be charged to offset travel costs associated with Geology 301, 302, 303, 304, 450, and 496.

[4]This sequence is recommended only for those with high school chemistry, a minimum math ACT score in the 60th percentile, and the intention of taking more chemistry.

[5]Some may have had adequate mathematics preparation in high school. For those who have not, Math 103 (College Algebra) and Math 105 (Trigonometry) are recommended.

[6]Majors planning to enter graduate school should note that Applied Calculus (Math 146 and 147) is not considered adequate preparation in calculus by some programs.

[7]Calculus-based physics is recommended for all students planning to pursue advanced degrees and is required for the geochemistry option.

NOTE: 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.

Mathematics

Mathematics is the language of science and technology. Its explosive development in this century and its history as the oldest and most highly developed discipline make it one of the most exciting and rewarding areas of study.

The use of mathematics and the need for mathematical competence has increased tremendously. Mathematical training is in high demand in such fields as actuarial science, business, economics and commerce, engineering, and statistics, as well as the basic sciences. These disciplines, in turn, feed back new directions to the mathematical community. Trends indicate that students should plan their programs to reflect the increased emphasis on interdisciplinary competency.

Students are able to study theoretical and applied mathematics to prepare for careers or for further schooling while studying with faculty members who have a wide range of interests and expertise. Students may earn academic credit by applying what they have learned in the classroom as they gain on-the-job experience through the Cooperative Education Program. Opportunities also exist for students to work as paper graders and assistants to professors.

The department offers a broad and balanced curriculum of courses. A student may major or minor in mathematics or mathematics education. Students interested in mathematics education should consult with their major adviser and the School of Education for professional education requirements. Special double majors are available with computer science, with physics, and with statistics. While the choice of major need not be made during the freshman year, an early decision allows more flexibility in tailoring programs to individual interests. The department also offers both a master's degree and a Ph.D. program in mathematics.

Recommended Curriculum Mathematics

A total of 42 mathematics credits is required. Requirements are flexible so programs may be tailored to suit student interests, abilities, and plans. The following is only a sample program:

	Credits F	Credits S
First Year		
Comm 110, Fund of Public Speaking		3
CSci 160, 161, Computer Sci I, II	3	3
Engl 110, 120, College Composition I, II	3	3
Math 165, 166, Calculus I, II	4	4
Univ 189, Skills for Academic Success	1	
General Electives[1]	4	3
Totals	15	16
Second Year		
Math 229, Basic Linear Algebra	2	
Math 265, Calculus III	4	
Math 266, Intro to Diff Eqns		3
Math 270, Intro Abstract Math	3	
Math 329, Linear Algebra		3
Phys 251-L, 252-L, Univ Physics I, II, Labs	6	5
Wellness		2
General Electives[1]	3	3
Totals	18	16
Third Year		
Math 340, Geometry	3	
Math 420, Abstract Algebra I	3	3
Math 436, Combinatorics		3
Math or Related Electives[2]	3	3
Humanities, Soc/Behav Sci[1]	6	6
Totals	15	15
Fourth Year		
Math 450, 451, Real Analysis I, II	3	3
Math 488, 489, Numerical Analysis I, II	3	3
Math 491, Senior Seminar	1	
Math or Related Electives[2]	3	3
General Electives[1]	6	6
Totals	16	15
Curriculum Total		126

[1]In choosing electives, a student must satisfy the general education requirements for a B.A. or B.S. degree.

[2]Mathematics electives may be chosen to emphasize pure, applied, computational, or actuarial interests. At least one approved upper-division one-year sequence must be elected and at least one course must be chosen from each of lists A and B. Special double-major options with computer science, statistics, and physics are available.

A: Math 330, 340, 372, 436, 440, 446, 452
B: Math 480, 481, 482, 483, 488, 489, Stat 467

Pre-Actuarial Science Option

Actuarial science is the study of the evaluation and measurement of risk. The actuary science option is a pre-professional program designed to provide the background needed to enter the field. Entrance into the profession is regulated under a system of examinations run by actuarial professional societies. The curriculum of the option is designed to prepare the student to pass several of these examinations. The nature of the actuarial profession requires its practitioners to have a broad knowledge of finance, law, mathematics, management, and statistics. This option leads to a double major in mathematics and statistics with either a minor in economics or additional courses in business. Students selecting this option are requested to visit with the actuarial adviser in the Department of Mathematics early and often to confirm their progress and to inform themselves of changes in the examination curriculum.

Recommended Curriculum Pre-Actuarial Science Option B.S. with Double Major in Mathematics and Statistics

	Credits F	Credits S
First Year		
Comm 110, Fund of Public Speaking		3
CSci 160, 161, Computer Sci I, II	4	4
Engl 110, 120, College Composition I, II	3	3
Math 165, 166, Calculus I, II	4	4
Math 229, Basic Linear Algebra		2
Stat 330, Introductory Statistics	3	
Univ 189, Skills for Academic Success	1	
Totals	15	16
Second Year		
Acct 200, 201, Elem/Accounting I, II	3	3
Econ 201, 202, Micro, Macroeconomics	3	3
Math 265, Calculus III	4	
Math 266, Intro/Differential Equations		3
Math 270, Intro to Abstract Math	3	
Math 329, Linear Algebra		3
Stat 461, Applied Regression Models	3	
Stat 462, Intro/Experimental Design		3
Totals	16	15
Third Year		
CSci 453, Linear Prog/Network Flows	3	
CSci 454, Operations Research		3
Math 450, Real Analysis I	3	
Phys 251, 251L, Univ Physics I, Lab	5,1	
Phys 252, 252L, Univ physics II, Lab		4,1
Stat 467, 468, Prob/Math Stat I, II	3	3
Humanities and Fine Arts*	3	3
Statistics Elective**		3
Totals	18	17

Fourth Year	Credits F	S
Math 376, Actuarial Exam Study		1
Math 451, Real Analysis II OR Math 489, Numerical Analysis II		3
Math 488, Numerical Analysis I	3	
Stat 476, Actuary Exam Study II		1
Business or Economics Electives***	6	3
Social/Behavioral Science Electives*	3	3
Statistics Electives**	3	3
Wellness		2
Totals	15	16
Curriculum Total		128

*University and College of Science and Mathematics general education requirements include three credits each in courses approved for global perspectives and in cultural diversity.
**Statistics electives include any additional 400-level, 3-credit statistics course.
***Business or Economics electives must be taken from Busn 340, 440, 441, 442, 444, Econ 341, 343, or any 400-level Econ course.

Busn or Econ Elective		3
Math Elective		3
Stat Elective	3	
Totals	15	14
Curriculum Total		123

Natural Resources Management

This multidisciplinary program is available through the College of Science and Mathematics departments of botany/biology, geosciences, and zoology. For the program description, refer to the appropriate listing in the College of Agriculture section.

Physics

Students who complete a major in physics are prepared for industrial and governmental research and development; for graduate study in physics, astronomy, engineering, medicine, oceanography, materials science; and for environmental science. In-depth preparation is also provided for teaching in secondary schools. Students may build upon the basic physics program with greater depth in physics or they may choose the engineering physics option.

The basic physics program requirements include a minimum of 40 credits in physics; 22 credits in mathematics; 30 in the languages, social sciences, and the humanities; and six credits of chemistry. For physics depth, students are required to take Physics 251, 251L, 252, 252L, 350, 351, 361, 401, 402, 462, 471, and 485, plus at least two courses selected from Physics 352, 463, 486 or MSUM Phys 340, 360, 380 or 410.

A grade-point average of 2.70 or higher is required in all physics courses. Courses do not count toward the major if the grade is less than a C.

Recommended Curriculum Physics Major

First Year	Credits F	S
Chem 150, 151, Prin Chem I, II	3	3
Chem 160, 161, Prin Chem Lab I, II	1	1
CSci 126, Fortran	3	
Engl 110, 120, College Composition I, II	3	3
Math 165, 166, Calculus I, II	4	4
Phys 251, 251L, Univ Physics I, Lab		5,1
Univ 189, Skills for Academic Success	1	
Wellness	2	
Totals	17	17
Second Year		
Comm 110, Fund of Public Speaking		3
Math 265, Calculus III	4	
Math 266, Intro to Diff Eqns		3
Phys 252, 252L, Univ Physics II, Lab	4,1	
Phys 350, Intro Modern Physics		3
Computer Language	3	3
Electives	3	3
Totals	15	15
Third Year		
Math 488, 489, Num Analysis I, II	3	3
Phys 351, 352, Mechanics I, II	3	3
Phys 361, 402, Electromag, Optical Elec	4	3
Humanities, Soc/Behav Sci	6	7
Totals	16	16
Fourth Year		
Math 480, Diff Equations	3	
Math 483, Partial Diff Equations		3
Phys 401, Fund Prop Solids		3
Phys 462, Heat and Thermal	3	
Phys 471, Advanced Lab		2
Phys 485, 486, Mod Physics I, II	3	3
Electives/ General Education	6	6
Totals	15	17
Curriculum Total		128

Engineering Physics Option

Engineering physicists work in a wide variety of fields: optics, electronics, materials science, reactor engineering, chemical physics, biophysics, medical physics, bio-engineering, radiological science, and even meteorology. The curriculum includes a balanced education in engineering, mathematics, and physics. Research experience is emphasized through student participation in faculty-administered research and a student-initiated research project in the senior year. Research projects may be pursued in engineering, physics, mathematics, or computer science. In addition to a core curriculum of courses in engineering, mathematics, and physics, all students must include 15 semester hours of engineering electives in their studies and a senior design course. These may be in electrical or mechanical engineering, materials science, or another engineering discipline, depending on career goals.

Recommended Curriculum Engineering Physics

First Year	Credits F	S
Chem 121, 121L, General Chem I, Lab	3,1	
Chem 122, 122L, General Chem II, Lab		3,1
Comm 110, Fund of Public Speaking	3	
Engl 110, 120, College Composition I, II	3	3
Math 165, 166, Calculus I, II	4	4
Phys 251, 251L, Univ Physics I, Lab		5,1
Univ 189, Skills for Academic Success	1	
Wellness	2	
Totals	17	17
Second Year		
Math 265, 266, Calc III, Intro/Diff Eqns	4	3
ME 211, Intro Engr Methods	3	
ME 221, 222, Engr Mechanics I, II	3	3
Phys 252, 252L, Univ Physics II, Lab	4,1	
Phys 350, Mod Physics		3
Humanities, Soc/Behav Sci		6
Totals	15	15
Third Year		
ECE 301, 302, Elect Engr I, Lab	3,2	
Math 452, Complex Anal	3	
Math 480, Appl Diff Eq		3
Math 488, 489, Num Analysis I, II	3	3
Phys 351, 402, Mech I, Optic Electron	3	3
Phys 401, Fund Prop Solids		3
Phys 485, Mod Physics I	3	
Humanities, Soc/Behav Sci		3
Totals	17	15
Fourth Year		
ECE 351, Appli Electromag	4	
ECE 457, Opt Sig Trans		3
IME 440, Engr Econ		2
Phys 462, Heat and Thermodyn	3	
Phys 494, Indiv Study	2	2
Phys 471, Adv Lab	2	
Electives	6	6
Humanities, Soc/Behav Sci		3
Totals	17	16
Curriculum Total		129

Polymers and Coatings

The Department of Polymers and Coatings is internationally known for the excellence of its educational and research programs. Close ties with industry and government agencies are maintained to assure that teaching and research programs remain in step with the rapidly changing science and technology of the area.

Knowledge of polymers is a desirable foundation for a career as a professional chemist in industry. More than 80 percent of the industrial chemists work with polymers, and many physicists and engineers also work on polymer-related projects.

Within the broad area of polymers, the department puts special emphasis on coatings. Coatings are encountered so often in everyday life they may be taken for granted. Paint on walls, coatings on the outside of automobiles, aircrafts or space shuttles, liners for the interior of beverage cans, coatings to protect bridges from corrosion, coatings on magnetic tapes and computer chips, and body implants are only a few selected examples. Closely related fields are adhesives, printing inks, plastics, and biotechnology. Since only five other universities in the U.S. offer programs in coatings, employment opportunities far exceed the number of graduates.

To encourage students to study in the field, companies and organizations fund undergraduate scholarships of up to $2,250 a year. Entering freshmen and transfer students apply for these scholarships through the Office of Admission. Undergraduates already enrolled at NDSU apply to the department chair.

The Department of Polymers and Coatings does not offer an undergraduate major.

Undergraduates interested in polymers and coatings are encouraged to major in chemistry or mechanical engineering (ME). Refer to the polymers and coatings option in chemistry or the P&C option in mechanical engineering. Individual programs for majors in other disciplines have been worked out.

The polymers and coatings option provides excellent preparation for professional employment at the B.S. level and for graduate school. Students are strongly advised to plan their programs so that the entire coatings course (P&C 474, 475) and laboratory sequence (P&C 484, 485 for chemistry majors) (P&C 484 for ME majors) can be taken during the same academic year. Chemistry majors with the polymers and coatings option are also required to take polymer synthesis (P&C 473) and chemistry and chemical industries (P&C 472) prior to graduation.

Polymers and Coatings offers a major at the graduate level for programs leading to the M.S. degree in Polymers and Coatings Science and M.S. and Ph.D. degrees in Chemistry.

Psychology

Psychology is concerned with behavior, both of human beings and other living organisms. In studying behavior, psychologists rely heavily upon the methods of science. Some areas of psychology are most closely related to the natural and biological sciences while other areas within psychology are more closely related to the social sciences, especially sociology, anthropology, and communication. Both an undergraduate major and an undergraduate minor in psychology are available. Psychology majors may select the degree program that best suits their needs and interests from the B.A. and B.S. tracks outlined in this section.

Psychology Major

All majors must complete 30 credits in psychology as listed in the outline for the B.S. degree. Additional courses in psychology may be selected, in consultation with the adviser, from any of those listed under the department's offerings. Courses in the major field may not be taken on a pass/fail basis (except Psyc 494 and 496, which may be graded on a satisfactory/ unsatisfactory basis by the instructor).

Career Orientation Overlays

An undergraduate education in psychology leads to a number of career choices following graduation. To assist students in preparing for post-graduate work and careers in psychology or related fields, the department has prepared several Career Orientation OverLays (COOLs). COOLs establish curriculum guidelines and suggestions for students who may be interested in a variety of careers, including medicine and neurosciences, business and industry, graduate school in psychology, or mental health and applied psychology. COOLs, when used in conjunction with the counsel of an adviser, are intended to help a student select the best courses within and outside of psychology (e.g., biology for medicine or business for industrial psychology) to suit particular interests and career goals.

B.S. with a Major in Psychology

A total of 122 credits is required for a major in psychology leading toward a B.S. degree. The following requirements must be fulfilled:

First-Year Experience: 1 credit (Univ 189, Skills for Academic Success)

A. Communication: 9 credits (must include Engl 110, 120, and Comm 110)

B. Quantitative Reasoning: 6 credits (must include Math 104 or 146 or higher and Stat 330 or 368).

C. Science and Technology: 10 credits from courses in natural sciences, physical sciences, or technology. A minimum of 4 credits must be in natural and physical sciences. Courses in this category must include Computer Science 147 and a 1-credit lab course.

D. Social and Behavioral Sciences & Humanities and Fine Arts:
18 credits which must include:
1. Social and Behavioral Science (not psychology): 6 credits
2. Humanities and Fine Arts: 6 credits

E. Wellness: 2 credits

F. Supporting Track: Each student, in consultation with his or her adviser, must select one of the following tracks. Requirements are in addition to those specified in A-E.
1. Natural science track: 14 additional credits in mathematics, computer science, statistics, and/or science.
2. Social science track: 14 additional credits in social science (other than psychology)
3. A minor in an approved area of study.

G. Psychology: 30 credits as follows:

Required:	**Credits**
Psyc 111, Introduction to Psychology	3
Psyc 350, Research Methods I	3
Psyc 351, Research Methods II	3
Area 1: At least one from the following:	
Psyc 453, Organizational Psychology	3
Psyc 468, Personality	3
Psyc 470, Experimental Social Psyc	3
Area 2: At least one from the following:	
Psyc 460, Sensation & Perception	3
Psyc 465, Psychobiology	3
Psyc 486, Neuropsychology	3
Area 3: At least one from the following:	
Psyc 461, Memory & Cognition	3
Psyc 463, Exp Developmental Psyc	3
Psyc 499, Attention and Thinking	3
Area 4: Capstone Experience	
Psyc 480, History and Systems	3
Psyc 489, Honors Thesis	2-6
Electives:	
Psyc, 400-level courses*	6
Psyc, free choice on course level	6

*Three credits may be from any combination of Psyc 489, 494, or 496, but may not be taken pass/fail.

H. Cultural Diversity: 3 credits (may also be counted in Category D)

I. Global Perspectives: 3 credits (may also be counted in Categories C and D)

J. Electives: To total 122 credits

K. At least 37 credits must be obtained in 300- 400-level courses.

B.A. with Major in Psychology

Requirements for the Bachelor of Arts degree are the same as the Bachelor of Science degree except as follows:

The supporting track (F) is replaced by a foreign language requirement: completion of second-year college level in a single language, or equivalent as defined by the Department of Modern Languages.

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. Several sets of courses are available as suggested minor curricula. These groups of courses are designed to be 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.

Students selecting a minor in psychology must complete computer science (CSci 147, or equivalent) and 18 credits in psychology (excluding Psyc 494 or 496). These 18 semester credits must include Psyc 111 (Introduction to Psychology) and at least one additional 300- or 400-level course, and may not be taken pass/fail.

Recommended Curriculum B.S. with Psychology Major

	Credits	
First Year	**F**	**S**
Anth 111, Intro Anthropology	3	
Biol 126, Human Biology	3	
Chem 117, 117L, Chem Concepts & Appli, Lab		3,1
CSci 146, Busn Use of Computers OR CSci 147, Microcomputer Pkgs		3
Engl 110, 120, College Composition I, II	3	3
Math 103, College Algebra OR Math 104, Finite Math	3	
Psyc 111, Intro Psyc	3	
Soc 110, Intro Sociology		3
Univ 189, Skills for Academic Success	1	
Psychology 200-level Elective	__	3
Totals	16	16
Second Year		
Comm 110, Fund of Public Speaking	3	
Psyc 350, Research Meth I		3
Stat 330, Statistics		3
Humanities Elective	3	
Psychology 200-level Electives	6	3
Social Science Electives	3	6
Wellness	__	2
Totals	15	17

Third Year	Credits F	Credits S
Psyc 351, Research Meth II	3	
Psychology Required Course		3
Psychology 200-300-Level Elect	3	
Psychology 400-Level Elective		3
Supporting track or minor	6	6
Electives	3	3
Totals	15	15
Fourth Year		
Psychology Required Course	3	3
Psychology 400-Level Elective	3	
Capstone Experience		3
Supporting Track or Minor	3	3
Electives	6	6
Totals	15	15
Curriculum Total	124	

This curriculum is a recommended model. The particular sequence of courses a student chooses will depend upon his or her interests. In choosing electives, a student must satisfy the general requirements for a B.A. or B.S. degree.

Respiratory Care

The baccalaureate degree respiratory care (RC) program includes three years of academic course work at NDSU and a full year (12 months) of clinical training in the Cardiopulmonary Services department at MeritCare Medical Center, Fargo, N.D. Academic course work includes chemistry, computer science, mathematics, microbiology, physics, and anatomy and physiology. Students who have completed the prerequisite courses at NDSU are eligible to apply for one of 12 clinical positions each year. The clinical training or internship at MeritCare consists of lecture, laboratory, and clinical instruction, which prepares the student to enter the RC profession. Admission into the internship is competitive. Specialty training within RC occurs at the end of the internship year and may focus on neonatal/pediatrics, intensive care, home care, diagnostics, education, or management.

Recommended Curriculum Respiratory Care

First Year	Credits F	Credits S
Biol 150, 150L, Gen Biology, Lab	3,1	
Biol 202, 202L, Intro Micro, Lab		2,1
Chem 121, 121L, Gen Chem I, Lab	3,1	
Chem 122, 122L, Gen Chem II, Lab		3,1
Engl 110, 120, College Composition I, II	3	3
Math 103, College Algebra	3	
RC 111, Intro to RC	1	
Soc 110, Intro Sociology		3
Univ 189, Skills for Academic Success	1	
Wellness		2
Totals	16	15
Second Year		
Chem 241, Survey Organic Chem	3	
Chem 260, Fund Biochem		4
CSci 147, Microcomp Pkgs		3
HPER 210, First Aid and CPR	2	
Phys 120, Fund of Physics		3
Psyc 111, Intro Psyc	3	
Stat 330, Intro Statistics		3
Zoo 120, 120L, Hum Anat & Physiol, Lab	4,1	
General Education Requirements	3	3
Totals	16	16
Third Year		
RC 496, Internship	16	
RC 496, Internship		16
Summer Session		
RC 496, Internship	8	
Fourth Year		
Comm 110, Fund of Public Speaking	3	
RC 494, Individual Study		4
Special Electives*	6	6
General Education Requirements	3	3
Totals	12	13
Curriculum Total	128	

*Each student will develop a specialty proposal in his/her own area of primary interest. Each specialty will consist of RC 494 (Individual Study) totaling 4 credits and a minimum of 12 additional academic credits at the 300-400 level or higher. A list of approved specialty elective courses is available from the RC adviser. The development of the specialty will be initiated in the latter part of the internship year and presented prior to the completion of the internship to the Respiratory Care Consortial Committee for approval. Once approved, any changes must occur by petition to the Consortial Committee.

Statistics

Statistics involve the analysis of numerical data. This ranges from the calculation of simple statistics to the mathematical theory behind very sophisticated statistical procedures. Statistical tools are used by professionals in areas such as agriculture, pharmacy, business, human development, and the social sciences.

The Department of Statistics offers a major leading to a B.S., 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 Major

The statistics major requirements include at least 24 credits in statistics. These requirements include the following:

Requirements:	Credits
Stat 367, Probability	3
Stat 368, Statistics	3
Stat 461, Applied Regression Models	3
Stat 462, Intro Experimental Design	3
Stat 491, Capstone Seminar	1
Five courses from the following:	
CSci 161, Computer Science II OR CSci 228, Computing Fund II OR CSci 418, Simulation Models	3-4
Math 329, Linear Algebra	3
Stat 450, Stochastic Processes	3
Stat 451, Bayesian Stat Dec Theory	3
Stat 460, Applied Survey Sampling	3
Stat 463, Nonparametric Statistics	3
Stat 464, Discrete Data Analysis	3
Stat 467, Probability/Math Stats I	3
Stat 468, Probability/Math Stats II	3
Additional requirements:	
CSci 126, Fortran OR CSci 160, Computer Science I OR CSci 227, Computing Fund I	2-4
CSci 222, Discrete Math OR Math 270, Intro Abstract Math	3
Math 165, Calculus I	4
Math 166, Calculus II	4
Math 265, Calculus III	4

Minor in one of the following: Social science, physical science, biological science, business, mathematics, or computer science (approved by faculty member in that discipline).

Recommended Curriculum Statistics Major

First Year	Credits F	Credits S
Comm 110, Fund of Public Speaking	3	
CSci 126, Fortran OR CSci 160, Computer Science I OR CSci 227, Computing Fund I		3-4
Engl 110, 120, College Composition I, II	3	3
Math 165, 166, Calculus I, II	4	4
Univ 189, Skills for Academic Success	1	
Wellness		2
Electives*	6	3
Totals	17	15-16
Second Year		
Math 265, Calculus III	4	
Stat 367, Probability	3	
Stat 368, Statistics		3
Electives*	9	12
Totals	16	15
Third Year		
Math 270, Intro Abstract Math OR CSci 222, Discrete Math	3	
Stat 461, Applied Regression Models	3	
Stat 462, Intro Experimental Design		3
Electives*	6	9
Stat Electives	3	3
Totals	15	15
Fourth Year		
Stat 491, Capstone Seminar		1
Electives*	9	10
Stat Elective(s)	6	3
Totals	15	14
Curriculum Total	122-123	

*Electives must be used to satisfy the general education requirements including humanities, social/behavioral sciences, science and mathematics (other than major), and a laboratory course.

Pre-Actuarial Science Option

Actuarial science is the study of the evaluation and measurement of risk. The actuary science option is a pre-professional program designed to provide the background needed to enter the field. Students completing this program will graduate with a double major in mathematics and statistics. Further details, including a recommended curriculum, are listed in the Mathematics section.

Statistics Minors

Two different minors in statistics are offered.

Applied Statistics (Track 1): This minor consists of 17 credits in statistics including Stat 330, 331, and four approved 400-level, three-credit Stat courses.

Statistics (Track 2): Requirements for this minor are Stat 331 or 461, 367, 368, 462, and one other approved 400-level, three-credit Stat course. A Department of Statistics (Waldron 201) adviser for minors must approve the program.

Zoology

Zoology is a diverse field with specialties in the study of cells (cytology, molecular biology, genetics), the study of organisms (anatomy, physiology, mammalogy, ornithology, etc.), and the study of populations and their relation to each other and to their environment (ethology, ecology). Specialized training in professional or graduate schools is required for most of these areas, but the student starts with a major in zoology. Acceptance for advanced training is competitive. Thus, it is important for students to consult frequently with their advisers regarding the proper options and courses related to their special interests. In addition, students should correspond early with professional or graduate schools to make sure they satisfy specific requirements.

Zoology Major

Minimum requirements for the zoology major include 42 credits of biological sciences, of which 14 are "core" credits in zoology and biology. An additional 21 to 26 credits fulfill one of three options including courses in chemistry, physics, mathematics, and statistics. The 42 credits for the major are completed with elective zoology courses. College and University general education requirements constitute the remainder of the curriculum.

Zoology major "core" course requirements include the following:
Biol 150-150L, general biology
Zoo 170-170L, general zoology
Zoo 315-315L, genetics
Zoo 491, seminar

Students may pursue their personal and career interests through one of the following options in zoology.

Option 1: General Zoology: This option includes more elective choices than the other options and is designed for students who wish to pursue an area not represented in the other two options.

Option 2: Physiology, Cell Biology, or Health Sciences: This option is designed for students who are interested in physiology or cell and molecular biology or who plan to enter medical, dental, or optometry school.

Option 3: Fisheries, Wildlife, Ecology, and Behavior: This option is designed for students who are interested in fisheries management, ecology, conservation, natural resource management, or behavior.

Option requirements include one or more courses from each concept category as indicated in the table. (Contact the department for more specific information.)

A grade-point average of 2.0 is required for courses taken to fulfill the 42 credits in the major. A maximum of two credits of Independent Study (494) and/or Field Experience (496) and a maximum of two credits in Seminar (491) may apply to the 42 credits required for the major. All credits taken may apply toward those required for graduation.

Zoology Minor

Requirements for a minor in zoology include Biol 150/150L, Zoo 170/170L, 315/315L, and electives to total 18 credit hours. Electives must be approved by the chair of the Department of Zoology.

Sample curricula for the options in zoology are presented to illustrate a typical sequence in which zoology core courses and supporting courses in other areas may be planned. These sequences are meant only to be a guide; other models or pathways are certainly possible.

Sample Curriculum Option 1: General Zoology

	Credits F	S
First Year		
Biol 150, 150L, Gen Biology, Lab	3,1	
Chem 121, 121L, Gen Chemistry I, Lab	3,1	
Chem 122, 122L, Gen Chemistry II, Lab		3,1
Comm 110, Fund of Public Speaking		3
Engl 110, 120, College Composition I, II	3	3
Math 146, Applied Calculus I	4	
Univ 189, Skills for Academic Success	1	
Zoo 170, 170L, Gen Zoology, Lab		3,1
Wellness		2
Totals	16	16
Second Year		
Biol 364, Gen Ecology OR Zoo 360, Animal Behavior		3
Bot 170, Plant Form and Diversity		4
Chem 341, 341L, Organic Chem I, Lab	3,1	
Stat 330, Intro Statistics		3
Zoo 315, 315L, Genetics, Lab	4	
Zoo 280, Comp Chor Morph OR Zoo 480, Comp Chor Embryo		3-4
General Education Requirements	7	3
Totals	15	16-17
Third Year		
Phys 120, Fund of Physics	3	
Zoo 370, Cell Biol OR Zoo 380, Vert Histology	3	or 3
Zoo 450, Invertebrate Zoology		3
Zoo 460, An Phys OR Zoo 462, Phys Ecology	4	or 3
Zoology Electives	3-4	3-4
Electives	3-8	3-6
Totals	13-15	15-16
Fourth Year		
Zoo 491, Seminar	1	or 1
Biodiversity Elective	3	or 3
Zoology Electives	3-4	3-4
Electives	8-12	8-12
Totals	15	15
Curriculum Total	122	

Concept Categories	Option 1	Option 2	Option 3
Biodiversity (Zoo 450, 452, 454, 456, 458)	x	x	x
Cell biology (Micr 350-350L; Zoo 370, 380)	x	x	
Ecology/behavior (Biol 364; Zoo 360, 470)	x	x	x
Management (Zoo 472, 474, 476)			x
Morphology (Zoo 280, 480)	x	x	x
Physiology (Zoo 460, 462, 464)	x	x	x

Recommended Curriculum Option 2: Physiology, Cell Biology, and Pre-Professional

This option is designed to meet the requirements for most professional schools (medical, dental, optometric, chiropractic, and osteopathic) and graduate programs in physiology and cell biology. The emphasis is on additional course work in cell biology, physiology, chemistry, and physics. For clinical laboratory science and respiratory care, see individual programs in this bulletin.

	Credits F	S
First Year		
Biol 150, 150L, Gen Biology, Lab	3,1	
Chem 121, 121L, Gen Chemistry I, Lab	3,1	
Chem 122, 122L, Gen Chemistry II, Lab		3,1
Comm 110, Fund of Public Speaking		3
Engl 110, 120, College Composition I, II	3	3
Math 146, Applied Calculus I	4	
Univ 189, Skills for Academic Success	1	
Zoo 170, 170L, Gen Zoology		3,1
Wellness		2
Totals	16	16
Second Year		
Biol 364, Gen Ecology OR Zoo 360, An Behavior		3
Chem 341, 341L, Organic Chem I, Lab	3,1	
Chem 342, 342L, Organic Chem II, Lab		3,1
Stat 330, Intro Statistics		3
Zoo 280, Comp Chor Morph		4
Zoo 315, 315L, Genetics, Lab	3,1	
General Education Requirements	7	2-3
Totals	15	16-17
Third Year		
Bioc 460, Found Biochem and Mol Biol I	4	
Phys 211, 211L, College Physics I, Lab	3,1	
Phys 212, 212L, College Physics II, Lab		3,1
Zoo 370, Cell Biology		3
Zoo 460, Animal Physiology	4	
General Education Requirements		9
Zoology Elective	3-4	
Totals	15-16	16
Fourth Year		
Zoo 462, Physiol Ecology OR Zoo 464, Endocrinology	3	or 3
Zoo 491, Seminar	1	or 1
Biodiversity Elective	3	or 3
Cell Biology Elective	3-4	
Zoology Elective		3-4
Electives	6-12	6-12
Totals	14	14
Curriculum Total	122-123	

Recommended Curriculum Option 3: Fisheries, Wildlife, Ecology, and Behavior

Courses focused on invertebrates, fish, amphibians, reptiles, birds, mammals, ecology, management, animal behavior, and population dynamics are added to the "core" courses. In addition, a course in physiology and a course in morphology are required. These studies prepare the student for research or management positions with federal, state, or other agencies such as the U.S. Fish and Wildlife Service, State Game and Fish Departments, State Conservation Departments, U.S. and State Forest Services, U.S. Bureau of Land Management, U.S. Soil Conservation Service, and the Environmental Protection Agency, as well as national and state parks.

A wildlife or fisheries biologist participates in a wide range of activities including natural history, systematics, aquatic and terrestrial ecology, population dynamics, management techniques, pollution biology, and public relations. Some positions require advanced training at the master's (M.S.) or doctoral (Ph.D.) level. In addition to the curriculum suggested, at least one summer or semester of field experience is recommended. Field experience may be gained either at a biological field station or through employment approved by the adviser.

	Credits	
First Year	**F**	**S**
Biol 150, 150L, Gen Biology, Lab	3,1	
Chem 121, 121L, Gen Chemistry I, Lab	3,1	
Chem 122, 122L, Gen Chemistry II, Lab		3,1
Comm 110, Fund of Public Speaking		3
Engl 110, 120, College Composition I, II	3	3
Math 146, Applied Calculus I	4	
Univ 189, Skills for Success	1	
Zoo 170, 170L, Gen Zoology, Lab		3,1
Wellness	__	2
Totals	16	16
Second Year		
Biol 364, Gen Ecology		3
Bot 170, Plant Form and Diversity		4
Chem 240, Survey Organic Chem		3
CSci 147, Microcomputer Packages	3	or 3
Stat 330, Intro Statistics	3	
Zoo 280, Comp Chor Morph		4
Zoo 315, 315L, Genetics, Lab	4	
General Education Requirements	4-7	0-3
Totals	14-17	14-17
Third Year		
Bot 314, Systemic Botany*		3
Phys 120, Fund of Physics	3	
Zoo 462, Phys Ecology		3
Biodiversity Elective	3	or 3
General Education Requirements	6-12	3-12
Management Elective	3	or 3
Totals	15	15
Fourth Year		
Zoo 491, Seminar	1	or 1
Biodiversity Elective	3	or 3
Botany Elective*	3	or 3
Ecology/Behavior Elective	3	or 3
Management Elective	3	or 3
Zoology Elective	3-4	or 3-4
Electives	0-15	0-15
Totals	15	16
Curriculum Total		122

*Strongly recommended, but not required.

College of University Studies

Morrill 112 (701) 231-7014
William D. Slanger, Interim Dean

Programs in the College of University Studies are designed for students with general needs or unique goals. These programs involve general studies for the deciding students or the Bachelor of University Studies degree (a tailored degree program) for students with distinctive educational goals.

General Studies

The general studies program is designed to serve new students who wish to enter college but are unsure about their plans for the future. Special attention is given to selecting the best advisers, giving students a chance to explore a variety of fields, and acquainting them with people who are familiar with post-graduation opportunities.

Students in general studies may elect any pattern of courses for which they have satisfactory preparation. They may carry as little as one course (usually three hours of class a week), a full load of four or five courses, or, on rare occasions, as many as six or seven courses.

Transfer to other colleges on campus from this program or into this program is possible at any time. Most students elect to pursue a major in one of the other academic units at NDSU by the end of their third semester.

Bachelor of University Studies Degree

Students with no fewer than 15 semester credits remaining to be registered and wishing to tailor their own degree may do so by proposing a plan of study. Upon approval, this plan of study leads to a Bachelor of University Studies degree.

Students seeking the Bachelor of University Studies degree usually begin by visiting the director's office and talking with an adviser about their long-range hopes and aspirations. Together, they select an adviser whose professional skills and interests most closely coincide with those of the student. The adviser is a faculty member who will work with the student in preparing a statement of goals, a summary of previous education and experience, and a plan of study for the degree. After both have signed the proposal, it is forwarded to the Academic Policies/ Program Review committee of the College of University Studies for approval. If the program is approved by the committee, it becomes a set of requirements for graduation. Each program must meet the general education requirements and the graduation requirements of the University.

Experiential Learning Credit

Students may gain credit for university-level experiential learning depending on how their experience relates to their educational objectives and the pattern of formal education they plan to pursue. Students requesting credit for university-level experience must prepare summaries of their learning, including time periods, job descriptions, responsibilities, on-the-job training, verification of employment, and any other pertinent information. Credit may be requested for any type of experience provided the experience leads to university-level learning. Ultimately, students must be prepared to demonstrate increased knowledge, problem-solving ability, ability to understand people, or some other significant personal growth as the result of their experience.

Degree Plan Proposal

The degree plan must be submitted to the Academic Policies/Program Review committee through the Office of the Director of University Studies at least two weeks before midterm (seventh week) of the semester prior to the beginning of the last semester of study. No fewer than 15 credits must be proposed (remain to be taken after approval) and included in the proposal. Students who submit proposals after the due-date will not be considered for graduation the following semester. Students are encouraged to submit their proposals during the junior year with approximately 30 credits proposed.

A program must include the following: at least one semester (15 credits) of study to be completed after approval; a total of no fewer than 122 credits (including credit for military experience, previous college work, work experience, etc.); 37 credits of junior- and senior-level courses (300-400 level); a cumulative grade-point average of 2.00 based on all work completed at North Dakota State University; 60 credits from a four-year institution; and the residency requirement (36 credits must be completed at North Dakota State University). In addition, each program must fulfill the General Education requirements including the Capstone Experience, Cultural Diversity, and Global Perspectives categories and have as a minimum the following:

Requirements	Credits
First-Year Experience	1
Communication	9
Comm 110, Fund of Public Speaking	(3)
English 110, 120, College Composition I, II	(6)
Quantitative Reasoning	3
Math 104, Finite Math OR	
CSci Programming, e.g., BASIC OR	
Stat 330, Intro Statistics	
Science and Technology	10
A laboratory course is included in this requirement.	
Humanities and Fine Arts	6
Social and Behavioral Sciences	6
Wellness	2
Total	37

Approval of a student's proposal means that everybody involved believes that the approved plan is the best educational program available to that student and that it is a baccalaureate-level program.

It is the policy of the College of University Studies that students seeking a B.U.S. degree will, following approval of the B.U.S. proposal, 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 proposals of students who lack progress will no longer be considered valid for graduation with a B.U.S. degree. If these students choose to continue to seek a B.U.S. degree, it will be necessary to submit a new proposal for consideration by the committee.

In addition to the College of University Studies continual progress policy, NDSU requires that any student who discontinues enrollment for more than one year is subject to completing the General Education requirements in effect at the time of re-entry. B.U.S. proposals are subject to the NDSU baccalaureate degree requirements.

For further information, contact the following:
Carolyn A. Schnell, Director
College of University Studies
112 Morrill Hall
North Dakota State University
Fargo, ND 58105
Telephone: (701) 231-7014

Graduate School

Old Main 201 (701) 231-7033
William D. Slanger, Interim Dean

The Graduate School presents advanced programs leading to the Master of Science, Master of Arts, Master of Business Administration, Master of Education, and Doctor of Philosophy degrees. Master of Science, Master of Education, and Educational Specialist degrees for school administrators are available with course work through the Tri-College University. Graduate degrees offered and subject matter fields are listed at the end of this section. For more complete details, see the Graduate Bulletin.

The Graduate School offers to superior students the opportunity to develop more fully their capabilities in given areas. Graduate study is particularly recommended for those students whose interests and aptitudes carry them beyond routine application. Graduate students are encouraged to develop powers of independent thought and to become familiar with the conduct of research.

The Graduate School extends and enlarges the work of the undergraduate programs and supports specialized training, research, and scholarly expression.

The graduate program is administered by the dean of the Graduate School assisted by a Graduate Council composed of six elected and six appointed faculty members and two appointed graduate students.

Admission to Graduate Study

Every applicant must complete an application form, as well as a Reasons for Graduate Study Statement, and return it to the Graduate School. Arrangements must be made for official transcripts of all previous course work to be sent to the Graduate School. Application and personal reference report forms may be obtained from the Graduate School or from the departments offering graduate programs. Some departments require Graduate Record Examination (GRE) scores. Education and Counseling and Guidance require scores on the Miller Analogies Test (MAT) or the Graduate Record Examination (GRE). Applications to the Master of Business Administration program must include Graduate Management Admission Test (GMAT) scores.

Processing time requires that international student applications must be received by the Graduate School prior to April 1 for Fall Semester and prior to August 1 for Spring Semester.

Admission to the Graduate School is open to qualified graduates of universities and colleges of recognized standing without regard to age, race, color, gender, sexual orientation, religion, national origin, disability, or Vietnam-era veteran status. Admission to the Graduate School is a selective process intended to identify applicants who are outstanding among recipients of baccalaureate degrees.

The following minimum qualifications are required of all students seeking an advanced degree:

1. The applicant must have a baccalaureate degree from an educational institution of recognized standing. Under special circumstances, NDSU students who have fewer than 10 semester credits to complete for the baccalaureate degree are permitted to apply to the Graduate School.
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. The applicant at the baccalaureate level must have earned a cumulative grade-point average in all courses of at least 3.0, or equivalent, to attain full standing in a graduate degree program. Students with a previous graduate degree for which the GPA was at least 3.0 or equivalent may be admitted in full standing.
4. Each department or program may set higher qualifications and may require the submission of additional evidence of academic performance.

A student is permitted to register in the Graduate School only after formal admission. Departments or programs make recommendations on all applications, but the final admission decision is the responsibility of the dean of the Graduate School.

Registration Procedure

For first-time registration, consult with the department chair or designee or your major adviser and complete the necessary forms for on-site registration. Thereafter, consult with an adviser in advance of registration to plan courses to meet degree requirements.

Complete the registration process, including clearing with the Registrar's Office and the Business Office.

Fees for Graduate Students

Fees are listed in the section entitled Financial Information.

General Requirements for Master's Degrees

Minimum requirements for all master's degrees include the following.

Master's Degree: Supervisory Committee

The student, with the approval of the department/program chair, will select a major adviser. The major adviser-student relationship must be mutually acceptable. The major adviser will act as the chair of the student's supervisory committee and will be in charge of the plan of study. In addition to the major adviser, two additional members must be agreed upon by the adviser and student. One of these members must be from the faculty. The other member may be either a faculty member or a qualified off-campus expert in the field, depending upon the department. A fourth committee member is a Graduate School appointee.

The student and major adviser in consultation with all other supervisory committee members will develop a tentative Plan of Study, consisting of not fewer than 30 graduate semester credits. The plan of study must bear the signatures of the supervisory committee and be approved by the chair of the major department, the academic dean, and the graduate dean before it is official. It may be revised as advisable and necessary but must be filed with the Graduate School not later than the term immediately after the supervisory committee is formed. Revisions may be made later, but must be approved by the student, all supervisory committee members, the chair of the student's department (when required), and the graduate dean.

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's graduate program.

Number of Credit Hours

Candidates for the master's degree are required to earn a minimum total of 30 credits in appropriate and approved 600- and 700-level courses.

Residence Requirement

No degree is given without at least one full year of academic work in residence. The residence requirement may be met by residence at the institution for two full semesters on a full-time basis. Part-time students earn residence in proportion to the number of credits earned.

Transfer of Credit
All graduate credits used to meet the requirements of a master's degree must be approved by the supervisory committee, the department/program chair, the academic dean, and the dean of the Graduate School. A candidate for the master's degree must petition in order to transfer up to a maximum of eight (8) (Thesis Option) or nine (9) (Comprehensive Study Option) semester hours of graduate credit from another institution to satisfy course requirements on the plan of study.

Note: Educational Leadership Program course requirements taken through the Tri-College are not considered transfer credits, and may be included on plans of study without petition. All other graduate credits earned through the Tri-College University are considered transfer credits.

Time Limitation
All requirements for the master's degree must be completed within a period of seven (7) consecutive years. Graduate credit for any course work that is more than seven calendar years old at the time of the final examination may not be used to satisfy degree requirements.

Final Examination
The candidate shall pass a final examination 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. Committee member substitutions must be approved by the graduate dean.

The final examination shall cover course work taken by the candidate, the thesis or paper, and knowledge fundamental thereto. The candidate shall prepare for each member of the committee a written statement describing the plan of study, i.e., courses and their respective instructors, credits, grades, and dates taken. The final examination shall be held before commencement.

Master of Science Requirements
The Master of Science (M.S.) degree is offered in two options: Thesis Option (available in all departments) or Comprehensive Study Option (not available in all departments). The Thesis Option emphasis is on research and ability to analyze data and to prepare a scholarly thesis, whereas the Comprehensive Study Option emphasis is on a broader understanding of a major area.

In those departments offering both options, the choice should be made jointly by the student and the major adviser, based upon the nature of the responsibilities for which the student is preparing.

Under the guidance of the major adviser, each candidate shall prepare a thesis or paper to be approved by the chair of the major department, all members of the supervisory committee, and the dean of the Graduate School. The thesis contributes no fewer than six (6) and no more than ten (10) credits toward the minimum 30 required credits. The paper contributes no fewer than two (2) and no more than four (4) credits toward the minimum 30 required credits. The thesis or paper bearing the approval of the major adviser shall be in the hands of the examining committee seven days before the oral examination. The candidate shall consult the major adviser regarding the form in which the thesis or paper is to be presented. Guidelines for thesis or paper preparation are available in the lower level of the Varsity Mart.

After the final examination, the student incorporates into the thesis or paper corrections suggested at the oral examination. The thesis or paper is then presented to the Graduate School for editing and format checking by a disquisition editor. Five final copies of the thesis or paper, bearing the approval of the major adviser, other supervisory committee members, and the department chair, are to be presented, unbound, to the Office of Graduate Studies along with a receipt from the Business Office for binding fees. Two bound copies of the thesis or paper go the University Library. The remaining three bound copies are for the student, the student's adviser, and student's department.

Master of Arts Requirements
Candidates for the Master of Arts (M.A.) degree will meet the preceding general requirements and those specific requirements in the humanities and social and behavioral sciences departments that offer the M.A. degree. These normally include two years of a foreign language.

Master of Business Administration
The Master of Business Administration (M.B.A.) degree is a non-disquisition, professional degree program structured to serve qualified students with any undergraduate degree.

Master of Education Requirements
The Master of Education (M.Ed.) degree is a non-disquisition, practitioner-oriented degree for teachers and school counselors. Candidates for this degree will meet the preceding general requirements, as well as specific requirements established by the School of Education.

Master of Science Master of Education, Educational Specialist in Leadership Requirements
Candidates for the Master of Science, Master of Education, and Education Specialist in Educational Leadership degrees will meet the requirements established by the Tri-College University Educational Leadership program. Additional information outlining these requirements is available on request from the Graduate School of North Dakota State University or the Office of the Dean of Academic Services of Minnesota State University Moorhead.

Doctor of Philosophy Degree Requirements
Only a brief summary of the requirements for the Ph.D. degree is listed. (For details see the Graduate Bulletin.)

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 certain prescribed examinations, and the development of an acceptable dissertation covering some significant aspect of a major field of learning.

Plan of Study and Advisory Committee
See this section under General Requirements for the Master's degree. Minimum number of semester credits is 90. Thirty (30) of these may be satisfied with a previous M.S. degree.

Residence Requirement
Graduate study for the Doctor of Philosophy degree normally requires a minimum of three (3) years 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.

Time Limitation
All requirements for the Doctor of Philosophy degree must be completed within a period of 10 consecutive years. Graduate credit for any course work, not included in the master's degree, that is more than 10 calendar years old at the time of the final examination may not be used to satisfy degree requirements.

Language Requirements
Each graduate department will determine whether it will require a language and, if so, the language or languages applicable to the candidate's field of study and the level of reading proficiency required. Low-level proficiency will measure the candidate's comprehension of material in the major field in the foreign language with unlimited use of linguistic reference sources (e.g., dictionaries, glossaries, etc.); high-level proficiency will measure a similar reading comprehension with limited use of such reference sources. All examinations will be administered under the supervision of the Department of Modern Languages. International students whose native language is not English may satisfy the language requirement in their native language, providing their graduate department approves. In these cases, the basis for proficiency will be the candidate's use of English, rather than the foreign language. The certificate testifying to proficiency in the foreign language must be filed with the graduate dean before the student

may be admitted to the comprehensive/preliminary examination in those cases where the department requires a foreign language.

Examinations

Comprehensive/Preliminary Examination: This examination will be required of each student after the greater portion of courses has been completed and any required language proficiency has been certified. The examination consists of both written and oral parts. 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.

Final Examination: This examination will be taken after the candidate has completed the course work and dissertation. This is an oral examination which is concerned primarily with the dissertation, but may also include material from course work, especially courses fundamental to the dissertation.

Dissertation

The dissertation must show originality and demonstrate the student's capacity for independent research. It must embody results of research which constitute a definitive contribution to knowledge.

General Regulations

The following pertain to all graduate programs of study at NDSU.

Scholastic Standards

Graduate study demands a substantially greater effort on the part of the student than undergraduate study. The graduate student must maintain an overall average grade of B or better in all courses taken as a graduate student. Grades lower than C will not be accepted for graduate credit. Thesis, paper, and dissertation grades will be recorded as satisfactory or unsatisfactory.

Credit Courses

Courses approved at the 600- and 700-level may be taken for graduate credit and used to satisfy course requirements on the graduate 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.

Credit Load

A full-time graduate load is nine (9) credits. Graduate assistants in half-time status (0.5 FTE) are considered full-time if registered for four (4) or more graduate credits. Graduate assistants wishing to register for more than ten (10) credits in a regular semester shall secure the approval of their academic dean and dean of the Graduate School.

Graduate Study by Faculty Members

A member of the faculty who holds a rank above instructor, or equivalent, may not receive the Doctor of Philosophy degree from this institution. Staff members may register for graduate work.

Individualized Plans of Study

To be most effective, graduate study must provide for the individual interests, needs, and abilities and should not be subject to rigid, detailed regulation. Therefore, the dean of the Graduate School is authorized to consider each case according to the recommendations of the program committee.

Graduate Degrees Granted

Degrees offered are Master of Science, Master of Arts, Master of Education, Master of Business Administration, and Doctor of Philosophy.

The following programs are offered at the master's degree level.

Agricultural and Biosystems Engineering
Agricultural Economics
Agricultural Education
Animal and Range Sciences
Biochemistry
Botany
Business Administration (MBA)
Cereal Science
Chemistry
Child Development and Family Science
Civil Engineering
Computer Science
Counseling and Guidance
Educational Administration
Electrical Engineering
English
Entomology
Environmental Engineering
Family and Consumer Sciences Education
Food and Nutrition
History
Horticulture
Industrial Engineering and Management
Mass Communication
Mathematics
Mechanical Engineering
Microbiology
Natural Resources Management
Pharmaceutical Sciences
Physics
Plant Pathology
Plant Sciences
Polymers and Coatings Science
Psychology
Secondary Education—Options:
  Curriculum Design
  Health, Physical Education and Recreation
  Music Education
  Science Education
Social Science—Options:
  Political Science
  Sociology/Anthropology
Soil Science
Speech Communication
Statistics, Applied
Theatre Arts
Zoology

The Education Specialist degree may be earned in Educational Leadership through the Tri-College University.

The Doctor of Philosophy degree may be earned in the following fields of study:

Animal and Range Sciences
Biochemistry
Botany
Cellular and Molecular Biology
Cereal Science
Chemistry
Computer Science
Engineering
Entomology
Mathematics
Pharmaceutical Sciences
Physics
Plant Pathology
Plant Sciences
Polymers and Coatings Science
Soil Science
Statistics
Zoology

Course Descriptions

Courses approved at the time of publication are listed in this bulletin. Not all courses are offered every term. Refer to the "Registration Schedule" published each term for listed offerings.

Definitions

Course descriptions frequently include additional information about enrollment. 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.

Course corequisites (Coreq): Corequisites indicate courses to be taken concurrently with the course described.

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 departments are noted and the full description appears under the department responsible for the course. Credit may only be earned for the course under one of the prefixes.

Dual-listed courses: Dual-listed courses with 400- 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.

Designators

• **(CCN)** - This abbreviation indicates the course has a common number, title, and description throughout ND University System institutions. Common courses offered at NDSU are listed in the Appendix.

• **(ND:___)** - This designator has various abbreviations following the colon to indicate the general education category for which the course has been approved by the ND University System for transfer to other System institutions. Other General Education Requirement Transfer Agreement (GERTA) designators are the following: (ND:CompSc) computer science, (ND:Engl) English composition, (ND:FA) fine arts activities, (ND:Hist) history, (ND:Hum) humanities, (ND:LabSc) laboratory science, (ND:Math) mathematics, (ND:Sci) science and technology, (ND:Comm) speech, and (ND:SS) social science. For more GERTA information, refer to the Academic Policies section in this bulletin.

Note: NDSU general education requirements and approved courses are listed in the Appendix. Also refer to the centerfold of the "Registration Schedule" each term for approved updates.

Format of Course Listings

All University course offerings, listed alphabetically by areas of study, are described on the following pages. This bulletin is published biennially and in the interim certain courses may be deleted from or added to departmental offerings. Course change information is available from the specific departments.

The heading, which precedes the brief description of each course, includes the current course number; former course number, if any, in brackets; course title; a CCN indicator, if any; and the number of semester credit hours, fixed or variable. Enrollment information, such as prerequisites and corequisites, appears at the end of the description.

Course Numbers

Course numbers indicate the student classification for which the course is primarily intended. Some course numbers end with a letter suffix: H - honors course; L - laboratory course. The number system is as follows:

001-099 - non-degree credit courses*
100 series courses - open to 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
600 numbered courses - Continuing Education post-baccalaureate courses, not applicable toward graduate degrees
601-699 series courses - graduate courses taught concurrently in the same classroom with advanced undergraduates at the 400 level
700-799 series courses - open to graduate students

*Any 100-level course offered for non-degree credit is noted in the course description.

Note: A bracketed course number [] indicates the former number of the same course. Double credit cannot be earned by repeating a course unless the course description indicates otherwise.

Uniform Course Numbers

The following courses may be offered by departments but are described here because of their uniform numbers and descriptions.

(Prefix) 291, 391, 491 [498], **590, 690, 790**
Seminar (CCN) **1-3**
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 [294, 494]
Study Abroad (CCN) **1-15**
Pre-arranged study at accredited foreign institutions or in approved study abroad programs. Prereq: Sophomore standing and prior approval by major department. Graded P or F.

(Prefix) 194, 294, 394, 494 [197, 497]
Individual Study (CCN) **1-3**
Individual student work on research or criticism under the supervision of a professor.

(Prefix) 196, 296, 396, 496 [195, 495], **595, 695, 795**
Field Experience (CCN) **1-15**
Field-oriented supervised learning activities outside the college classroom that include a preplanned assessment of the experience and post evaluation with the instructor. Departmental approval.

(Prefix) 297, 397, 497 [295, 395]
Cooperative Education (CCN) **1-4**
Practical application of classroom learning through employment in supervised career-related positions. Students are granted full-time student status by the University regardless of the actual credit hours. Requires departmental approval and Co-op Program application.

(Prefix) 199, 299, 399, 499 [196, 296, 396, 496], **596, 696, 796**
Special Topics (CCN) **1-5**
A group study of the known and established literature of a field, or other evidence, for purposes of scholarly development.

(Prefix) 592, 692, 792
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
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
Practicum/Internship **1-8**
Course designed to provide practical participation under professional supervision in selected situations to gain experience in the application of concepts, principles, and theories related to the student's area of specialization. Requires approved program and consent of instructor. Graded S or U.

(Prefix) 791
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) 797
Master's Paper 1-3
Literature review, research, and preparation for paper required for the comprehensive study option. Graded S or U.

(Prefix) 798
Master's Thesis 1-15
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
Doctoral Dissertation 1-15
Original investigation under the supervision of a major adviser and an advisory committee. Graded S or U.

ACCOUNTING (Acct)

Leitch, Dean; Brown, Buckhoff, Clifton, Glatt, Hansen, Harter, Knoepfle

COURSES

102 [210] **Fundamentals of Accounting (CCN) 3**
Includes elements of financial statements and the full accounting cycle. Not available to majors and accounting minors in the College of Business Administration.

200, 201 [211, 212] **Elements of Accounting I, II (CCN) 3 each**
200: Basic principles of the complete accounting cycle. 201: Special emphasis on corporate accounting and the uses of accounting information by managers. Prereq: Sophomore standing. Coreq: CSci 146 or departmental approval.

311, 312 Intermediate Accounting I, II 4 each
Intensive study of accounting theories, corporate accounting problems, financial statements and disclosures, problems in income determination, and other evolving problems in accounting. Prereq: Acct 201.

318 Taxation in Management Decisions 3
Study of the fundamental concepts of federal income tax implications that result from common business transactions. Prereq: Acct 102 or 201, junior standing. Cross-listed with Busn.

320 [315] **Cost Management Systems 3**
Cost management encompasses the activities of managers in the planning and control of costs. Discussion of proper design and implementation of cost management systems along with their motivational effects on organizational members. Prereq: Acct 201.

321 Government and Not-for-Profit Accounting 3
Introduction to the accounting standards and procedures applicable to government and not-for-profit institutions. Prereq: Acct 201.

410/610 Forensic Accounting 3
Study of the pervasiveness of and causes of fraud in society; exploration of methods of fraud detection, investigation, and prevention; and detection of financial statement fraud. Prereq: Acct 201 or equivalent.

413 Accounting Internship 3
Supervised professional experience in public, industrial, or government accounting. Students must meet standards established by the employer and the College of Business Administration.

415/615 Advanced Accounting 3
Study of special problems in accounting including consolidated statements, international operations, partnerships, corporate liquidations, corporate reorganizations, estates, and trusts. Prereq: Acct 312.

418/618, 419/619 Tax Accounting I, II 3 each
Study of the theory and principles related to the determination of taxable income and computation of federal income taxes for individuals, partnerships, corporations, trusts and estates, and other specialized tax issues. Prereq: Acct 201.

420/620 [427/627] **Accounting Information Systems 3**
Examination of accounting information systems with emphasis on systems planning and design and on application of appropriate software and hardware technology. Prereq: Acct 201, Busn 370.

421/621, 422/622 Auditing I, II 3 each
Study of audit objectives and procedures, auditing standards, legal liability, ethics, internal controls, and report writing. Prereq: Acct 312.

425/625 Accounting Theory 3
Critical examination and study of the current literature and official releases of professional and regulatory bodies in accounting. Prereq: Acct 312.

430 Tax Practice and Research 3
Supervised, practical experience applying knowledge and skill in areas of tax practice and research. Students prepare a variety of income tax returns and develop a basic understanding of tax research methods. Prereq: Acct 418, departmental approval.

440 [411] **Management Control System 3**
Management control systems involve the accumulation and use of information to facilitate the process of making planning and control decisions throughout the organization and to guide the behavior of its managers and employees. Prereq: Acct 201.

486 Senior Thesis 3
Directed development of a capstone paper showing the application, synthesis, and integration of accounting concepts. Prereq: Departmental approval.

AEROSPACE STUDIES (AS) (AIR FORCE ROTC)

Goehring, Chair; Bursey, Gerber, Huhtala, Monson

General Military Courses

The four-year program begins with the General Military Course (GMC). The GMC covers the mission and structure of the Air Force, examines life in the Air Force, and includes the study of strategy, doctrine, and missions of aerospace power from balloons to the space age. Instruction is provided in Air Force career opportunities, educational benefits, and life and work as an Air Force officer.

COURSES

111, 112 The Air Force Today 1 each
Survey course designed to introduce students to the United States Air Force and provide an overview of the basic characteristics, missions, and organization of the Air Force. Coreq: AS 210.

210 Leadership Laboratory 1
Introduction to and application of Air Force customs and courtesies, drill, and ceremonies, and military commands. Introduction to the environment of an Air Force officer and opportunities available to commissioned officers. May be taken four times.

211, 212 Evolution of USAF Air and Space Power 1 each
Introduction to Air Force heritage and leaders, Quality Air Force concepts, ethics and values, leadership, group leadership problems, and the application of communication skills. Prepares cadets for field training. Coreq: AS 210.

Field Training

Air Force ROTC Field Training is offered during the summer months at selected Air Force bases throughout the United States. Students in the four-year program participate in four weeks of field training during the summer after their sophomore year. Students applying for entry into the two-year program must successfully complete six weeks of field training prior to enrollment in AFROTC.

The major areas of study in the four-week field training program include junior officer training, aircraft and aircrew indoctrination survival training, base functions, the Air Force environment, and physical training.

The six-week field training course covers the same areas of study as the four-week program and includes an additional two weeks of academic instruction in general military courses.

Leadership Laboratory

Instruction is conducted within the framework of a cadet organization and includes a progression of experiences designed to develop each student's leadership potential. Leadership laboratory involves a study of Air Force customs and courtesies, drill and ceremonies, career opportunities in the Air

Force, and the life and work of an Air Force junior officer. Students develop their leadership potential in a practical and supervised laboratory, which may include field trips to Air Force installations throughout the United States.

Professional Officer Course (POC)
The Professional Officer Course, taken during the student's junior and senior years, concentrates on four main themes: communicative skills, national security forces in contemporary American society, the principles and practices of management, and leadership in the U.S. Air Force.

321 Air Force Leadership/ Management I **3**
Introduction to management within the USAF, emphasizing communication skills in both oral and written Air Force formats, interpersonal skills, and quality Air Force concepts. Coreq: AS 410.

322 Air Force Leadership/ Management II **3**
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. Coreq: AS 410.

410 Leadership Laboratory **1**
Development of leadership skills in a practical, supervised laboratory. Students must instruct, supervise, and lead junior cadets participating in AS 210, Leadership Laboratory, and perform higher level management functions within the cadet corps organization. May be taken four times.

441, 442 Preparation for Active Duty I, II **3 each**
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. Includes application of communication skills and preparation for a new officer's first active duty assignment. Coreq: AS 410.

AGRICULTURAL AND BIOSYSTEMS ENGINEERING (ABEn)

Stegman, Chair; Backer, Bon, Disrud, Lindley, Panigrahi, Schwarz, Solseng, Steele, Wiesenborn

COURSES

110 Introduction to Agricultural and Biosystems Engineering **2**
Introduction to the agricultural engineering profession with emphasis on engineering problem solving. 2 lectures.

189 [199] **Skills for Academic Success** **1**
See University Interdisciplinary Studies for description.

255 Computer-Aided Analysis and Design **3**
Application and use of software in engineering analysis and design. 3 lectures.

263 Biological Materials Processing **3**
Processing equipment design and physical properties of biological materials that influence their harvesting, handling, processing, storage, marketing, and quality evaluation. 2 lectures, 1 three-hour laboratory. Prereq: ABEn 255 or equivalent.

358 Electric Energy Application in Agriculture **3**
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.

377 Numerical Modeling in Agricultural and Biosystems Engineering **3**
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.

383 Structural Design for Biosystems **3**
Study of framing systems, building materials, and load requirements. Analysis of structures for Biosystems. 3 lectures. Prereq: ME 223.

452/652 Bioenvironmental Systems Design **3**
Study of Psychometrics, heat and mass transfer, and physiological requirements for livestock and bioproducts. Design of environmental modification and control systems. 3 lectures. Prereq: CE 309, ME 350.

458/658 Food Process Engineering **3**
Analysis and design of food processing equipment and plants. Emphasis is on application of fluid flow, thermodynamics, and heat and mass transfer principles. 3 lectures. Prereq: Junior standing.

464/664 Resource Conservation and Irrigation Engineering **4**
Resource principles and design of systems for soil and water resource management and environmental protection. 3 lectures. 1 three-hour laboratory. Prereq: CE 309.

473/673 Agricultural Power **3**
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.

478/678 Machinery Analysis and Design **2**
Principles of design, development, and testing of agricultural machines and machine systems. Applications of computer-aided design and FMEA. 2 lectures. Prereq: ME 442.

482/682 Instrumentation and Measurements **3**
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: ME 223, Phys 252.

486 Design Project I **1**
Capstone learning experience involving principles of design, project management, and evaluation. Student teams define a capstone project in their area of interest. 1 lecture/laboratory. Prereq: Senior standing.

487 Design Project II **2**
Continuation and completion of capstone learning experience begun in ABEn 486. Communication in oral, written, and graphic forms is emphasized. 2 lectures/laboratory. Prereq: ABEn 486.

758 Electrical and Electronic Applications **3**
Sensors and non-destructive principles (e.g., computer vision, spectroscopy, imaging, fiber optic sensing) for bioproduction and processing applications. Data/signal acquisition, signal conditioning/analysis, signal interpretation, and pattern recognition using statistical, neural networks, and fuzzy logic techniques. 3 lectures. Prereq: Graduate standing.

763 Theory of Drying Biological Products **3**
Theory used to describe the drying processes of biological products. 3 lectures. Prereq: Graduate standing.

765 Small Watershed Hydrology and Modeling **3**
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 464/664.

773 Advanced Agricultural Power and Machinery **3**
Theory and design of agricultural power units and field machines. 3 lectures. Prereq: ABEn 473/673.

783 Advanced Structures and Environmental Systems **3**
Detailed analysis of building components and advanced design problems relating to agricultural and environmental systems. 3 lectures. Prereq: ABEn 383.

AGRICULTURAL ECONOMICS (AgEc)

Lambert, Chair; Aakre, C. DeVuyst, E. DeVuyst, Flaskerud, Hughes, D. Johnson, Koo, Kraenzel, Leistritz, B. Leitch, Mack, Nelson, Nganje, Petry, Rathge, Saxowsky, Schuck, Shultz, Swenson, Tweeten, Wachenheim, Wilson

COURSES

150 Quantitative Economics 2
Application of algebra and calculus to price theory. 2 lectures. Prereq: AgEc 201 and Math 103 or 104.

201 [110] **Principles of Microeconomics (CCN) 3**
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. Cross-listed with Econ (CCN).

202 [111] **Principles of Macroeconomics 3**
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. Cross-listed with Econ (CCN).

220 World Agricultural Development 3
Introduction to theories, policies, and practices to increase food production and agricultural development in developing countries. 2 lectures. Prereq: AgEc 201.

242 Introduction to Agricultural Management (CCN) 4
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, 1 laboratory. Prereq: AgEc 201, CSci 146, accounting.

244 Agricultural Marketing (CCN) 3
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. Prereq: AgEc 201, sophomore standing.

246 Introduction to Agricultural Finance I (CCN) 4
Introduction to agricultural finance; provides background in farm and agribusiness credit use and evaluation. Discussion of specific financial conditions on farms and in agribusiness. 3 lectures, 1 laboratory. Prereq: AgEc 201, accounting.

250 Agribusiness Marketing 3
Principles of agricultural marketing: approaches, structural dynamics and regulatory framework, alternative strategies (open market, hedging, contracting, integration, cooperatives, bargaining, marketing orders, commodity promotion, procurement), international trade, and marketing management of agricultural products. Prereq: AgEc or Econ 201.

339 Quantitative Methods and Decision Making 3
Application of basic probability concepts to decision analysis, introduction to linear programming models, and decision-free analysis. 3 lectures Prereq: AgEc 150 or Math 146; Coreq: Stat 330.

342 Farm and Agribusiness Management II 3
Application of production economics principles to farm and agribusiness operations. Economic input-output principles and profit maximization. 2 lectures, 1 laboratory. Prereq: AgEc 242; Coreq: AgEc 339.

344 Agriculture Price Analysis 3
Introduction to price analysis in agricultural markets. 3 lectures. Prereq: AgEc 244, 339, Econ 341; Coreq: Stat 331.

346 Agricultural Finance II 3
Development of tools to analyze financial and credit use problems unique to farms, ranches, and agribusinesses. For agricultural economics majors. 3 lectures. Prereq: AgEc 246.

347 Principles of Real Estate 3
Principles and techniques of real estate appraisals, practical application of appraisal principles, and techniques to real property evaluation. 2 lectures, 1 laboratory. Prereq: AgEc 201. Cross-listed with Busn.

355 Negotiation 3
Principled negotiation (interests, options, legitimacy, BATNA, working relationships, and agreement) in resolving conflicts and joint problem solving; negotiation power; and responding to unscrupulous tactics. Prereq: AgEc 201, junior standing.

374 Cooperatives 3
Theory, practice, and evaluation of cooperatives including principles, management, marketing, finance, taxes, legal issues, and adjusting to change. 2 lectures. Prereq: AgEc 201. Cross-listed with Busn.

375 Applied Agricultural Law (CCN) 3
Study of laws affecting agriculture and agribusiness including property ownership, financial relations, and environmental regulation. 2 lectures. Prereq: Junior standing.

380 Public Policy Choices 1
Economic justification for public involvement in resource allocation problems to achieve optimal resource use and distribution. 3 lectures for the first five weeks of semester. Prereq: AgEc 201, junior standing.

381 Resource Economics 2
Natural resource and environmental problems and policies. Application of economic decision-making concepts and tools. 3 lectures for the last 10 weeks of semester. Prereq: AgEc 380. Cross-listed with NRM.

382 Economics of State and Local Government 2
Description and analysis of the economic roles of state and local government relating to public services, equity and efficiency, and economic development. 3 lectures for last 10 weeks of semester. Prereq: AgEc 380.

420 Integrated Farm and Ranch Management 3
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 or 244 or 246, accounting, senior standing.

442/642 Farm and Agribusiness Management III 3
Capstone course for agribusiness. Integration and application of principles and methods to real-life management problems in cooperation with management from local agri-business firms. Prereq: AgEc 342, Busn 350.

444/644 Crops Marketing 3
Capstone course for commodity marketing option. Advanced work on topics related to marketing of crops. 2 lectures. Prereq: AgEc 344.

445 Agricultural Market Organization 3
Agribusiness interfirm marketing functions and strategies and application of analytical models to agribusiness problems. 3 lectures. Prereq: AgEc 344, Busn 360, Stat 331.

446/646 Agribusiness Finance 3
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 346, Busn 340, senior standing.

450 National AgriMarketing Association (NAMA) I 1
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. Prereq: AgEc 201, junior standing or departmental approval.

451 National AgriMarketing Association (NAMA) II 2
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 in April. 2 lectures. Prereq: AgEc 450.

470/670 Agricultural Trade 2
Introduction to trade theory and policies and their applications to agricultural product trade. 2 lectures. Prereq: AgEc 201, 202, senior standing.

472/672 Logistics and Transportation Management 3
Advanced transportation demand analysis, mathematical programming, and transportation investments and decisions.

480/680 Environmental Economics 3
Conceptual basis for government intervention into agriculture, rural economies, and the environment. Application of economic analyses to assess alternative public policies. Contemporary case studies. Prereq: Graduate standing or departmental approval.

484 Agricultural Policy 2
Description of the evolution of current farm programs; economic analysis of the consequences on producers, consumers, and taxpayers. 3 lectures for the last 10 weeks of semester. Prereq: AgEc 380.

701 Research Philosophy 1
Role of the scientist, reasoning, values, and decisions. Problem formulation, literature review, hypothesis development, data collection, analysis, and interpretation. 1 lecture. Prereq: Stat 330.

710 Econometrics 3
Applications of statistical methods to specification, estimation, and forecasting of linear economic models including multiple regression models, cross-section data analysis, time-series data analysis, and qualitative dependent variable models. 4 lectures for first half of semester. Prereq: AgEc 701, Stat 331.

739 Analytical Methods for Applied Economics 3
Study and application of operations research techniques and other decision methods to problems in agriculture, transportation, and resource management. 3 lectures. Coreq: AgEc 710, Econ 741.

741 Advanced Microeconomics 3
Advanced analysis of demand, production, and costs; pricing output and resource allocation under various market structures. Prereq: Econ 341, Math 146 or equivalent.

743 Advanced Macroeconomics 3
Advanced analysis of macroeconomic theories; economic growth, business fluctuations, and inflation. Prereq: Econ 343, Math 146 or equivalent.

744 Agricultural Marketing 3
Investigation of agricultural firm-level marketing with emphasis on competition and resulting strategies. 3 lectures. Prereq: AgEc 710, 739, 741.

746 Rural Industry Finance 3
Exploration of the problems of financial markets and intermediation, capital budgeting, portfolio analysis, capital rationing, financial institutions, and insurance faced by rural business firms. 3 lectures. Prereq: AgEc 741.

771 Rural and Non-Metropolitan Transportation Systems 3
Transportation systems concepts and analysis, transport economics, freight technology and operations, transit, logistics and distribution. Includes rural and non-metropolitan case studies. Cross-listed with CE.

772 Rural Logistics and Distribution Management 3
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 CE.

774 Statewide Transportation Planning 3
Introduction to transportation institutions, regulation and safety, transportation finance, modal planning (for highways, railroads, airports, and waterways), multimodal planning, and transportation impact assessment. Cross-listed with CE.

778 Transportation Administration 3
Public organizational behavior and administration, fund accounting, public budgeting, financial management, and strategic management of transportation agencies. Includes transportation case studies. Cross-listed with CE.

AGRICULTURAL AND EXTENSION EDUCATION

(See Human and Community Education.)

AGRICULTURAL SYSTEMS MANAGEMENT (ASM)

Stegman, Chair; Backer, Bon, Disrud, Lindley, Panigrahi, Schwarz, Solseng, Steele, Wiesenborn

COURSES

115 Fundamentals of Agricultural Systems Management (CCN) 3
Overview of agricultural systems management; engines, machinery, structures, electricity, processing, and conservation. 3 lectures. Prereq or coreq: Math 103, 104, or higher.

125 Fabrication and Construction Technology (CCN) 3
Introduction to materials, methods, and tools used in fabrication, installation, and maintenance of agricultural production and processing facilities. 2 lectures, 1 three-hour laboratory.

225 Computer Applications in Agricultural Systems Management 3
Application and use of software for problem solving, reporting, and graphical communication. 3 lectures. Prereq: CSci 146 or 147.

264 Natural Resource Management Systems 3
General principles of management of natural resource systems including hydrology, soil erosion, irrigation, drainage, and water quality. 2 lectures, 1 three-hour laboratory. Prereq: Math 103 or 104. Cross-listed with NRM.

323 Post-Harvest Technology 3
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 104.

354 Electricity and Electronic Applications (CCN) 3
Fundamentals and applications of electricity, electronic power distribution, controls, motors, and solid state electronics. For non-engineering majors. 2 lectures, 1 three-hour laboratory. Prereq: Math 103 or 104, junior standing.

368 Structures and Environment Systems 3
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 104.

373 Tractors and Power Units (CCN) 3
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 104.

374 Power Units Laboratory (CCN) 1
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.

378 Machinery Principles and Management (CCN) 3
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 104.

427/627 Unit Operations in Food Manufacturing 3
Principles of basic processes in food manufacturing: conveying, size reduction, separations, mixing, heat transfer, concentration, drying, and extrusion. 3 lectures. Prereq: Math 105.

475/675 Management of Agricultural Systems 2
Capstone learning experience involving team solution to problems in agricultural systems management. Oral and written communications are emphasized. 2 lectures. Prereq: Senior standing.

AGRICULTURE (Agri)

Jensen, Dean

COURSES

150 Agriculture Orientation 1
Introduction to opportunities and professional advancement in agricultural careers. Overview of majors offered in the College of Agriculture, activities, and support services.

189 [199] **Skills for Academic Success 1**
See University Interdisciplinary Studies for description.

ANIMAL AND RANGE SCIENCES (ARSc)

Dodd, Chair; Barker, Bauer, Berg, Biondini, Blanchetot, Caton, Danielson, Grazul-Bilska, Grygiel, Harrold, Haugen, Kirby, Lardy, Marchello, Moore, Park, Redmer, Reynolds, Schroeder, Sedivec, Slanger, Socha, Tilton

COURSES

114 Introduction to Animal Sciences (CCN) 3
General principles of the livestock industry and relationships to mankind. 2 lectures, 1 two-hour laboratory.

123 Feeds and Feeding (CCN) 3
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.

220 Livestock Production (CCN) 3
General production and management of major meat animal species. Topics include production systems, feeding, facilities, health, economics, and marketing. 2 lectures, 1 two-hour laboratory.

222 Meat Animal Evaluation (CCN) 2
Relationship between live animal characteristics and structure to product value. 2 two-hour laboratories.

225 Natural Resource and Ago-ecosystems (CCN) 3
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.

260 Horse Production (CCN) 3
Care, management, and feeding of light horses. 2 lectures.

320 Dairy Cattle Selection 1-2
Visual appraisal, selection, and evaluation of dairy cattle. Type classification of dairy cattle. 2 three-hour labs. May be repeated. Prereq: Departmental approval.

323 Fundamentals of Nutrition 3
Fundamentals of nutrition emphasizing digestion, metabolism, function, requirements, and sources of specific nutrients. 3 lectures. Prereq: ARSc 123, Bioc 260, or departmental approval.

326 Modeling of Agroecosystems 3
Introduction and applications of systems analysis and simulation modeling to agriculture, biology, and natural resources management. 2 lectures, 1 two-hour laboratory. Offered even years.

330 Meat Selection, Grading, and Judging 1-2
Evaluation and grading of carcasses and wholesale cuts of beef, pork, and lamb. Written explanation of decisions and comparisons. 2 three-hour laboratories. May be repeated. Prereq: ARSc 222 or departmental approval.

331 Livestock Selection (CCN) 1-2
Visual and performance evaluation of breeding and slaughter classes of the major meat producing livestock. 2-3 three-hour laboratories. May be repeated. Prereq: ARSc 222 or departmental approval.

336 [325] **Introduction to Range Management (CCN) 3**
Principles of range management which include plant identification, range evaluation, and range improvement. 3 lectures.

340 Meat Science and Technology 3
Introduction to meat science. Chemical, physical, and structural properties of meat and meat products. Identification, nutritive analysis, preservation, cooking, and packaging technology. 2 lectures, 1 two-hour laboratory. Prereq: Chem 260.

344 Fundamentals of Meat Processing 2
Chemical and physical relationships in meat preservation, sausage production, and other meat product preparation. 1 lecture, 1 three-hour laboratory.

357 Animal Genetics 3
Genetic and statistical principles applied to livestock improvement. 2 lectures, 1 two-hour laboratory. Prereq: PlSc 315, Stat 330.

435/635 Nutrition Laboratory Techniques 3
Theory and basic laboratory techniques associated with nutritional research and current information regarding advanced techniques and developments. 2 lectures, laboratory by arrangement. Offered even years; fall. Prereq: Chem 260.

450/650 Range Plants 3
Identification, distribution, and forage value of important U.S. range plants. 1 lecture, 2 two-hour laboratories. Prereq: Bot 314. Cross-listed with Bot.

452/652 Geographic Information Systems in Range Survey 3
Analysis of methods for determining range composition, condition, and productivity. Emphasis will be given to the use of Geographic Information Systems. 3 lectures. Offered odd years; fall. Prereq: ARSc 336.

456/656s Range Habitat Management 3
Capstone course to include specific techniques and systems approaches to maintenance and improvement of rangeland ecosystems. 3 lectures. Offered odd years; spring. Prereq: ARSc 336.

458/658 Grazing Ecology 3
Grazing processes and systems and their effects on plants and herbivores. 3 lectures. Offered even years; spring. Prereq: ARSc 336.

460/660 Plant Ecology 3
See Botany for description.

463/663 Physiology of Reproduction 4
Anatomy, physiology, and endocrinology of reproduction in mammals. Extensive oral and written communication experience. 3 lectures, 1 two-hour laboratory. Cross-listed with Zoo.

464 Reproductive Management Procedures 2
Demonstration and utilization of the latest technology in large animal reproductive management including embryo and semen collection, pregnancy diagnosis, and estrous control. 1 lecture, 1 three-hour laboratory. Prereq: ARSc 463.

470 Applied Nutrition 4
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: ARSc 323.

482 Sheep Production 2
Capstone course to include the management, systems, selection, record keeping, merchandising, and production testing of sheep. 3 lectures, 1 two-hour laboratory. Half semester. Prereq: ARSc 220, 336, 357, 463, 470, or departmental approval.

484 Swine Production 2
Capstone course includes breeding systems, disease control, applied economics, housing, marketing, and nutrition in a systems approach. 3 lectures, 1 two-hour laboratory. Half semester. Prereq: ARSc 220, 357, 463, 470, or departmental approval.

486 Beef Production 2
Capstone course includes the management, systems, selection, record keeping, merchandizing, and production testing of beef. 3 lectures, 1 two-hour laboratory. Half semester. Prereq: ARSc 220, 336, 357, 463, 470, or departmental approval.

488 Dairy Production and Dairy Products 3
Capstone course includes the management, selection, record keeping, merchandising, and production testing of dairy and dairy products. 2 lectures, 1 two-hour laboratory. Prereq: ARSc 220, 357, 463, 470, or departmental approval.

710 Range Communities and Watersheds 3
Study of grazing reaction, forage value, and watershed characteristics of major range plant communities. 3 lectures. Offered even years; fall. Prereq: ARSc 336.

716 Agrostology 3
Identification and description of U.S. grasses and grass-like plants. 2 lectures, 2 two-hour laboratories. Offered even years; fall. Prereq: Bot 314. Cross-listed with Bot.

717 Aquatic Vascular Plants 2
Identification and description of aquatic vascular plants. 1 lecture, 2 two-hour laboratories. Offered odd years; fall. Prereq: Bot 314. Cross-listed with Bot.

721 Biology of Lactation 2
Mammary gland development and mechanisms controlling lactation. 2 lectures. Prereq: Bioc 460.

728 Advanced Reproductive Biology 3
Discussion of reproductive physiology research with emphasis on current topics in cellular and molecular biology. 3 lectures. Offered odd years; spring. Prereq: ARSc 463, Bioc 460.

730 Growth Biology 2
Regulation of growth at the cell/tissue, organ systems, and whole animal levels. 2 lectures. Offered even years; spring. Prereq: ARSc 463, Bioc 460.

732 Reproductive Endocrinology 3
Reproductive endocrinology with emphasis on molecular, biochemical, and endocrinological mechanisms. 3 lectures. Prereq: ARSc 463, Bioc 460.

736 Experimental Nutrition Methods 1
Design, conductance, analysis, and reporting of experiments taken in conjunction with ARSc 773, 774, 775, or 776. Prereq: ARSc 470, Bioc 460.

740 Data Analyses and Designs of Experiments 3
Experimental design principles, introductory statistical theory, and commonly used data analyses of animal and range science data are taught and practiced with practical applications using the computer. 3 lectures. Prereq: Stat 725.

755 Advanced Meat Science 2
Physical, chemical, and structural characteristics of the postmortem meat animal. 2 lectures. Offered even years. Prereq: ARSc 340, Bioc 460.

765 Analysis of Ecosystems 3
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. Offered even years; spring. Prereq: Stat 330.

773 Energy Metabolism 3
Methods of measuring energy values and the metabolic processes involved in the production of useful biological energy from organic compounds. 3 lectures. Offered odd years; fall. Prereq: ARSc 470, Bioc 701.

774 Nitrogen Metabolism 3
Detailed overview of nitrogenous compounds including metabolism and function. Considerable emphasis on current research from the literature. 3 lectures. Offered even years; spring. Prereq: ARSc 470, Bioc 701.

775 Vitamins and Minerals 3
Metabolism of vitamins and minerals and their application in animal nutrition and the feed industry. 3 lectures. Offered even years; fall. Prereq: ARSc 470, Bioc 701.

776 Digestive Physiology 3
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. Offered odd years; fall. Prereq: ARSc 470, Bioc 701.

ANTHROPOLOGY

(See Sociology and Anthropology.)

APPAREL, TEXTILES, AND INTERIOR DESIGN (ATID)

Bastow-Shoop, Chair; Bates, Braaten, Corry, Manikowske, Marth, Ray-Degges, Williams

COURSES

Apparel and Textiles

155 Apparel Construction and Fit 3
Principles of apparel construction and analysis. Construction of a fitting sloper and two fashion garments. Fall.

170 Introduction to Retail Merchandising 3
Development and technological advances of the retail merchandising industry from concept to consumer. Includes a retail visitation experience. Fall.

181 Aesthetic Analysis in Business and Society 3
Analysis of aesthetics and its application to textiles and apparel products, environments, and oneself.

265 Introduction to Textiles 3
Fibers, yarns, fabric constructions, finishes, and dyestuffs related to selection, use, and maintenance of textile products. Fall.

266 Textiles Laboratory 1
Textile product characterization through the analysis of yarn type, fabric, construction, finishes, and dyestuffs; care procedures; simple identification of fibers, yarns, and fabrics. Fall. Coreq: ATID 265.

270 Evaluation of Ready-to-Wear and Accessories 3
Methods for evaluating the quality of ready-to-wear apparel and accessories. An industry approach to product development and assembly. Spring. Coreq: ATID 265.

310 Evolution of Fashion 3
Historic view of the relationship between costume/fashion evolution in the western world and sociological/economic change. Spring.

355 Apparel and Pattern Design 3
Developing original patterns through either pattern drafting and grading or flat pattern techniques and draping. Individual and commercial applications. May be repeated. Prereq: ATID 155 or departmental approval.

371 Visual Merchandising and Promotion 3
Principles, theory, and practice in planning and executing merchandise presentation and promotion at the retail level as related to image, sales, profit, and aesthetics. Spring.

372 Global Retailing 3
Theoretical approach to management practices and marketing policies for retail soft goods in a complex and changing world market. Prereq: ATID 170 or Busn 360. Cross-listed with Busn.

382 Women in Management 3
Survey of gender issues in management. Analysis of behaviors and attitudes that affect women in the work force.

385 Fashion Economics 3
Study of factors affecting production, distribution, and consumption of products in domestic and foreign textile and apparel industries. Prereq: Econ 201.

410/610 Dress in World Cultures 3
Analysis of world dress as related to cultural, technological, aesthetic, and social patterns. Concepts illustrated through comparative studies of selected world cultures. Prereq: Junior standing.

465/665 Textile Product Analysis 3
Analysis of fiber, yarn, and fabric properties that affect textile product performance. Application of analysis techniques and results to specification development for textile products. Prereq: ATID 265.

470/670 Retail Financial Management and Control 4
Study of retail planning, buying, control, and analysis as it relates to decision making using computer simulation packages. Prereq: ATID 170, CSci 146 or 147, Math 104 or higher, Busn 360.

481 Apparel and Textiles Capstone Experience 3
Critically analyze and propose research-based solutions to problems related to apparel and textiles including production, distribution, and retailing of goods and services. Spring. Prereq: Senior standing.

486/686 Dress and Human Behavior 3
Influence of dress and appearance on human behavior throughout the life cycle. Prereq: Psyc 111 or Soc 110.

Facility Management

368 Quality Assurance and Maintenance of Institutional Environments 3
Guidelines for selecting products, supplies, and equipment. Institutional maintenance and management concerns: quality management, laundry procedures, safety regulations, waste and infection control. Spring. Prereq: Junior standing.

380 Facility Operations and Analysis 3
Integrative organizational theory applied to financial structures, management procedures, support functions, and operations within a major facility. Offered even years; fall. Prereq: Acct 102.

480 Facility Design and Management 3
Understanding facilities and their components, mastering techniques and procedures for analyzing, planning, designing, constructing, programming, specifying furnishings, and equipping facilities. Offered odd years; fall. Prereq: ATID 161, 252, 253 or departmental approval.

Interior Design

150 Design Fundamentals—Lecture 3
Study of the elements and principles of design. Fall. Prereq: Interior design major; Coreq: ATID 151.

151 Design Fundamentals—Studio 3
Study and application of elements and principles of design; two and three dimensional applications. Fall. Prereq: Interior design major; Coreq: ATID 150.

160 Interior Design Careers 1
Survey of the interior design profession, careers, licensure, and professional organizations. Half semester; fall.

161 Interior Graphics I 3
Fundamentals of technical and graphic communication for interior design documentation. Emphasis on lettering, sketching, and drafting. Spring. Prereq: ATID 150, 151, or departmental approval.

250 Interior Design I—Lecture 3
Introduction of design theory and process to analyze and design residential environments; introduction to material selection. Fall. Prereq: ATID 150, 151, 161, or departmental approval; Coreq: ATID 251, 261, 263.

251 Interior Design I—Studio 3
Application of design theory and process to analyze and design residential environments. Emphasis on programming, schematics, design development, and material selection. Fall. Prereq: ATID 150, 151, 161, or departmental approval; Coreq: ATID 250, 261, 263.

252 Interior Design II—Lecture 3
Introduction of design theory and process to analyze and design commercial environments. Emphasis on materials and products developed for commercial installations. Spring. Prereq: ATID 250, 251, 261, 263, or departmental approval; Coreq: ATID 253, 363.

253 Interior Design II—Studio 3
Application of design theory and process to analyze and design commercial environments. Programming, schematics, and design development are emphasized. Spring. Prereq: ATID 250, 251, 161, 263, or departmental approval; Coreq: ATID 252, 363.

261 Interior Graphics II 3
Principles and methods of drawing and sketching including perspective. Emphasis on a variety of rendering techniques and media. Fall. Prereq: ATID 150, 151, 161, or departmental approval; Coreq: ATID 250.

263 Interior Technology I 3
Fundamentals of building construction, materials, and methods for residential and commercial structures. Fall.

315 [215] **History of Interiors I 3**
Survey of historical interiors and furnishings beginning with antiquity through the 1800s. Fall.

316 [216] **History of Interiors II 3**
Survey of historical and contemporary interiors and furnishings beginning with the 1800s to the present day. Spring.

350 Interior Design III—Lecture 3
Lecture sequence exploring interior products and materials, code issues, and client analysis. Fall. Prereq: ATID 252, 253, program admission; Coreq: ATID 351.

351 Interior Design III—Studio 3
Studio sequence of projects requiring identification, analysis, program development, and presentation of a solution to interior design problems. Fall. Prereq: ATID 252, 253, program admission; Coreq: ATID 350.

352 Interior Design IV—Lecture 3
Lecture sequence exploring interior products and materials, code issues, budgetary constraints, client analysis, and design theory. Spring. Prereq: ATID 350, 351; Coreq: ATID 353.

353 Interior Design IV—Studio 3
Sequence of projects requiring identification, analysis, program development, concept and design development, and presentation of a solution to interior design problems. Spring. Prereq: ATID 350, 351; Coreq: ATID 352.

363 Interior Technology II 3
Introduction to interior systems and life safety concerns. Spring. Prereq: ATID 263.

365 CADD for Interiors 3
Computer-aided design and drafting, emphasizing applications in interior design. Includes drawing creation, editing, layers, blocks, and attributes. Introduction to 3-D. Spring. Prereq: Interior design or facility management major, ATID 161, or departmental approval.

450 Interior Design V—Lecture 3
Advanced exploration of design theory and process; emphasis on personal and environmental interaction. Fall. Prereq: ATID 352, 353; Coreq: ATID 451.

451 Interior Design V—Studio 3
Advanced application of design theory and process. Fall. Prereq: ATID 352, 353; Coreq: ATID 450.

452 Comprehensive Interior Design Project 6
Capstone design studio. Student defined problem. Synthesis and implementation of previous course work. Spring. Prereq: Departmental approval; Coreq: ATID 460.

460 Professional Practice 3
Overview of professional standards and promotional activities as related to the interior design profession. Spring. Prereq: ATID 450, 451; Coreq: ATID 452.

ARCHITECTURE (Arch)

Gleye, Chair; Booker, d'Anjou, Faoro, Faulkner, Hatlen, Mahalingam, Martens, Nelson, Prafcke, Ramsay, Yergens

COURSES

132 Architectural Graphics 2
Introduction to free-hand and instrument-based drawing techniques used in architecture and landscape architecture. Includes graphic techniques required for rendering shades, shadows, and perspectives. Various media will be used including grayscale and color drawings. Prereq: Arch 171.

171 Environmental Design I 3
Introduction to the environmental design fields of planning, urban design, landscape architecture, architecture, and interior design Particular attention is given to basic design concepts, visualization, visual analysis, imagination, and creativity. Lecture course. Cross-listed with LA.

172 Environmental Design II 3
Introduction to the vocabulary, history, theory, technology, design process, and tools used in architecture and landscape architecture. Lecture course. Prereq: Arch 171. Cross-listed with LA.

271, 272 Architectural Design I, II 4 each
Studio courses 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 for 271: Arch 132, 172; Prereq for 272: Arch 271.

321 History of Architecture I 3
History of architecture from ancient times through the Renaissance with attention placed on the design connections across cultures and across the globe. Lecture course.

322 History of Architecture II 3
History of architecture from the Baroque to the present placing within a global perspective. Lecture course.

326 Design Process and Methods 2
Study of the methodology, procedure, and theory of architectural design. Lecture course. Prereq: Arch 271 or LA 271.

341 Architectural Structures I 3
Overview of the principles of statics and mechanics of materials and structural concepts relative to building members and frames. Prereq: Arch 272, two Math courses (103 and higher), Phys 120.

342 Architectural Structures II 3
Basic qualitative and quantitative concepts of structural behavior of building frames. Includes methods in the design of elementary frames and member design of steel, concrete, and masonry structural systems and methods of connection. Prereq: Arch 341.

351 Materials and Construction 4
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.

352 Environmental Control Systems I 4
Study of architectural design related to thermal comfort, climate, passive and active solar systems, daylighting, acoustics, and other environmental concerns. Prereq: Arch 371, two Math courses (103 and higher), Phys 120.

371, 372 Architectural Design III, IV4 each
Studio courses providing intermediate level exercises in architectural design; responding to contextual, cultural, environmental, climatic, technological, and aesthetic determinants. Prereq for 371: Arch 272; Prereq for 372: Arch 371.

451 Environmental Control Systems II 3
Study of the 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 352, 372, Math 105, Phys 120.

452 Construction Detailing 3
Graphic study of wood, steel, masonry, and concrete construction assemblies through architectural detailing with an introduction to specifications and construction documents. Prereq: Arch 471.

461 Urban Design 2
Study of urban form and urban theory, development, and processes in an historic and contemporary context. Prereq: Junior standing or departmental approval; Coreq for majors: Arch 471.

471, 472 Advanced Architectural Design I, II 5 each
Studio courses involving the complex organization of architectural spaces and forms in an urban context. Prereq for 471: Arch 372; Prereq for 472: Arch 471.

521-528 History/Theory Seminars
Prereq for majors: Arch 471; Prereq for non-majors: Departmental approval.

521 Non-Western Traditions 2
Advanced seminar on the investigation of design methods and building traditions of non-western cultures and diverse geographic regions.

522 Urbanism 2
Advanced seminar to explore in-depth aspects of current urban design.

523 Preservation 2
Advanced seminar to explore the philosophy and techniques of architectural preservation.

524 Technology 2
Advanced seminar to explore the historical nd theoretical underpinnings of architectural technology.

525 Post World War II 2
Advanced seminar to explore the major architectural movements and personalities in architecture and design since World War II.

526 Current Theory 2
Advanced seminar focused on the work and design theory of leading living architectural practitioners around the world.

527 Vernacular Traditions 2
Advanced seminar to explore the vernacular design traditions in North America and elsewhere.

528 Socio-Cultural Issues 2
Advanced seminar focused on the social issues and movements that have influenced environmental design.

561 Architecture Programming 2
See Landscape Architecture for description.

571 Advanced Architectural Design III 6
Studio course involving complex design problems requiring increased self-direction. Prereq: Arch 472; Coreq: Arch 561.

572 Advanced Architectural Design IV 8
Studio course devoted to the execution of a capstone thesis project from schematic design through design development, presentation, and review. Prereq: Arch 571.

582 Professional Practice 2
Study of contemporary practice covering professional development, firm organization, and project management within the context of the ethical, legal, and regulatory environment. Prereq: Arch 472.

589 Professional Seminar 2
Topics related to theoretical or methodological aspects of architecture. Prereq: Arch 472, fifth-year standing in the department.

ART

(See Fine Arts.)

BIOCHEMISTRY (Bioc)

Killilea, Chair; Fleeker, Meinhardt, Oleson, Sparks, Srivastava

COURSES

Chem 260 [Bioc 260] **Elements of Biochemistry (CCN) 4**
Protein structure, function conformation, and dynamics; enzymes, DNA-RNA: structure and flow of genetic information; biological membranes; metabolism. 4 lectures. Prereq: Chem 117 or 122, 140; Chem 240 recommended. Also listed under Chem.

460 Foundations of Biochemistry and Molecular Biology I 4
Rigorous treatment of biomolecules, generation and use of metabolic energy, biosynthesis, metabolic regulation; storage, transmission, and expression of genetic information. 3 lectures, 1 hour discussion, 1 three-hour laboratory. Prereq: Chem 240 or 342.

461 Foundations of Biochemistry and Molecular Biology II 4
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. 4 lectures. Prereq: Bioc 460.

465/665 Principles of Physical Chemistry and Biophysics 4
Conceptual approach to physical chemistry and biophysics; molecular structure, energy, equilibria, and kinetics. Application of fundamental concepts and related instrumental techniques to the life sciences. 4 lectures. Prereq: Math 147, Phys 212; Coreq: Bioc 460.

473/673 Methods of Biochemical Research 3
Advanced separation, characterization, and enzymological techniques for research in the biological sciences are emphasized. 1 lecture, 2 three-hour laboratories. Prereq: Bioc 461 or 701 or Coreq: Bioc 701.

474/674 Methods of Recombinant DNA Technology 3
Principles and techniques of recombinant DNA construction, gene cloning, and analysis of gene structure. 1 lecture, 2 three-hour laboratories. Prereq: Bioc 461 or 702 or Coreq: Bioc 702.

485/685 Industrial Biotechnology 3
Discussion of commercial biochemical processes, including industrial fermentation and fermentor design, immobilized cell and enzyme bioreactors, product recovery methods, relevant metabolic pathways, and other aspects of industrial biotechnology. 3 lectures. Spring. Prereq: Bioc 460 or 702, Micro 350.

701, 702 Comprehensive Biochemistry I, II 4 each
Comprehensive treatment of the chemistry and biochemistry of proteins, nucleic acids, carbohydrates, lipids, vitamins, hormones, and the specific metabolism of these substances. 4 lectures. Prereq for 701: Chem 342; Prereq for 702: Bioc 701.

716 Protein and Enzyme Biochemistry 3
Advanced topics in protein properties and structure, and the influence of these factors on enzyme kinetics and mechanism. 3 lectures. Alternate years; spring. Prereq: Bioc 702.

717 Carbohydrate/Lipid Biochemistry 3
Advanced topics in the structure, reactions, biosynthesis, and properties of carbohydrate and lipid materials of plant and animal origin. 3 lectures. Alternate years; spring. Prereq: Bioc 702.

718 Metabolic Regulation 2
Advanced topics in regulation of metabolic processes including signal transduction, reversible and irreversible covalent modification, hormonal effects, protein turnover, and related phenomena. 2 lectures. Alternate years; fall. Prereq: Bioc 702.

719 Molecular Biology of Gene Expression and Regulation **3**
Advanced topics in molecular biology and regulation in prokaryotes, eukaryotes, and archaea; early events in developmental gene expression. 3 lectures. Alternate years; fall. Prereq: Bioc 702.

BOTANY/BIOLOGY

White, Chair; Anderson, Barker, Clambey, Esslinger, Fawley, Galitz

COURSES

Biology (Biol)

124 [113] **Environmental Science (CCN)** **3**
Ecological principles related to human cultures, resource use, and environmental alterations. (ND:Sci)

126 [115] **Human Biology (CCN)** **3**
Consideration of selected problems in human biology. Cross-listed with Zoo. (ND:Sci)

150, 150L [150, 151] **General Biology, Lab (CCN)** **3,1**
Introduction to cellular and molecular biology, genetics, evolution, and ecology. (ND:LabSc)

202, 202L Introductory Microbiology, Lab (CCN) **2,1**
See Veterinary and Microbiological Sciences for description.

315, 315L [311, 312] **Genetics, Lab (CCN)** **3,1**
See Plant Sciences for course description.

321 Human Karyotyping **1**
See Plant Sciences for course description.

323 Ecological Issues **3**
Applied view of ecological relationships, natural resources and services, and human impacts and risks. Case studies and analytical approaches included. Prereq: Biol 124 or 150.

364 General Ecology **3**
Ecological principles associated with organism-environment interactions, populations, communities, and ecosystems. Quantitative approach with examples (animal, plant, microbial) included. Prereq: Biol 150. Cross-listed with Zoo.

440/640 Biotechnology and Ethics **2**
Study of ethical issues associated with the development of emerging technologies and their application in solving biological problems. Prereq: Biol 150 or junior standing.

459/659 Evolution **3**
Discussion of the mechanisms of evolution, including population genetics, selection, speciation, adaptation, and molecular evolution. Capstone course for Botany and Biology majors. Prereq: Biol 315, 364, Bioc 260 or 460.

722 Current Topics in Cell and Molecular Biology **3**
Advanced studies on selected current topics in cellular and molecular biology.

Botany (Bot)

149 Plants and People **3**
Study of the numerous ways plants affect human existence. Emphasis on major groups of useful plants and their impact on civilization.

170 Plant Form and Diversity **4**
Survey of plants and plant-like organisms, with emphasis on the structure and function of vascular plants. Prereq: Biol 150.

314 Systematic Botany **3**
Principles of plant systematics as illustrated by study of variation within and relationship between selected families and orders of vascular plants. Prereq: Bot 170.

315, 315L [311, 312] **Genetics, Lab (CCN)** **3,1**
See Plant Sciences for description.

380 Plant Physiology **4**
Broad coverage of plant growth and metabolism including water relations, mineral nutrition, photobiology, carbon fixation, metabolic processes, stress responses, developmental biology, and growth regulation. Prereq: Bot 170.

431/631 Intermediate Genetics **3**
See Plant Sciences for description.

450/650 Range Plants **3**
See Animal and Range Sciences for description.

452/652 Plant Structure **3**
See Plant Pathology for description.

460/660 Plant Ecology **3**
Ecological structure, processes, and patterns observed with plant communities and populations as influenced by environmental conditions. Illustrations provided with local fieldwork. Prereq: Bot 170. Cross-listed with ARSc.

471/671 Phycology **3**
Identification, systematics, evolution, ecology, life histories, physiology, cytology, and culture of algae. Prereq: Bot 170.

472/672 Lichenology **3**
Biology, ecology, and systematics of lichen fungi. Prereq: Bot 170.

480/680 Plant Tissue Culture **2**
Introduction to the culture of plant cells, tissues, organs, and protoplasts and its applications. Prereq: Bot 170.

714 Advanced Systematic Botany **2**
Discussion of cytotaxonomy, biochemical systematics, experimental biosystematics, and mathematical systematics. Emphasis on using related data in the study of systematic problems. Prereq: Bot 314.

716 Agrostology **3**
See Animal and Range Sciences for description.

717 Aquatic Vascular Plants **2**
See Animal and Range Sciences for description.

720 Advanced Cell Biology **3**
In-depth survey of cell biology, including studies of membranes, secretion cytoskeleton, cellular movement organelles, and gene regulation. Prereq: Bioc 702.

762 Environment and Adaptation **3**
Environmental factors and responses evidenced with life-history patterns, genetic variation, population dynamics, species-interactions, and physiological processes. Prereq: Bot 460/660.

764 Ecological Processes **3**
Ecosystem dynamics (short-term, successional, evolutionary), component interactions, ecological energetics, and biogeochemical transfers, with consideration of anthropogenic aspects. Historical and theoretical viewpoints included. Prereq: Bot 460/660.

780 Plant Metabolism **4**
Study of the characteristic metabolic pathways and enzyme systems of higher plants in relation to subcellular organization. Prereq: Bot 380, Bioc 460.

782 Regulation of Plant Growth **4**
Role of hormones, water, and mineral elements in plant growth. Ion and water absorption and translocation. Hormone dynamics. Emphasis on recent molecular studies of hormonal regulation. Prereq: Bot 380, Bioc 460.

784 Photobiology of Plants **4**
Photosynthesis, pigments, light regulated metabolism, photoreceptors, photoperiodism, photomorphogenic responses. Emphasis on recent molecular studies of photoregulation. Prereq: Bot 380, Bioc 460.

BUSINESS ADMINISTRATION (Busn)

Leitch, Dean; Bahrami, Froelich, Garrison, Jacobson, Jones, Knoepfle, Latimer, Macintosh, Martin, Rymph, Smith, Stevens, Traub, Vijayasarathy, Walker

COURSES

280 Introduction to Business **3**
Survey of the general nature, surroundings, and organization of business and management.

(All courses 300 level and above require a minimum of junior standing.)

310 International Business **3**
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. Prereq: Junior standing.

318 Taxation in Management Decisions **3**
See Accounting for description.

340 Principles of Finance 3
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, 201, Econ 201, 202, Stat 330.

347 Principles of Real Estate 3
See Agricultural Economics for description.

350 Foundations of Management 3
Study of the major functional areas of management including an international perspective of management. Prereq: Psyc 111.

351 Foundations of Organizational Behavior 3
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: Busn 350.

352 Operations Management 3
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: Busn 350, Math 146.

360 Foundations of Marketing 3
Survey of the four basic areas of marketing: product, price, place, and promotion. Exposure to consumer behavior and strategic marketing from an international perspective.

361 Marketing Management 3
Focus on analysis, planning, implementation, and control of worldwide marketing programs for the purpose of achieving an organization's objectives. Prereq: Busn 360.

362 Foundations of Retailing 3
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: Busn 360.

370 Management Information Systems 3
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 146.

372 Global Retailing 3
See Apparel, Textiles, and Interior Design for description.

374 Cooperatives 3
See Agricultural Economics for description.

375 Database Design for Business Application 3
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: Busn 370, CSci 228.

376 Data and Telecommunications Administration 3
Introduction to a wide variety of topics in the voice and data communications field. Prereq: Busn 370, CSci 228.

413 Business Internship 3
Supervised professional experience with an appropriate public or private business. Students must meet standards established by the employer and the College of Business Administration.

430/630 Legal and Social Environment of Business 3
Study of legal and regulatory environment in which business firms operate, as well as the social environment. Includes business ethics and social responsibility issues.

431, 432 Business Law I, II 3 each
Study of the principles of law encountered in business including the law of contracts, torts, property and bailments, sales, commercial paper, creditor's rights, and business organizations. Prereq for 432: Busn 431.

435/635 International Business Law 3
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.

441/641 Investment Analysis and Management 3
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: Busn 340 or 540.

442/642 Speculative Markets 3
Evaluation of options, futures, and other derivative securities used for hedging, speculation, and arbitrage. Related market structure, trading strategies, and risks are examined. Prereq: Busn 441/641 or 444/644.

443/643 Management of Financial Institutions 3
Development, role, and functions of depository financial institutions. Emphasis on domestic and international regulation, structure, management, and operations of commercial banks. Prereq: Busn 340 or 540.

444/644 Money and Capital Markets 3
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: Busn 340 or 540.

445/645 International Finance 3
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: Busn 340.

450/650 Human Resource Management 3
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: Busn 350.

451 Managerial Economics 4
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: Busn 350, Econ 201, 202, Math 146.

452 Compensation Management 3
Study of the human resource management function of compensation. Topics include the analysis and evaluation of jobs, wage determination, pay-for-performance, and employee benefits. The impact of compensation on recruitment, employee satisfaction, and performance is examined. Prereq: Busn 450.

453 Cultural Pluralism and the Management of Organizations 3
Use of case analysis and experiential learning to consider implications of cultural pluralism at three management levels: personal values, beliefs, and actions; group dynamics; institutional policies, practices, and norms. Prereq: Busn 350.

454/654 International Management 3
Focused on management challenges associated with business activity across national boundaries. Development of management skills for global contexts. Prereq: Busn 350.

460/660 Consumer Behavior 3
Examination of dimensions of consumer buying theories. Aimed at understanding the buying behavior of customers. Prereq: Busn 360.

461/661 Advertising and Integrated Marketing Communication 3
Examination of the use of advertising as part of he worldwide marketing function; prepares the student to analyze and plan integrated marketing communication campaigns. Prereq: Busn 360.

462/662 Sales and Sales Force Management 3
Examination of different aspects of effective personal selling with focus on decision areas pertaining to sales force management. Prereq: Busn 360.

464/664 International Marketing 3
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: Busn 360.

470 Information Systems 3
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: Busn 370.

483/683 Organizational Communication 3
See Communication for description.

486 Senior Thesis 3
Directed development of a paper showing the application, synthesis, and integration of business concepts. Prereq: Instructor approval.

489 Strategic Management 4
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: Busn 340, 350, 360, 430, senior standing.

520 Financial and Managerial Accounting 3
Intensive single semester treatment of accounting emphasizing concepts. Includes a study of accounting information for analytical, product costing, and decision-making purposes.

540 Corporate Finance 3
Survey of financial management covering financial mathematics, financial planning and analysis, sources of capital, capital budgeting, and working capital management. Emphasis on firm value maximization concepts. Prereq: Busn 520, Stat 331.

551 Production/Operations Management 3
Overview of the operations management field. Includes operations strategy, production technology, operation planning, facility location/layout, inventory management, MRP, just-in-time manufacturing, productivity management, and total quality management. Prereq: Busn 350, Stat 331.

571 Management Information Systems 3
Fundamental concepts in management information systems. Discussion of information needs of managers at a conceptual level followed by hands-on experience in solving business problems. Prereq: CSci 146.

720 Advanced Managerial Accounting 3
Study of various forms of control in business organizations with emphasis on accounting controls such as budgets, variances, and performance measurement. Prereq: Busn 520.

740 Advanced Financial Management 3
In-depth coverage of concepts and decision-making tools in financial analysis, cost of capital, capital structure, capital budgeting, and dividend policy. Emphasis on risk analysis, international perspectives, and current topics in corporate finance. Prereq: Busn 340 or 540.

750 Advanced Organizational Behavior 3
Study of theory and current management research dealing with individual and small-group behavior in organizations. Topics include motivation, reward, job satisfaction, stress, communication, and conflict resolution. Prereq: Busn 350.

751 Advanced Operations Management 3
Advanced study of concepts and technologies used by service and manufacturing firms with emphasis on process analysis and improvements. Includes demonstration and application of techniques such as simulation, linear/integer programming, and project scheduling. Prereq: Stat 330.

752 Industrial Relations and Negotiation 3
Study of the impact of the law on labor-management relations, negotiation theory, strategy, and tactics including application to dispute resolution. Prereq: Busn 350.

760 Strategic Marketing Management 3
Focus on the major decision areas that marketing executives face in their efforts to match the objectives and resources of the organization with the needs and opportunities in the marketplace. Prereq: Busn 360.

761 Marketing Research 3
Study of research methods with focus on research design, data collection, and analysis techniques. Prereq: Busn 760.

770 Information Resources Management 3
Examination of the role of information resources in supporting a wide range of organizational functions by providing a managerial perspective on the use, design, and evaluation of information systems. Focus is managerial rather than technical. Prereq: Departmental approval.

780 Business Conditions Analysis 3
Preparation of students to analyze domestic and global economic factors that impact the U.S. and world economy. Prereq: Busn 540, 720, 760.

789 Business Policy and Strategy 3
Process and tools of strategy formulation and implementation in a variety of organizational environments. Prereq: Busn 720, 740, 750, 751, 760.

CEREAL SCIENCE (CS)

Gordon, Chair; Bhattacharya, Chang, Hall, Khan, Manthey, J. Schwarz, P. Schwarz, Wiesenborn; Adjunct Faculty: Doehlert, Grant, Hareland

COURSES

210 Introduction to Food Science and Technology 2
Overview of food components, food quality, nutrition, processing, packaging, safety, sanitation laws, sensory evaluation, distribution, and utilization. Cross-listed with F&N.

430/630 Food Unit Operations 2
Thermodynamics, materials and energy balance, mechanical separation, fluid flow, heat transfer, heat exchange, all related to food processing. Prereq: Math 147, Phys 211, 211L.

431/631 Food Unit Operations Laboratory 1
Experiments and field trips relevant to 430/630, with emphasis on application of mass and energy balances and heat transfer to food processing operations. Coreq: CS 430/630.

450/650 Cereal Technology 3
Discussion of cereal grains, their properties, evaluation, and utilization.

460/660 Food Chemistry 3
Study of food components including water, carbohydrates, lipids, proteins, vitamins, minerals, and enzymes. Prereq: CS 210, Chem 341, 341L, Bioc 460.

461/661 Food Chemistry Laboratory 1
Laboratory isolation, observation of characteristics, and quantitation of food components. Coreq: CS 460/660.

470/670 Food Processing 3
Capstone course integrating principles of food chemistry, food microbiology, food engineering, nutrition, statistics, and sensory evaluation through the discussion of food processing operations. Prereq: CS 450, 460, or departmental approval.

471/671 Food Processing Laboratory 1
Field trips, experiments on freezing, freeze drying, spray drying, canning, beverage production, water activity measurements, shelf life, and quality control. Coreq: CS 470/670.

758 Fundamentals of Flour Testing and Baking 3
Flour testing, industrial, and experimental bread baking. Production methods, ingredients, and baking reactions. Lectures and laboratories. Prereq: CS 450/650.

759 Milling 3
Experimental and industrial feed and flour milling. Production, equipment, and factors involved in the milling process. Lectures and laboratories. Prereq: CS 450/650.

760 Pasta Processing 2
Durum wheat quality, pasta production, and pasta quality evaluation. Lectures and laboratories. Prereq: CS 450/650.

761 Malting and Brewing **2**
Barley and malt quality; malting and brewing. Lectures and laboratories. Prereq: CS 450/650.

764 Cereal Carbohydrates **2**
Carbohydrates (monosaccharides, oligosaccarides, and polysaccharides) of cereals with emphasis on barley, wheat, and flour and their importance in industrial products. Prereq: Bioc 701.

765 Cereal Science Lipids **2**
Lipids with emphasis on cereals; chemical and physical properties in foods. Prereq: Bioc 701.

766 Cereal Proteins **2**
Cereal proteins with emphasis on barley and wheat; their biochemistry and role in industrial processing and food properties. Prereq: Bioc 701.

767 Cereal Enzymes and Bioprocessing **3**
Discussion of enzymes with emphasis on wheat, barley, and malt, their biochemistry and role in industrial applications. Industrial fermentation with review of major pathways, cell growth in batch and continuous culture, and downstream processing. Prereq: Bioc 701.

CHEMISTRY (Chem)

McCarthy, Chair; Boudjouk, Campiglia, Cook, Eaton, Garvey, Gillispie, Hershberger, Jacobson, Mallik, Page, Rasmussen, Rodgers, Sibi, Tallman

COURSES

117, 117L [110, 111] **Chemical Concepts and Applications, Lab (CCN)** **3,1**
Introduction to general and organic chemistry, with applications drawn from the health, environmental, and materials sciences. Prereq: Math 103 or equivalent. (ND:LabSc)

121, 121L [120, 130] **General Chemistry I, Lab (CCN)** **3,1**
Matter, measurement, atoms, ions, molecules, reactions, chemical calculations, thermochemistry, bonding, molecular geometry, periodicity, and gases. Prereq or coreq: Math 103. (ND:LabSc)

122, 122L [121, 131] **General Chemistry II, Lab (CCN)** **3,1**
Intermolecular forces, liquids, solids, kinetics, equilibria, acids and bases, solution chemistry, precipitation, thermodynamics, and electrochemistry. Prereq: Chem 121, 121L. (ND:LabSc)

140 Organic Chemical Concepts and Applications (CCN) **1**
Introduction to organic chemistry for pre-nursing and other students who need to meet the prerequisite for Chem 260.

150, 160 Principles of Chemistry I, Lab **3,1**
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.

151, 161 Principles of Chemistry II, Lab **3,1**
Liquids and solids, equilibrium, kinetics, thermodynamics, acids and bases, oxidation-reduction chemistry, electrochemistry. Prereq: Chem 150, 160.

240 [241] **Survey of Organic Chemistry (CCN)** **3**
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.

260 Elements of Biochemistry (CCN) **4**
See Biochemistry for description.

341, 341L [341, 351] **Organic Chemistry I, Lab (CCN)** **3,1**
First semester of a two-semester course in organic chemistry for students in sciences and pre-professional curricula. Prereq: Chem 122, 122L.

342, 342L [342, 352] **Organic Chemistry II, Lab (CCN)** **3,1**
Structure and reactivity, named reactions, carbon-carbon bond forming reactions, aromatic and heterocyclic chemistry, biomolecules and polymers, and multistep synthesis. Prereq: Chem 240 or 341, 341L.

353 Majors' Organic Chemistry Laboratory I **1**
Organic functional group synthesis. Modern analytical tools for functional group analysis and structure determination. Coreq: Chem 341.

354 Majors' Organic Chemistry Laboratory II **2**
More advanced aspects of organic laboratory operations, synthesis, analysis, and structure determination using spectroscopic techniques. Coreq: Chem 342.

364, 365 Physical Chemistry I, II **4 each**
Mathematical and physical basis of chemical phenomena. Quantum chemistry and chemical kinetics. Thermodynamics and statistical mechanics. Prereq for 364: Chem 151, Math 266, Phys 252; Prereq for 365: Chem 364.

380 Chemistry Junior Seminar **1**
Includes discussion of chemistry topics, technical writing instruction and assignments; participation in senior seminar discussions.

425/625 Inorganic Chemistry I **3**
Electronic structure, ionic and covalent structure and bonding, point groups and symmetry, coordination chemistry, acid-base and redox chemistry. Prereq: Chem 364.

426/626 Crystallography/Crystal Chemistry **2**
Geometric and space group crystallography. Structure and bonding in common minerals and industrially important solids. Structure-property relationships. Half semester. Cross-listed with Geol.

427/627 X-Ray Diffraction **2**
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. Cross-listed with Geol.

428/628 Geochemistry **3**
See Geology for description.

429 Inorganic Chemistry Laboratory **2**
Methods of synthesis and characterization of inorganic and organometallic compounds. Capstone laboratory experience for ACS certified chemistry majors. Coreq: Chem 425.

431, 431L [330, 331] **Analytical Chemistry I, Lab** **3,2**
Chemical equilibrium and its analytical applications; introduction to chromatography and potentiometry. Prereq: Chem 122, 122L or 151, 161.

432/632, 432L/632L [430/630] **Analytical Chemistry II, Lab** **3,1**
Theory and application of modern instrumental techniques, including spectroscopy and electrochemistry. Prereq: Chem 431, 431L.

471 Physical Chemistry Laboratory **2**
Measurement of thermodynamic and spectroscopic properties of chemical substances, analysis of data. Prereq: Chem 364.

486/686 Corrosion and Its Control by Coatings **2**
See Polymers and Coatings for description.

725 Inorganic Chemistry II **4**
Molecular symmetry, molecular orbital and valence bond theories, inorganic reactions and mechanisms. Prereq: Chem 425.

726 Inorganic Photochemistry **2**
Principles underlying the photochemical reactivity of coordination and organometallic compounds; photochemical and photophysical experimental techniques. Half semester. Prereq: Chem 725.

727 Organometallic Chemistry **2**
Synthesis, reactivity, and bonding in organometallic compounds. Half semester. Prereq: Chem 725.

728 Physical Methods in Inorganic Chemistry **2**
Physical methodology especially appropriate to the characterization of inorganic and organometallic compounds. Includes electronic, vibrational absorption, electronic spin resonance, Mössbauer spectroscopy and nuclear magnetic resonance methods. Prereq: Chem 725.

729 X-Ray Structure Determination **2**
Use of single crystal X-ray diffraction data to determine molecular and crystal structures. Half semester. Prereq: Chem 626 or 627.

730 Equilibrium and Separations **4**
Theory of equilibrium chemistry in aqueous and nonaqueous systems; principles of chromatographic and other separation techniques. Prereq: Chem 432/632.

732 Electrochemistry 4
Theory and application of modern electrochemical methods, including potentiometry, voltammetry, electrochemical impedance spectroscopy, kinetics and mechanisms of electrode processes, corrosion, simulation techniques, and instrumentation. Prereq: Chem 432/632.

734 Instrumentation Electronics 5
Design and operation of digital and analog circuits used in chemical instrumentation, computer interfacing. Includes laboratory. Prereq: Chem 432/632.

736 Mass Spectrometry 2
Theory and application of mass spectrometry in analysis, tandem mass spectrometry, ionization techniques. Half semester. Prereq: Chem 432/632.

737 Gas Phase Ion Chemistry 2
Principles and applications of gas phase ion techniques to the study of the chemical and physical properties of reactive intermediates. Half semester. Prereq: Chem 736.

741 Physical Organic Chemistry I 4
Principles governing the reactivity of organic compounds and methods for determining reaction mechanisms.

742 Physical Organic Chemistry II 2
Aromaticity, electrophilic substitution, Woodward-Hoffman rules. Half semester. Prereq: Chem 741.

743 Reactive Intermediates 2
Radicals, carbenes, nitrenes, arynes, carbenium ions, survey of other reactive intermediates. Half semester. Prereq: Chem 741.

744 Organic Spectroscopy 2
Structure elucidation by spectrometric methods, including infrared, mass spectrometry, UV, and nuclear magnetic resonance. Interpretation of 2-D NMR spectra. Half semester.

745 Organic Synthesis 2
Functional group synthesis, synthetic design, stereochemical control. Half semester. Prereq: Chem 741.

746 Advanced NMR Spectrometry 2
Theory of pulsed FT-NMR, instrumentation, pulse sequences (with emphasis on multipulse experiments), two-dimensional NMR and applications. Half semester. Prereq: Chem 744.

754 Organic Spectroscopy Laboratory I 1
Laboratory to accompany Chemistry 744, with emphasis on NMR techniques. Half semester. Coreq: Chem 744.

759 Intermediate Physical Chemistry 3
Fundamental principles of physical chemistry including quantum chemistry, spectroscopy, molecular thermodynamics, and kinetics.

760 Statistical Thermodynamics 4
Macroscopic and microscopic models for the study of equilibrium properties of pure phases and solutions. Prereq: Chem 365.

761 Optical Spectroscopy 2
Theory and practice of modern spectroscopic methods. Emphasis on visible and ultraviolet wavelength ranges. Half semester. Prereq: Chem 632.

763 Kinetics 2
Experimental methods to determine reaction rates, empirical rate laws, transition state theory. Half semester. Prereq: Chem 365.

764 Dynamics 2
Chemical physics of energy transfer and reactive collisions. Half semester. Prereq: Chem 763.

766 Quantum Chemistry I 4
Wave functions and their properties, quantum mechanical behavior of atoms and molecules. Prereq: Chem 365.

767 Quantum Chemistry II 2
Ab initio and semi-empirical methods for the calculation of energetic and structural properties of molecules; computational methods. Half semester. Prereq: Chem 766.

CHILD DEVELOPMENT AND FAMILY SCIENCE (CDFS)

Deal, Chair; Bailey, Brotherson, DeHaan, Duggan, Fitzgerald, Habedank, Kaler, Light, Sanders, Soderquist, Storlie

COURSES

135 Family Science 3
Introduction to family science concepts including family life cycle, different styles of family life, and the influence of society on the family.

138 Intimate Relationships 2
Study of the dynamics of interpersonal and intimate relationships.

151 Child Development Practice 4
Knowledge and skills to promote the physical, intellectual, social, and emotional development of young children in group settings. Includes Child Development Associate (CDA) functional areas.

186 Consumer and Society 3
Consumer rights, responsibilities, and consequences of consumer decision making. Overview of advertising, fraud, and other issues.

230 Life Span Development 3
Study of human growth and development throughout the life span.

232 Prenatal/Infant Development 3
A functional approach to the study of growth and development of the infant during the first two years of life. Prereq: CDFS 230 recommended.

242 Marriage and the Family 3
Study of factors related to mate selection, marital dynamics, and family relationships.

247 Creative Family Management 3
Management decision making, goal setting, and resource allocation within families. Factors affecting decision conflict.

248 Issues of Housing 3
A cross-cultural perspective of physical, social, psychological, and managerial aspects of housing.

330 Child Development 3
Study of children, birth through middle childhood. Emphasis on social, cognitive, physical, and emotional development. Prereq: CDFS 230 recommended.

341 Parent-Child Relations 3
Contemporary parenting principles and strategies. Emphasis on application in the home and professional settings. Prereq: CDFS 230.

353 Children, Families, and Public Policy 3
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: CDFS 135.

357 Personal and Family Finance 3
Factors influencing decisions on acquiring and using financial resources and budgeting to achieve goals. Overview of credit, taxation, savings, insurance, and investments. Prereq: CDFS 186 recommended.

364 Consumer Protection and Legislation 3
Advanced study of consumer issues and governmental policies. Discussion of consumer education resources and their potential in communicating concepts of rational consumer behavior. Prereq: CDFS 186 recommended.

371 Guidance and Curriculum in Preschool Programs 4
Examination of philosophies, curriculum models, and guidance techniques in the field of childhood care and education, including sensitivity to cultural diversity. Prereq: CDFS 230, 330.

372 Child and Family Services 2
Study of service agencies and delivery ethics, legislation, and laws associated with child and family services. Prereq: CDFS 135, 230.

381 Creative Activities for Children 3
Study of developmentally appropriate activities for infants, toddlers, and preschoolers. Prereq: CDFS 230, 330; Coreq: CDFS 382.

382 Implementing Creative Activities for Children 2
Supervised implementation and evaluation of developmentally appropriate activities for infants, toddler, and preschoolers. Prereq: CDFS 230, 330; Coreq: CDFS 381.

425/625 Children and Stress 3
Survey of theory and research relating to children's reactions to stress and coping, infancy through adolescence. Examination of strategies for working with children, including topics on children's reactions to divorce, sibling death, and hospitalized children. Prereq: CDFS 230, 6 credits of social science.

448/648 Issues in Sexuality 3
Study of personal, interpersonal, and societal meanings of human sexuality. Decision making relevant to sexual behavior. Prereq: Psyc 210 recommended.

450/650 Adolescent Development 3
Study of physical, social, cognitive, and emotional development of adolescents. Includes examination of contemporary issues related to this age group. Prereq: CDFS 230, 6 credits of social science.

460/660 Adult Development and Aging 3
Study of development during adulthood and later life. Emphasis on perceptual-motor and cognitive functioning, personality, adjustment, social, familial, and cultural aspects of adulthood. Prereq: CDFS 230, 6 credits of social science.

462/662 Family Crisis 3
Effects of crisis-producing situations on adjustment within the family. Intervention strategies. Prereq: CDFS 135, 6 credits of social science.

468/668 Women in Economic Systems 3
Study of economic behavior and circumstances of women in various economic systems worldwide. Policies of economic institutions and their impact on women. Prereq: 6 credits of social science.

471/671 Program Administration and Professional Relations 3
Overview of policies, strategies, and skills involved in administration of early childhood programs. Includes parent-professional relations. Prereq: CDFS 230, 330, 371, 381; CDFS 341 recommended.

475/675 Children and Families Across Cultures 3
Study of developmental and family issues as viewed from a cross-cultural diversity perspective. Prereq: 6 credits of social science.

477/677 Financial Counseling 3
Advanced analysis of family financial issues. Evaluation of alternative financial programs. Prereq: CDFS 357.

478/678 Financial and Consumer Issues of Aging 3
Integration of economic and consumer problems of the elderly including income trends in retirement and health care. Prereq: 6 credits of social science.

480/680 Language and Cognition in Children 3
Study of developmental research and theoretical approaches to learning and cognitive development in children from birth through adolescence. Prereq: CDFS 230, 330.

482/682 Family Dynamics of Aging 3
Examination of issues related to family life in the later years from the perspectives of the elderly and the family. Prereq: 6 credits of social science.

483/683 Family Wellness 3
Principles and theories of family wellness/enrichment. Includes study of preventive and enrichment programs for couples and families. Prereq: CDFS 135, 6 credits of social science.

485 Capstone Experience in CDFS 3
Integration and application of concepts. Emphasis on theory and research in CDFS, processing and presenting information, and community service. For CDFS majors who will graduate within one year. Prereq: CDFS major, senior standing.

486/686 Children in Social Contexts 3
Critical examination of research and theory on social relationships established in childhood and adolescence. Special attention given to the development of peer relationships and school contacts and contexts specific to certain children. Prereq: CDFS 330.

487 Practicum in Child Development Programs 1-7
Supervised on- or off-campus experience in early childhood settings. Application of theoretical and practical knowledge as a professional. Prereq: Grades of C or better in CDFS 330, 341, 371, 381; First aid and infant/toddler CPR certification.

488/688 Exceptional Child and Family 3
Study of children and their families who vary from the norm in development and functioning. Prereq: CDFS 230, 6 credits of social science.

703 Research Methods in Child Development and Family Science 3
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.

773 Foundations of Marital and Family Therapy I 3
Introduction to theoretical foundations of marital and family therapy and the historical and contemporary development of the field.

774 Foundations of Marital and Family Therapy II 3
Study of critical epistemological issues in the field of marriage and family as they relate to contemporary models in the practice of therapy.

775 Clinical Applications in Marital and Family Therapy I 3
In-depth study of current approaches to family therapy. Emphasis on contextual, structural, and strategic approaches.

776 Clinical Applications in Marital and Family Therapy II 3
In-depth study of current approaches to family therapy. Emphasis on constructivist approaches. Application in the clinical practice of marital and family therapy.

777 Diagnosis and Assessment in Marital and Family Therapy 3
Training in methods of diagnosis and assessment in mental health issues using DSM-IV criteria as applied to the discipline of marital and family therapy.

780 Ethics and Professional Issues in Marital and Family Therapy 3
Study of legal responsibilities, ethical issues, and professional matters as they pertain to the practice of marital and family therapy.

781 Family Systems 3
Advanced study of contemporary family systems with emphasis on research, ethics, media, and current family issues. Prereq: Graduate standing.

782 Advanced Human Development 3
In-depth examination of research and theory in lifespan development. Topics include physical, cognitive, social, sexual, and emotional development across the lifespan. Discussion of implications for development and implementation of services for children and families. Prereq: CDFS 784 or departmental approval.

783 Dynamics of Parent-Child Relations 3
Study of selected theories and research in parent-child relations. Emphasis on interaction between adults and children from infancy to youth. Prereq: CDFS 784 or 785 or departmental approval.

784 Theories of Child Development 3
Examination and comparison of both historical and cutting-edge theories of child development. Exploration of links between theory and researching and working with children.

785 Family Theory 3
Identification and analysis of theoretical approaches to research on the family. Study of frameworks currently used.

788 Physical and Motor Development of Children 3
Theory and research in developmental processes and individual differences from birth through youth. Prereq: CDFS 784 or departmental approval.

CIVIL ENGINEERING (CE)

Padmanabhan, Chair; Andersen, Bengtson, Katti, Kellogg, La Palm, Lin, Nelson, Varma, Yazdani

COURSES

111 Introduction to Civil Engineering 1
Introduction to engineering, duty and role of the professional engineer, phases of engineering activity, computer applications with word processing, and spreadsheets. 1 one-hour lecture, 1 one-hour laboratory.

113 Elements of Surveying 2
Surveying for non-CE students. Importance of measurements and errors and use of surveying instruments for obtaining field data and valid measurements. 1 one-hour lecture, 1 three-hour laboratory. Prereq: Math 105.

204 Surveying 4
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.

303 Civil Engineering Materials 3
Physical and chemical properties of different types of bituminous materials and Portland cement concrete; industry standards and tests for evaluating raw materials and mix designs. 2 one-hour lectures, 1 three-hour laboratory. Prereq: CE 316 or CM&E 320.

309 Fluid Mechanics 3
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.

310 Fluid Mechanics Laboratory 1
Visualization and verification of the concepts of fluid flow, pumps, turbines, and flow meters. 1 two-hour laboratory. Prereq: CE 309.

316 Soil Mechanics 3
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 223.

320 Elements of Structures I 3
Analysis of statically determinate structures, including beams and frames. Study of the design of steel elements and structural systems. 2 lectures, 1 three-hour session. Prereq: ME 223 or 228.

332 Introduction to Structural Engineering 3
Structural systems, building materials, structural loading, review of free-body diagrams, shear and bending moment diagrams, moving loads, pattern loading, building codes, and deflection in beams, frames, and trusses. 2 one-hour meetings, 1 three-hour calculation period. Prereq: ME 223.

343 Structural Analysis 3
Analysis of structures by classical and matrix methods; elastic deflections of trusses, beams, and frames; indeterminate analysis by compatibility and equilibrium methods; generalized matrix formulations. 3 one-hour lectures. Prereq: CE 332.

370 Introduction to Environmental Engineering 3
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.

371 Environmental Engineering Laboratory 1
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.

404/604 Reinforced Concrete* 3
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.

405/605 Advanced Reinforced Concrete 2
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.

408 Water Resources and Supply 3
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: Chem 122, CE 309.

410/610 Water and Wastewater Engineering 3
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: Chem 122, CE 309.

411/611 Design of Prestressed Concrete 2
Theory and design of prestressed concrete structures, pre- and post-tensioning, loss of prestress, proportioning of flexural members, deflections. 2 one-hour lectures. Prereq: CE 404.

415/615 Civil Engineering Systems* 2
Planning, evaluating, managing, and modeling of civil engineering projects using systems approach; CPM analysis; simulation decision analysis; optimization techniques utilizing computers and microcomputers. 2 one-hour lectures. Prereq: Math 265.

417/617 Slope Stability and Retaining Walls 2
Performance and design of retaining walls, sheet pile walls, braced walls, and reinforced earth. Also evaluation and mitigation of unstable earth slopes. 2 one-hour lectures. Prereq: CE 316.

418/618 Transportation Engineering* 4
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.

419/619 Pavement Design 3
Design of flexible and rigid pavements including subgrade, base courses, surface courses; evaluation criteria including soil, climate, traffic, material, drainage; initial and maintenance cost considerations; construction practices. 2 one-hour lectures, 1 two-hour session. Prereq: CE 316.

421/621 Open Channel Flow 3
Geometric and hydraulic properties of open channels, momentum and energy principles, design of channels for uniform flow, gradually varied and rapidly varied flow. 2 one-hour lectures. Prereq: CE 309.

430/630 Timber and Form Design 3
Analysis and design of wood structures and concrete form work. 2 one-hour lectures, 1 three-hour session. Prereq: ME 223.

441/641 Finite Element Analysis 2
Weak and strong solutions to governing differential equations in bars, boundary conditions, Galerkin approximation, nodal basis functions, shape functions. Two-dimensional problems with triangular and quadrilateral elements. 2 two-hour lectures.

442/642 Matrix Analysis of Structures 2
Review of matrix algebra, flexibility and stiffness methods, direct stiffness method, introduction to finite element analysis. 2 lectures. Prereq: CE 343.

444/644 Structural Steel Design* 3
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.

445/645 Advanced Steel Design 2
Analysis and design of metal structures including connections, selection of structural systems. 1 one-hour lecture, 1 two-hour session. Prereq: CE 444.

446/646 Basic Dynamics of Structures 3
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.

447 Computer-Aided Structural Design 2
Computer-aided structural steel design. Emphasis on using the software (ISDS) and verifying results. 2 one-hour lectures.

451/651 Advanced Surveying 2
Property description and legal land surveys. Astronomical observations to establish position and direction. State plane coordinates. 2 one-hour lectures. Prereq: CE 204.

454/654 Geometric Highway Design 3
Location and design of highways and streets; design controls, elements of design; cross-section and alignment; design of intersections, interchanges, safety appurtenances, and noise barriers. 2 one-hour lectures, 1 two-hour session. Prereq: CE 418.

455/655 Airport Planning and Design 2
System planning and demand forecasting; siting and configuration of airports; aircraft characteristics; air traffic controls; standards for geometric design, pavement design, earthwork, drainage, lighting, and marking. 2 one-hour lectures. Prereq: CE 418.

456/656 Railroad Planning and Design 2
Rail planning and location analysis, track/rail structure, track layout and control system, locomotives and train resistance, track safety standards and geometrics, terminal design. 2 one-hour lectures. Prereq: CE 418.

457/657 Pavement Management Systems 2
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 418, 419.

461/661 Foundation Engineering 2
Performance and selection of the following foundations: shallow, mat, combined pile, and drilled piers. 2 one-hour lectures. Prereq: CE 316.

462/662 Designing with Geosynthetics 2
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.

472/672 Solid Waste Management 3
Basic study of solid waste materials, current collection methods, available disposal techniques, recycling and resource conservation, and economics of solid waste collection and disposal. 3 one-hour lectures. Prereq: CE 370, 408.

473/673 Air Pollution 3
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.

475/675 Topics in Hydrology and Hydraulics 2
Principles of hydraulics and hydrology, flow in open channels and pipes, hydrologic and hydraulic design of water control and conveyance structures, pumps and turbines, sedimentation in streams and reservoirs, and model studies. 2 one-hour lectures. Prereq: CE 309.

477/677 Applied Hydrology 3
Scope of hydrology, probabilistic concepts in water resources, regional frequency analysis, application of risk concepts to hydrologic design, hydrologic data generation for ungaged watersheds, hydrologic modeling. 2 one-hour lectures. Prereq: CE 408.

478/678 Water Quality Management 3
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 408, 410.

479/679 Advanced Water and Wastewater Treatment 3
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 408, 410.

482 AutoCAD 1
Introduction to the fundamentals of the AutoCAD computer package, with applications for civil engineering and architecture. Prereq: PC skills.

483 Contracts and Specifications 3
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.

489 Senior Design 2
An open-ended capstone design project encompassing a number of the disciplines within civil engineering. 2 one-hour lectures. Prereq: Senior standing.

671 Water and Wastewater Laboratory 2
Emphasis on recent developments in and standard methods of water and wastewater analysis. Studies of efficiency, operation, and evaluation of water and wastewater treatment. 1 one-hour lecture, 1 three-hour laboratory. Prereq: CE 408, 410.

**Courses CE 604, 615, 618, and 644 are not acceptable for credit in graduate programs in Civil Engineering (M.S. or Ph.D.).*

701 Theory of Elasticity 2
A theoretical study of linear elasticity, Saint Venant's problems, plain stress, plain strain, strain energy, and torsion. 2 one-hour lectures.

702 Plates and Shells 2
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.

706 Plastic Design in Structural Steel 2
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.

707 Numerical Methods in Structural Engineering 3
Methods of successive approximations in stress, vibrations, and stability analysis of structural members and frames; numerical methods for the calculation of beam deflections, buckling of nonuniform columns, diaphragms, and webs. 3 one-hour lectures.

709 Dynamics of Structures and Foundations 2
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. Prereq: CE 446.

712 Ductile Structures 2
Ductile behavior of reinforced concrete structures, failure criteria, ductility of confined concrete, moment/rotation behavior of reinforced concrete members, collapse mechanism, and limit analysis. 2 one-hour lectures.

713 Structural Mechanics 2
Elements of classical mechanics: stress, strain, stress-strain relations, two dimensional problems in elasticity, torsion, axisymetrically loaded elements. Introduction to plates and shells. 2 one-hour lectures.

714 Theory of Elastic Stability 2
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.

720 Continuum Mechanics 3
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.

722 Theory of Models 2
Physical, analog, mathematical, and computer models; application of dimensional analysis to physical hydraulic model studies, scaling ratios, distorted models. 2 one-hour lectures. Prereq: CE 309.

762 Advanced Foundation Engineering 2
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 461/661.

770 Hazardous Waste Site Remediation 3
Hazardous waste site remediation, hazardous treatment technologies. 3 one-hour lectures. Prereq: CE 370, 408.

771 Rural and Non-Metropolitan Transportation Systems 3
See Agricultural Economics for description.

772 Rural Logistics and Distribution Management 3
See Agricultural Economics for description.

774 Statewide Transportation Planning 3
See Agricultural Economics for description.

776 Groundwater and Seepage 3
Groundwater as a resource, relation to hydrologic cycle, well hydraulics, seepage, ground water quality and contamination, ground water flow models. 2 one-hour lectures. Prereq: CE 408.

778 Transportation Administration 3
See Agricultural Economics for description.

780 Transportation Planning 3
Development and trends in travel demand forecasting; trip generation, trip distribution, mode choice, traffic assignment; transportation plans for modal, multi-modal, and paratransit alternatives; policy formulation and analysis. 3 one-hour lectures. Prereq: CE 418.

781 Traffic Engineering **3**
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. 2 one-hour lectures, 1 two-hour laboratory. Prereq: CE 418.

CLASSICAL LANGUAGES (Clas)

Andreini, Nichipor

COURSES

101, 102 [161, 162] **First-Year Latin I, II (CCN)** **4 each**
Introduction to forms, syntax, and vocabulary of classical Latin.

151, 152 [251, 252] **First-Year Greek I, II (CCN)** **4 each**
Introduction to forms, syntax, and vocabulary of Attic Greek along with selected readings.

180 [120] **Scientific Terminology: Greek and Latin (CCN)** **2**
Brief survey of prefixes, suffixes, and roots from Greek and Latin, which form the technical vocabulary for science and medicine.

201, 202 [261, 262] **Second-Year Latin I, II (CCN)** **3 each**
Designed to form a transition from introductory material to the Latin authors. Prereq for 201: Clas 102; Prereq for 202: Clas 201.

251, 252 [351, 352] **Second-Year Greek I, II (CCN)** **3 each**
Introduction to Koine Greek as found in the New Testament. Prereq for 251: Clas 152; Prereq for 252: Clas 251.

289, 290 [271, 272] **Biblical Hebrew I, II (CCN)** **3 each**
Fundamentals of Hebrew script, grammar, and syntax. Includes selected readings from Biblical prose.

350 Glory of Greece **3**
History of the ancient Greeks, their literature, politics, customs, art, and architecture.

360 Grandeur of Rome **3**
History of ancient Rome, its literature, politics, customs, art, and architecture.

361 Cicero **3**
Study of the life and times of Cicero through selections from his letters, speeches, and philosophical essays. Prereq: Clas 202.

362 Virgil **3**
Study of the poetry of Virgil with a concentration on the Aeneid. Prereq: Clas 202.

363 Advanced Latin Prose **3**
Readings from Roman historians and other writers of Latin prose. Prereq: Clas 202.

364 Advanced Latin Poetry **3**
Readings from Catullus, Horace, Ovid, and other Latin poets. Prereq: Clas 202.

370 Classical Mythology **3**
Study of the gods and heroes of the Greeks and Romans as found in classical and modern literature, sculpture, and painting.

451 Advanced Greek Prose **3**
Readings from Classical Greek philosophers, historians, and orators in the original. Prereq: Clas 252.

452 Greek Tragedy **3**
Appreciation of Greek drama through reading selections from Aeschylus, Sophocles, and Euripides in the original. Prereq: Clas 252.

CLINICAL LABORATORY SCIENCE (CLS)

(Medical Technology)
P. Olson

COURSES

111 Introduction to Clinical Laboratory Science (CCN) **1**
Introduction to the clinical laboratory science profession. 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 in the profession.

COMMUNICATION (Comm)

T. Sellnow, Chair; Brand, Burnett, Collins, Coumbe, Dyrstad, Gowin, D. Hindman, E. Hindman, Littlefield, Meister, Penuel, D. Sellnow, Vanhorn, Venette

COURSES

Mass Communication

112 Understanding Media and Social Change (CCN) **3**
Exploration of the purpose, function, and impact of media on society.

200 [210] **Introduction to Media Writing (CCN)** **3**
Introduction to writing in the styles and forms required in journalism, advertising, broadcasting, and public relations. Prereq: Engl 120.

240 [241] **Introduction to News Photography (CCN)** **3**
Introduction to the practice of photography and photographic composition.

242 Advanced News Photography (CCN) **3**
Further exploration of photography in all phases of news. Prereq: Comm 240.

310 Advanced Media Writing **3**
Construction of professional quality messages for print, public relations, and broadcast. Prereq: Comm 200 with grade of B or better.

313 Editorial Processes **3**
Principles of print media copy editing, headline composition, publication design, photo editing, and computer editing. Prereq: Comm 200.

340, 341 [301, 302] **Social Research Methods, Lab** **3,1**
See Sociology for description.

345 Principles of Broadcast Production **3**
Creation, critique, and analysis of audio production and single camera video productions with special emphasis on radio and television news. Prereq: Comm 112, 310.

362 Principles of Design for Print **3**
Applications of various design principles and pagination techniques to cognitive problem-solving involved in developing material for publication. Prereq: Comm 313.

370 Principles of Public Relations **3**
Public relations as a professional field; theory, principles, and practices used in solving public relations problems. Prereq: Comm 200.

425/625 Specialty Writing **3**
Methods and practice of writing features and opinion for print publications. Prereq: Comm 200, 310.

431/631 Communication Ethics **3**
Study of ethical theories and their role in conceptions of mass media responsibility. Capstone course.

434/634 Communication Law **3**
Exploration of speech and press protections of the First Amendment. Topics include libel, privacy, electronic media regulation, and speech regulation.

435/635 Popular Culture and Mass Media **3**
Analysis of popular culture messages (programming, content, and advertising) presented by the media as an expression of social values. Mediums include television, cinema, music, and radio.

436/636 Issues in Mass Communication **3**
Topical studies of media technologies and organizations in interaction with social, cultural, political, and economic realities. Media's impact on national life and thought. Prereq: Junior standing. May be repeated.

437/637 Mass Communication Theory **3**
Survey of social scientific, interpretive, and cultural critical theories used in mass media research and criticism. Prereq: Junior standing.

442/642 Information Technologies and Mass Media **3**
Study of mass media programming and management with an emphasis on the impact of new information technologies. Prereq: Junior standing.

443/643 Mass Media and Public Opinion **3**
Overview of theories and methodologies used in the study of the role of mass media in attitude formation, attitude change, and public opinion. Prereq: Junior standing.

445 Advanced Broadcast Production 3
Development of skills in the creation, critique, and analysis of television productions in the studio and in the field. Prereq: Comm 345.

472/672 Public Relations Campaigns 3
Social science research as applied to public relations, case study analysis, construction, and implementation of public relations campaigns. Prereq: Comm 370 or departmental approval.

473 Case Study in Public Relations 3
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.

Speech Communication

089 [100] **Communicating with Confidence 1**
Designed for students who are reluctant to enroll in speech due to high speech anxiety. Focused on discussing causes of speech anxiety and practicing anxiety-reducing techniques. *Does not satisfy any requirements for graduation.*

110 Fundamentals of Public Speaking (CCN) 3
Theory and practice of public speaking with emphasis on content, organization, language, delivery, and critical evaluation of messages. (ND:Comm)

114 Human Communication 3
Overview of communication theory with emphasis on information transmission and social influence functions of communication behavior in personal and mediated contexts.

150 Forensic Practice (CCN) 1
Applied speaking experiences in competitive and non-competitive settings. Speaking experiences in public address, oral interpretation, and reader's theatre settings. Competitive debate also offered. May be repeated.

211 [281] **Oral Interpretation (CCN) 3**
Study of literature for performance with emphasis on written and verbal analysis. Prereq: Comm 110.

212 [116] **Interpersonal Communication (CCN) 3**
Fundamental concepts of communication between individuals. Includes aspects of self-expression and relationship communication.

214 Persuasive Speaking (CCN) 3
Persuasive speaking with focus on evaluating information directed at the consumer. Strategies of altering attitudes, beliefs, values, and behavior. Prereq: Comm 110.

216 Intercultural Communication (CCN) 3
Exploration of the definition, models, and verbal processes of communication between different cultural groups. (ND:SS)

222 Voice and Diction (CCN) 3
Development of an efficient, pleasing voice quality, and techniques of articulatory usage. Includes study of international phonetics. Prereq: Comm 110.

271 Listening and Nonverbal Communication (CCN) 3
Theory and practice of effective listening; nonverbal aspects of human communication.

308 Business and Professional Speaking 3
Oral and written communication skills for those involved in professional and business settings. Includes principles and techniques for interviewing and for professional presentations. Prereq: Comm 110.

314 Argumentation and Debate (CCN) 3
Theory and process of argumentation with practical experience in preparation and delivery of formal debate. Prereq: Comm 110.

315 Small Group Communication 3
Focus on group processes, methods of problem solving, parliamentary procedures, and relational components of group interaction.

320 Communication Analysis 3
Introduction/overview to basic rhetorical and critical theory, including the influence of communication acts in historical and contemporary contexts.

401/601 Survey of Rhetorical Theory 3
Historical/descriptive examination of rhetorical theory from the classical through contemporary periods. Exploration of the foundations and evolution of modern rhetorical theory. Capstone option.

402/602 Contemporary Rhetoric 3
Examination of the use of public address in the contemporary culture to identify styles of usage and ethical practices employed by communicators. Prereq: Junior standing.

411/611 Communication Theory 3
Major theoretical approaches to the study of communication from a social scientific tradition. Capstone option.

412/612 Women and Gendered Communication 3
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.

450/650 Issues in Communication 3
Theory and philosophy of research issues in the field of communication. Prereq: Junior standing. May be repeated.

480/680 Health Communication 3
Designed to help individuals communicate in the health professions. Exploration of professional behavior as communication, staff-client communication, and team communication in the health-care setting.

483/683 Organizational Communication I 3
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.

700 Research Methods in Communication 3
Introduction to research planning and design, methods of research, and presentation of research results.

706 Advanced Interpersonal Communication 3
Interpersonal communication theory and research methods are developed from the perspectives of uncertainty reduction, conflict management, relationship reciprocity, constructivism, compliance gaining, discourse dominance, and relational dynamics.

715 Theories of Small Group Communication 3
Survey of theoretical constructs of communication in the small group setting. Examination of current methods of research.

721 Intercultural Communication 3
Advanced theories of verbal and nonverbal behavior, attitudes, and communication styles that affect interaction between cultural groups.

751 Directing Forensics 2
Theory and philosophy of coaching individual speaking events and debate. Designed for those who will coach at the high school or junior college level.

752 Theory of Argument 3
Philosophy and theory of argumentation. Exploration of analytical methods employed in argumentation.

767 Rhetorical Criticism 3
Survey of critical methods of inquiry that may be applied to oral discourse and frameworks for critically evaluating communication processes and products.

782 Theories of Persuasion 3
Survey of the theories related to persuasion, attitudes, and values of societal groups, and the assessment of attitudes and values held by the public.

784 Organizational Communication II 3
Study of the structure and function of communication interaction in formal organizations and survey of methods of analysis including the communication audit. Also includes models of introducing innovations.

COMPUTER SCIENCE (CSci)

Nygard, Chair; Erickson, Iftekharuddin, Juell, Kamel, Magel, Martin, Perrizo, Slator, Ubhaya

COURSES

122 [150] **Beginning BASIC/Visual BASIC (CCN)** **3**
Introduction to programming in the BASIC/Visual BASIC language. (ND:CompSc)

125 [161] **Beginning COBOL (CCN)** **3**
Introduction to programming in the COBOL language. (ND:CompSc)

126 [160] **Beginning FORTRAN (CCN)** **3**
Introduction to programming in the FORTRAN language. Prereq: Math 103. (ND:CompSc)

145 Introduction to Computing **2**
Introduction to word processing and spreadsheets on personal computers. Offered in separate sections for Macintosh and for IBM PC-compatible.

146 Business Use of Computers **3**
Exploration of how microcomputers are used in business. Use of word processing, spreadsheet, database, graphing, and telecommunication applications. *Credit awarded only for CSci 146 or 147, not both.*

147 Microcomputer Packages **3**
Experience in using word processing, spreadsheet, database, graphics, and telecommunications applications on personal computers. *Credit awarded only for CSci 146 or 147, not both. (ND:CompSc)*

155 [210] **Immigration (CCN)** **1**
Introduction to programming in the current language of CSci 160. For transfer students with CSci 160 or equivalent, in a language different from that used here. Prereq: CSci 160 or equivalent.

159 [128] **Computer Science Problem Solving** **2**
Problem solving techniques for both closed-ended and open-ended problems. Includes flow charting, data flow, and entity relationship diagrams.

160 [173] **Computer Science I (CCN)** **4**
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.

161 [174] **Computer Science II (CCN)** **4**
Advanced concepts in computer science including data structures, algorithm analysis, standard problems such as searching and sorting and memory management issues. Prereq: CSci 160.

162 Intense FORTRAN **2**
Intensive introduction to FORTRAN and its use in engineering applications. Students receive an introduction to numerical analysis, particularly error analysis. Prereq: Math 103. (ND:CompSc)

212 Self-Paced C++ **1**
Introduction to the C++ programming language. Students complete exercises and programming assignments at their own pace. Prereq: Programming skill in another language.

214 Self-Paced C **1**
Introduction to the C programming language. Students complete exercises and programming assignments at their own pace. Prereq: CSci 160.

222 Discrete Mathematics **3**
Sets, functions, relations, logic, methods of proof, mathematical induction, combinatorics, recurrence relations, generating functions. Prereq: CSci 160.

227, 228 Computing Fundamentals I, II **3 each**
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 for 227: Math 103 or equivalent; Prereq for 228: CSci 227.

235 Theoretical Computer Science I **3**
Models of computation, regular expressions, finite automata, Kleene's Theorem, lexical analysis, context-free grammars, pushdown automata, introduction to parsing. Prereq: CSci 161, 222.

236 Theoretical Computer Science II **3**
Parsing techniques, context-free languages, Turing machines, recursive and recursively enumerable languages, unrestricted grammars, unsolvable decision problems, computability, introduction to computational complexity. Prereq: CSci 235.

275 [270] **Digital Systems I** **3**
See Electrical and Computer Engineering for description.

315 System Analysis and Design **3**
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 160.

316 System Testing and Maintenance **3**
Introduction to the back end of the software development life cycle. Includes various modern concepts, techniques, and tools for testing and maintaining software systems. Prereq: CSci 315.

345 Topics on Personal Computers **3**
Exploration of some aspects of personal computers not covered in other courses, varies each time it is offered. May be repeated. Prereq: CSci 161.

366 Files for Database Systems **3**
File organization techniques, design, and implementation of database systems. Prereq: CSci 374.

372 Comparative Languages **3**
Explanation of the concept and impact of a block-structured language. Several languages will be compared with respect to application, suitability, syntax, and semantics. Prereq: CSci 161 or 228.

373 Assembly Programming **3**
Machine language, assembly language, and related hardware concepts, assembly language programming, macros and subroutines, system facilities and macros. Prereq: CSci 160. Cross-listed with ECE.

374 Computer Organization and Architecture **3**
Organization and structure of the major sections of a computer: CPU, memory, and I/O system organization and implementation issues. Prereq: CSci 373. Cross-listed with ECE.

418/618 Simulation Models **3**
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: CSci 126, Stat 367.

426/626 Introduction to Artificial Intelligence **3**
Introduction to artificial intelligence for undergraduates. Includes basic AI concepts and techniques. Prereq: CSci 372.

453/653 Linear Programming and Network Flows **3**
Linear programming models and applications, primal and dual formulations, computational procedures; introduction to networks, maximum flow, and shortest path problems. Prereq: Math 265.

454/654 Operations Research **3**
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 453/653, Stat 367.

458/658 Microcomputer Graphics **3**
Information on the techniques by which computers generate images of 2D and 3D objects. Principles to guide the use of computer graphics to enhance human-computer interaction. Prereq: CSci 372 and Math 146 or 165.

459/659 Local Area Networks **3**
LANs interconnect modern computer work groups. LAN architecture, applications, implementations, protocols, management, security, external connections, and future directions are examined. Prereq: CSci 214, 474.

460/660 Dynamic Programming **3**
Basic principles and algorithms of dynamic programming as applied to sequential decision problems in CS and OR. Prereq: Math 166.

467/667 Algorithm Analysis **3**
Design, correctness, and analysis of algorithms and data structures. Prereq: Math 166, CSci 161, 222.

468/668 Database Systems Design **3**
Overview of the maintenance and manipulation of databases. Includes a large project in C++. Prereq: CSci 366.

474 Operating Systems Concepts 3
How operating systems manage the resources of a computer. Topics include processes, concurrency, scheduling, deadlocks, memory allocation, virtual and secondary storage. Prereq: CSci 374.

475 Operating Systems Design 3
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 OSs. Prereq: CSci 474.

477/677 Object-Oriented Systems 3
Introduction to the concepts and advantages of object-oriented computer systems. Introduces exercises with at least one such language. Prereq: CSci 372.

488/688 Human-Computer Interaction 3
Survey of the methodologies and alternatives used in developing and evaluating human-computer interfaces. Prereq: CSci 372. Cross-listed with Psyc.

489/689 Social Implications of Computers 3
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, 467.

702 Performance Evaluation 3
Examination of basic techniques used to evaluate multi-programming systems. Both queuing models and other analytical approaches are constructed with simulation and direct measurements of actual systems. Prereq: CSci 475.

708 Foundations of Programming 3
Introduction to formalisms, in which computer programs are considered as mathematical objects, including weakest precondition and predicate calculus. Prereq: CSci 236.

713, 714 Software Engineering I, II 3 each
Software life-cycle, software design, tools, techniques, methods, testing, debugging, maintenance, and metrics will be studied. A large project started in 713 will be continued in 714. Prereq: CSci 372 or graduate standing.

722 Compiler Construction 3
Design and structure of complex grammars, lexical analysis, parsers, semantic data structures, and code generating and optimization. Construction of a simple compiler. Prereq: CSci 372 or graduate standing.

724 Survey of Artificial Intelligence 3
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. Prereq: CSci 372 or graduate standing.

728 Computer Graphics 3
Principles and algorithms used in computer graphics packages. Emphasis on raster graphics, clipping, hidden-surface elimination, ray-tracing, radiosity. Prereq: Graduate standing.

730 Office Information Systems 3
Exploration of the evolution of the office since the introduction of the computer. Examination of the introduction of computers, word processors, database management systems, networks, and AI into the office. Prereq: CSci 160 or graduate standing.

734 Expert Systems 3
Examination of types of expert systems, their powers and limitations. Students write their own expert system. Prereq: CSci 724.

735 Neural Networks 3
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.

737 System Simulation 3
Systems, models, discrete event simulation models, queuing systems, fundamental statistics of simulation. Prereq: CSci 653, Math 166.

741 Algorithm Analysis 3
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. Prereq: CSci 161, Math 166.

742 Algorithms and Complexity 3
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.

751 Nonlinear Optimization I 3
Convex sets, convex functions and extensions, one-dimensional optimization, theory and algorithms for constrained and unconstrained nonlinear programs, optimization without derivatives. Prereq: CSci 653.

752 Nonlinear Optimization II 3
Convergence, rates, primal and dual methods of constraining optimizations of large scale programs, linear complementarity, quadratic programs, computational complexity, minimax problems. Prereq: CSci 751.

760 Dynamic Programming 3
Dynamic programming as an algorithm design method, formulating and solving problems using dynamic programming, deterministic and stochastic problems in OR and CS. Prereq: Math 166.

761 Integer Programming 3
Integer linear programs and modeling, theory and algorithms, duality and relaxation, cutting plane and branch-and-bound methods, combinational problems, total unimodularity, matching and matroids. Prereq: CSci 653.

762 Network Flows 3
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.

765 Introduction to Database Systems 3
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. Prereq: CSci 366 or graduate standing.

766 Database System Internals 3
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.

778 Computer Networks 3
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. Prereq: CSci 474 or graduate standing.

783 Topics in Software Systems 3
Includes an area of computer science not otherwise treated in computer science courses. Varies each time offered. May be repeated. Prereq: Graduate standing or departmental approval.

785 Topics in Computer Architecture 3
Includes an area of computer architecture not considered in other courses. Varies each time offered. May be repeated. Prereq: Graduate standing or departmental approval.

787 Topics in Operations Research 3
Includes an area of operational research not considered in other courses. Varies each time offered. May be repeated. Prereq: Graduate standing or departmental approval.

789 Topics in Theoretical Computer Science 3
Includes an area of theoretical computer science not considered in other courses. Varies each time offered. May be repeated. Prereq: Graduate standing or departmental approval.

CONSTRUCTION MANAGEMENT AND ENGINEERING (CM&E)

Padmanabhan, Chair; Yazdani, Interim Director; K. Andersen, McIntyre, Salem

COURSES

111 Introduction to Construction Management and Engineering 1
Review of the history of engineering and construction, duty, and role of the professional engineer, construction engineer, and construction manager. 1 lecture.

205 Building Construction 3
Introduction to planning, design, and construction of residential structures, including cost estimating and project scheduling. Computer applications. 3 lectures.

301 Construction Technology and Equipment **4**
Study of construction techniques, analysis of equipment costs, production, and methods of proper equipment selection. Analysis of earth moving equipment, dewatering systems, and aggregate production. Prereq: ME 223, CE 309 or CM&E 325, CE 316 or CM&E 320, IME 440.

310 Construction Quality Control Management **2**
Discussion of inspection procedures and requirements; design and management of quality control/assurance programs for design and construction phases of a project. Includes statistical quality control methods and total quality management in construction. 2 lectures Prereq: Junior standing; Coreq: Stat 330 or IME 460.

315 Specifications and Contracts **3**
Discussion of procedures used to prepare and administer construction specifications and contracts. Construction Specification Institute format and AIA Documents and General Conditions are discussed. Includes liabilities and incentives for various kinds of construction contracts. 3 lectures. Prereq: Junior standing.

320 Soils and Foundations **4**
Topics include physical properties of soils, stress, settlement, consolidation, slope stability, earth pressures, bearing capacity, drainage, pore pressure, and foundations. 3 lectures, 1 three-hour laboratory. Prereq: ME 223, CM&E 325.

325 Fluid Mechanics for Technologists **3**
Fluid properties, fluid statics, fluid kinematics, energy, and impulse-momentum considerations in fluid flow, pumping systems, steady uniform flow in open channels, measurements, and forces on immersed bodies. Emphasis on topics pertinent to construction management. Prereq: ME 221.

370 Introduction to Cost Estimating **2**
Includes plan reading, definitions of drawing symbols, and material takeoff for estimating quantities for a commercial construction project using the Construction Specifications Institute Technical Divisions 1 through 16. 2 lectures. Prereq: Junior standing.

385 Construction Safety **2**
Planning and administration of construction safety programs. Includes the history and development of federal and state construction safety standards and methods for abatement and control of job site hazards to develop a safe construction project. 2 lectures.

403/603 Scheduling and Project Control **4**
Includes theories, principles, and techniques of construction planning and scheduling; emphasizes the management of time, costs, and other resources through the preparation and analysis of network schedules. Computer applications. 4 lectures. Prereq: CM&E 411.

409 Highway Construction **2**
Design and construction of flexible and rigid pavements including subgrade, base courses, surface courses; evaluation criteria including soil, climate, traffic, material, drainage, initial and maintenance cost considerations; construction practices. 2 lectures. Prereq: CE 316.

411/611 Construction Cost Estimating **2**
Topics include quantity takeoffs, labor, materials, equipment, overhead cost, profit, and bidding strategies. Computer applications. 2 lectures. Prereq: CM&E 370.

412/612 Construction Management **3**
Concepts of development and organization of projects, project contract administration, and project delivery systems; management methods; management information systems, constructability review, and value engineering; construction productivity. 3 lectures. Prereq: CM&E 403.

413 Construction Capstone **2**
Capstone project dealing with construction. 2 lectures. Prereq: Senior standing in construction management or construction technology.

420 Labor Productivity in Construction **3**
Study of the many complex issues relating to labor productivity, labor contracts and regulations, and effective use of labor resources. 3 lectures. Prereq: CM&E 315, 411, senior standing.

421 Electrical and Mechanical Construction **3**
Basic understanding of electrical and mechanical systems, design and construction procedures, flexibility in each system, space requirements, and at what point in the job the work on a particular system is done. 3 lectures. Prereq: Phys 212, senior standing.

425 Decision Making and Risk Analysis **3**
Decision making and decision theory. Decision support systems, applied risk identification, and analysis in construction activities. Computer applications. 3 lectures. Prereq: CM&E 403.

430/630 Land Development **3**
Practical applications of the planning, design, and construction phases of the land development process. Computer applications. 3 lectures. Prereq: CE 204, senior standing or departmental approval.

450 Steel Design for Technologists **3**
Selection of metal structural systems with simplified design and structural characteristics of members and connections. Methods of assembly. 3 lectures. Prereq: ME 223.

453 Concrete Design and Construction **3**
Fundamentals of design for concrete mix. Formwork and concrete structures. 3 lectures. Prereq: ME 223.

455 Formwork Design **2**
Design and construction of formwork structures for concrete structures. Computer applications. 2 lectures. Prereq: ME 223.

489 Construction Design **3**
Capstone project focused on design and construction activities. Prereq: Senior standing in construction engineering.

CRIMINAL JUSTICE (CJ)

(See Sociology.)

CROP AND WEED SCIENCES

(See Plant Sciences.)

ECONOMICS (Econ)

COURSES

201 [110] **Principles of Microeconomics (CCN)** **3**
See Agricultural Economics for description. (ND:SS)

202 [111] **Principles of Macroeconomics (CCN)** **3**
See Agricultural Economics for description. (ND:SS)

324 Money and Banking **3**
Institutional and theoretical framework of the financial structure including the banking system, Federal Reserve, money markets, and international monetary systems. Prereq: Econ 201, 202.

341 Intermediate Microeconomics **3**
Analysis of markets in terms of efficiency, resource use, and economic welfare. Prereq: Econ 201, 202.

343 Intermediate Macroeconomics **3**
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, 202.

456/656 History of Economic Thought **3**
Development of economic thought from the mercantilists to Keynesian economics. Prereq: Econ 341 or Busn 451 and Econ 324 or 343.

461/661 Economic Development **3**
Analysis of the main causes of economic development. Prereq: Econ 341 or Busn 451.

465/665 Labor Economics **3**
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 451.

470/670 Public Finance **3**
Taxation, intergovernmental fiscal relations, and public expenditures; implications of various taxation policies. Prereq: Econ 341 or Busn 451.

472/672 Advanced International Economics **3**
Theories of international trade, payments, and foreign exchange markets. Prereq: Econ 341 or Busn 451.

476/676 Monetary Theory and Policy **3**
Analysis of relationships among money, credit, employment, price stability, and national monetary policy. Prereq: Econ 324 or 343.

480/680 Industrial Organization 3
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 451.

EDUCATION

Wigtil, Chair; Hannon, Leung, May, Nielsen, Sauer, Stammen, Wageman, Wilhelm

COURSES

120 Peer Counseling 1
Designed to bring peer counseling theory and practice together in helping freshmen overcome the hurdles of the first year. May be repeated.

121 Improvement of Reading 1
A developmental reading program designed to help the student improve in reading efficiency.

122 Interpersonal Relationships 1
Study of the development of interpersonal relationships with a focus on listening and sharing in an experiential manner.

123 Study Skills 1
Assistance in the development of study skills necessary for academic achievement through learning and practice.

124 Career Planning 1
Study of the world of work with attention to self-assessment, vocational choice, and career planning.

125 Assertiveness Training 1
Behavioral approach to assertiveness combining a cognitive approach with role play and discussion.

126 Self-Esteem 1
Designed to assist students to improve self-esteem, increase self-awareness, and learn skills related to the growth of self-esteem.

300 Orientation to Elementary Teaching 2
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.

321 Introduction to Teaching 3
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. Coreq: Educ 381 recommended.

322 Educational Psychology 3
Review of human development with special emphasis on development of the young adolescent. Learning theories and learning styles with applications to individual student differences, exceptionalities, and cultural diversity; strong emphasis on educational research.

381 Early Experience 1
Field-based experience in a middle or high school setting. Overview of professional educators; opportunity to observe and interact with students, teachers, and administrators. At least five hours required in special education classroom with ESL teacher. Coreq: Educ 321 recommended. Cross-listed with H&CE (CCN).

389 [489] **Native Americans and Multicultural Instructional Practices 3**
History of North Dakota tribes and reservations. Traditional and modern Native American cultures and values. Issues in Native American education. Goals of multicultural education. Instructional strategies and resources for teaching students of diverse ethnic backgrounds.

451 Instructional Planning, Methods, and Assessment 3
Process of planning for teaching and implementing plans; micro-teaching activities reflecting various models for middle and high school classrooms; personalizing instruction; meeting multicultural needs. Includes computer applications; use of audiovisual equipment and other resources. Prereq: Educ 321, 322, admission to School of Education (SOE).

471/671 Middle School Philosophy and Curriculum 2
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 or graduate standing.

472/672 Middle Level Teaching Methods 3
Instruction and guidance in the design, implementation, and assessment of teaching strategies adapted to young adolescents. Prereq: Educ 451 or graduate standing.

475 Reading in the Content Area 2
Introduction to the relevance and need for incorporating reading and developing reading skills in middle and high school classrooms.

480 Stress Management 2
The dynamics of stress, sources and symptoms of stress, and stress management techniques will be presented and practiced.

481, 482, 483 Classroom Practice/ Methods of Teaching I, II, III 2-3 each
Specialized methods and classroom practices appropriate to the specific subject area. Prereq: Educ 321, 322, 381, admission to School of Education.

485 Student Teaching Seminar 1
Orientation to student teaching. Analysis of professional issues and concerns associated with education. Prereq: Admission to School of Education, completion of professional education courses; Coreq: Educ 486, 487.

486 Classroom Management of Diverse Learners 3
Examine and apply various classroom management and evaluation techniques to middle and high school levels. Offered during the student teaching semester as a five-week block prior to student teaching. Prereq: Completion of professional education courses, admission to School of Education.

487 Student Teaching 5-10
Supervised teaching in an approved and accredited school. Includes an on-campus seminar. Prereq: Completion of professional education courses, admission to School of Education. Cross-listed with H&CE.

702 Statistics in Educational Research 2
Basic theory; techniques for using descriptive and inferential statistics; application in educational research designs.

703 Research, Measurement, and Program Evaluation 3
Methodology and design of research studies; organization, reporting analysis, and interpretation of research.

710 Philosophy of Education 2
Major philosophical concepts and principles of education from Plato to the present.

712 Social, Cultural, and Political Dimensions of Schools 4
Social processes and interaction among diverse populations in educational settings. Relationship of schools to society.

714 History of American Education 2
Historical and intellectual development of education in the United States from the colonial period to the present.

716 Comparative Education 2
Analysis of educational systems of selected nations, including emerging and economically developed countries.

717 Adult Learning 2
Includes recent research concerning adult learning in the context of planning and operating effective adult education programs.

718 Community Education 2
Study of the theory base on which community education is founded. Consideration is given to implementing the concept in the community with available resources.

720 Supervision of Student Teachers 2
See Human and Community Education for description.

722 Instructional Systems, Media, Materials 2
Preparation of instructional systems in support of a variety of teaching techniques and alternative media approaches. Prereq: Educ 451.

724 Advanced Educational Psychology 2
Principles of effective human learning. Discussion of learning theories, the teacher as a director of learning experiences, and factors in students representing a variety of cultures and abilities in the educational setting.

726 Diagnosis of Learning Disabilities 2
Identification of different types of learning disabilities with an overview of diagnostic techniques and remediation procedures.

730 Leadership, Planning, and Organizational Behavior **3**
Introduction to models of educational leadership including organizational structure, theory, and leadership styles. Consideration of concepts, problems, and issues in administration.

731 Educational Law and Organizational Structure of Schools **3**
Examination of the legislative and judicial actions affecting the public schools. Consideration is given to contemporary legal issues for teachers, administrators, and boards.

732 Curriculum, Instruction, and Learning Theory **4**
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.

733 Technology and Information Systems **2**
Provides an understanding of selected computer applications for educational administrators at the building and district office levels.

734 Personal Communications and Ethics **3**
Prepares aspiring school leaders to plan for their personal and professional development and to understand and use the principles of communication, ethics, and values.

735 Personnel, Supervision, and Staff Development **4**
Specific techniques and systems to supervise instruction. Review of interpersonal communication and group process skills as applied to administrative supervision. Prereq: Educ 730.

736 Policy and Educational Finance **2**
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.

738 Administration of Elementary Schools **2**
Common elements of leadership as they apply to the principalship. Consideration of practical applications in an elementary school setting. Prereq: Educ 730.

739 Administration of Secondary Schools **2**
Common elements of leadership as they apply to the principalship. Consideration of practical applications in a secondary school setting. Prereq: Educ 730.

742 Elementary School Curriculum **2**
History, development, evaluation, and revision of the curriculum. Review of recent research in elementary school curriculum.

743 Secondary School Curriculum **2**
Study of contemporary curriculum patterns with emphasis on curricular construction and evaluation.

744 Administration of the Middle School **2**
Organization and administration of educational programs for early adolescents with special consideration given to block scheduling, interdisciplinary teams, advisor-advisee problems. Prereq: Educ 730.

747 Analysis of Elementary Reading Instruction **2**
Reading process, psychological and linguistic foundations, program assessments, and diagnostic approaches, skills, and individualization.

748 Collective Bargaining and Negotiation in Education **2**
Study of the principles and processes of collective bargaining in public educational institutions. Development of negotiation skills through participation in simulations.

750 Secondary School Counseling **2**
Overview of principles and functions of a secondary school counseling program and examination of secondary school counseling materials.

751 Elementary School Counseling **2**
Exploration of models of elementary counseling and examination of counseling materials in implementing a counseling program.

752 Guidance Administration and Consulting **2**
Role of administrators, counseling personnel, and teachers in the management of and consulting in K-12 counseling programs.

753 Middle School Counseling **2**
Exploration of models for middle school counseling and examination of counseling materials for middle school counseling programs.

754 Assessment Techniques **3**
Techniques and procedures of studying the individual and diagnostic process in identifying client issues. Prereq: Educ 760, 761, admission to program.

755 Career Counseling and Testing **3**
Study of theories of career development and the use of career information and testing in career counseling.

756 Dynamics of Addiction **3**
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: Educ 760, 761, admission to program.

757 Professional Orientation and Ethics **3**
Introduction to dealing with professional and ethical responsibilities and multicultural issues in the counseling field. Prereq: Educ 760, 761, admission to program.

758 Social and Cultural Foundations in Counseling **3**
Issues and trends in counseling with multicultural and diverse populations within our society. Prereq: Educ 760, 761, admission to program.

759 Sexual Functioning and Abuse Issues in Counseling **3**
Study of sexual dysfunction, incest and abuse, and strategies of intervention and counseling with victims and perpetrators. Prereq: Educ 760, 761, admission to program.

760 Counseling Techniques **3**
Basic principles and techniques in the counseling process. Emphasis given to counseling techniques from several counseling orientations. Prereq: Admission to program.

761 Counseling Theory **3**
Study of various theories and philosophies of counseling and therapy. Prereq: Admission to program.

762 Group Counseling **3**
Study of group counseling principles appropriate to various counseling settings including schools, treatment centers, and agencies. Includes a group experience. Prereq: Educ 760, 761, admission to program.

764 Advanced Assessment in Counseling **3**
Assessment and diagnostic procedures: how to use appropriate tools for accurate diagnosis and assessment; how to interpret assessment and diagnostic instruments; and how to make effective use of assessment results in counseling with clients.

765 Advanced Group Counseling **3**
Study of group facilitation skills, group process and dynamics, and group facilitator and member roles. Includes a supervised group facilitation experience. Prereq: Educ 762.

766 Dynamics of Self **3**
Application of personality theory and the life stages to human behavior and the counseling process.

768 Counseling Children and Adolescents **3**
Counseling with children and adolescents including specific counseling strategies; mental, physical, and emotional development issues related to counseling. Prereq: Educ 760, 761, admission to program.

773 Family Counseling **3**
Principles and techniques of family counseling, study of family dynamics, family systems, and theories of family counseling. Prereq: Educ 760, 761, admission to program.

774 Marital Counseling **3**
Survey of marital counseling theories and techniques; analyses of dysfunctional communications. Prereq: Educ 760, 761, admission to program.

775 Content Area Reading **2**
Examination of content, instructional methodologies, and evaluation techniques for reading in content classes.

777 Tort Liability **2**
Examination of the legal liability of teachers, administrators, and public school boards for injurious intentional or unintentional acts. Prereq: Educ 731.

778 School Fund Management 3
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. or equivalent in educational administration.

780 Instructional Models 2
Investigation of current practices and trends in instructional models. Emphasis is on the relationship of current research to contemporary practice.

781 Science Teaching and Curriculum 3
Overview of recent research on science teaching, learning, and curriculum. Special attention given to contemporary theories on science teaching models that enhance student understanding.

782 Supervisory and Administrative Theories 4
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.

783 Computer Data Management and Decision Making 2
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 and 10 credits in educational administration.

784 School Personnel Administration 2
Study of personnel administration in public school systems. Includes an examination of the purposes, policies, plans, procedures, and personnel administration. Prereq: Educ 782.

785 Organization and Administration of Vocational/Technical Education 2
Overview of the vocational education services of local educational agencies and their relation to post-secondary education. Emphasis on planning, organizing, administering, and managing resources.

786 School Facility Planning 2
Overview of the principles in planning, construction, and maintenance of school buildings. Visits to educational facilities and the assessment of school buildings. Prereq: M.S. or equivalent.

788 School Finance and Business Management 4
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.

789 School Community Relations 2
Purposes, organization, agencies, and criteria of good school-community relationships; knowledge and techniques for effective public relations. Prereq: Educ 739, M.S. or equivalent in educational administration.

ELECTRICAL AND COMPUTER ENGINEERING (ECE)

Baiocchi, Chair; Ewert, Farden, Glower, Green, Iftekharuddin, Jorgenson, Katti, Nelson, Patterson, B. Rao, Rogers, Smith, Stuehm, Tareski, Yuvarajan

COURSES

111 Introduction to Electrical Engineering 3
Introduction to electrical engineering; engineering problem solving, design, and professional issues. 3 lectures. Prereq: Math 105.

173 Introduction to Computing 3
Programming in a high level language with applications to engineering computation, analysis, and design. 3 lectures, 1 recitation.

EE 206 [211] **Circuit Analysis I (CCN) 4**
Linear electric circuits. Component models, circuit laws, transient analysis, design, computer tools. 3 lectures, 1 two-hour recitation. Prereq: Math 265 with grade of C or better and Phys 252.

275 [270] **Digital Systems I 3**
Introduction to number systems, combinational circuits, and sequential circuits. 3 lectures. Cross-listed with CSci.

301 Electrical Engineering I 3
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 265, Phys 252.

303 Electrical Engineering II 3
Electronic circuits and their applications. Electromechanical energy conversion. Transformers, DC and AC machines. 3 lectures. Prereq: ECE 301.

306 Electrical Engineering Lab I 1
Electronic instruments and measurements. Applications to electrical and electronic circuits, power devices, and systems. 1 two-hour laboratory. Coreq: ECE 303.

311 Circuit Analysis II 3
Analysis of single-phase and three-phase circuits, Laplace transforms in circuit analysis, Phasor analysis. Two-port networks. 3 lectures. Prereq: EE 206 with grade of C or better, Math 266.

312 Digital/Analog Circuits Lab 1
Experiments in digital and analog circuits. 1 two-hour laboratory. Prereq: ECE 275; Coreq: ECE 311.

314 Machines/Electromagnetics Lab 1
Experiments in energy conversion and electromagnetics. 1 two-hour laboratory. Prereq: ECE 312, 351; Coreq: ECE 331.

321 Electronics I 3
Characteristics and modeling of diodes, bipolar junction transistors, and MOSFETS. Biasing of transistors. Analysis of transistor amplifiers. Fabrication of intergrated circuits. 3 lectures. Coreq: ECE 311.

322 Electronics Laboratory 1
Laboratory experiments on electronic devices and basic electronic circuits. 1 two-hour laboratory. Coreq: ECE 321.

323 Electronics II 3
Frequency response of amplifiers. Feedback amplifiers. Power amplifiers. Introduction to digital electronics. 3 lectures. Prereq: ECE 321.

324 Electronics/Signals Laboratory 1
Experiments on electronic circuits and signals and systems. 1 two-hour laboratory. Prereq: ECE 322; Coreq: ECE 323, 343.

331 Energy Conversion 3
Magnetic circuits, transformers, DC and AC rotating machines. 3 lectures. Prereq: ECE 311.

343 Signals and Systems 3
Discrete-time and continuous-time signals and systems. Linearity, frequency response. Difference and differential equations. Transform techniques. 3 lectures. Prereq: ECE 311.

351 Applied Electromagnetics 3
Electromagnetic waves in linear media, effects of boundaries, transmission lines, electrostatics, and magnetostatics. 3 lectures. Coreq: ECE 311.

373 Assembly Programming 3
See Computer Science for description. Prereq: ECE 173 and 275.

374 Computer Organization 3
See Computer Science for description. Prereq: ECE 173 and 275 or CSci 373.

375 [370] **Digital System Design and Implementation 3**
Experience with digital system design and prototyping, including use of digital laboratory equipment. 2 lectures, 1 two-hour laboratory. Prereq: ECE 173, 275.

376 Embedded Systems 3
Use of computers for data acquisition and device control. Includes high level and assembly language programming, serial and parallel I/O, timers, and interface design. 3 lectures. Prereq: ECE 173, 275, EE 206.

401 Design I 3
Capstone experience in formulation and design of a system or device. Prereq: Senior standing.

402 Control Systems and Communications Lab 1
Experiments in communication systems and control systems. 1 two-hour laboratory. Coreq: ECE 443, 461.

403 Design II **3**
Capstone experience in design of devices and systems. Constraints: performance, economics, environment, manufacturing, testing, maintenance, and protection of the public. Design trade-offs. Teamwork, concurrent engineering, product implementation. Prereq: ECE 401.

404 Advanced Electrical Engineering Laboratory **1**
Experiments in advanced topics in electrical engineering. Coreq: ECE 443.

421/621 Communication Circuits **3**
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 323.

423/623 Digital Electronics **3**
Analysis and design of digital integrated circuits. Characteristics and applications of logic gates and regenerative logic circuits. 3 lectures. Prereq: ECE 323.

425/625 Introduction to Semi-Conductor Devices **3**
Properties and applications of semi-conductors and solid state electronic devices. Semi-conductors, junctions, and transistors. 3 lectures. Prereq: ECE 321, 351.

431/631 Power Systems **3**
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.

433/633 Power Systems Design **3**
Unbalanced power systems, economic dispatch, transients in power systems, power system stability, power system protection. 3 lectures. Prereq: ECE 311.

437/637 Power Electronics **3**
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.

441 Random Processes **3**
Principles of probability. Application of probability and statistics to engineering problems. 3 lectures. Prereq: Math 266.

443/643 Communications I **3**
Communications theory and design with an emphasis on spectral techniques. Modulation and noise effects. 3 lectures. Prereq: ECE 343; Coreq: ECE 441.

445/645 Communications II **3**
Continuation of ECE 443. Digital communications systems. Optimum receivers. Information theory and coding. 3 lectures. Prereq: ECE 443.

455/655 Designing for Electromagnetic Compatibility **3**
Principles and methods concerning electronic system designs that are not sources of or susceptible to electromagnetic interference. 3 lectures. Laboratory. Prereq: ECE 343, 351.

457/657 Optical Signal Transmission **3**
Optical signal transmission including geometric optics and modal analysis for homogeneous and inhomogeneous light guides. Systems studies including coupling, inter-symbol interference, sources, photo detectors, and modulation. 3 lectures. Prereq: ECE 351.

461 Control Systems **3**
Analysis and design of control systems. Controller design to meet time and frequency specifications. 3 lectures. Prereq: ECE 343.

463/663 Digital Control **3**
Analysis and design of sampled-data control systems including z-transforms, sampling theory, design to specifications, controllability, observability, stability, and optimization. 3 lectures. Prereq: ECE 461.

470 Digital Systems II **3**
Design and analysis of reliable digital systems through robust information coding, fault-avoidance, and fault-tolerance. 3 lectures. Prereq: ECE 275.

471 Computer Systems Design and Implementation **3**
Design and implementation of reliable, interrupt-driven systems. Use of development tools. System components issues including co-processors, buses, run-time. Prereq: ECE 376, 401, CSci 474.

483/683 Instrumentation for Engineers **3**
Study of instrumentation including design, fabrication, and application.

485/685 Biomedical Engineering **3**
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.

701 Advanced Engineering Problem Solving **3**
Application of advanced mathematical and computational methods to engineering problems. 3 lectures.

721 Integrated Circuits **3**
Introduction to CMOS circuits. Circuit characterization and performance estimation. CMOS circuit and logic design, CMOS testing. CMOS subsystem design. 3 lectures. Prereq: ECE 423/623.

723 Advanced Electronics **3**
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 421/621.

731 Power System Protection **3**
Power system protective relaying. Generator, transformer, line, bus, motor protection. 3 lectures. Coreq: ECE 433/633.

733 Power Distribution **3**
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 431/631.

741 Signal Processing I **3**
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 443/643.

743 Signal Processing II **3**
Discrete-time Wiener and Kalman filtering. Least squares signal processing and filter design. Spectral analysis. Adaptive signal processing. 3 lectures. Prereq: ECE 741.

745 Statistical Communications **3**
Advanced topics in communications theory including detection theory, estimation theory, and information theory. 3 lectures. Prereq: ECE 443/643.

751 Electromagnetic Theory and Applications **3**
Theory of radiation, antenna characteristics, complex waves, potential functions and spectral domain methods for waveguides and cavities, and dispersive media. 3 lectures.

755 Advanced Topics in Electromagnetics **3**
Topics of current interest in electromagnetics, microwaves, and optics. 3 lectures. Prereq: ECE 751 or departmental approval.

761, 763 Advanced Control Theory I, II **3 each**
State variable formulation of the control problem; system identification. Introduction to adaptive, distributed, multivariable, nonlinear, optimal, and stochastic control. Prereq for 761: ECE 461/661; Prereq for 763: ECE 761.

774 Computer Architecture **3**
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. Prereq: ECE 374.

778 Computer Networks **3**
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. Prereq: CSci 474.

ENGINEERING

Helweg, Dean

COURSES

111 Introduction to Engineering 1
Designed to provide general engineering students with an opportunity to review, study, discuss, and evaluate various engineering professions as career choices.

311 Impact of Technology on Society I 3
Study of the development of technology and its impact on the evolution of cities and societies; emphases on the forces that the technology has brought about on shaping and reshaping of the human environment. 3 recitations.

312 Impact of Technology on Society II 3
Study of the impact of technology on the natural environment; discussion of values, ethics, citizenship, social responsibilities, and relationship of humans and the natural and human-made environment. 3 recitations.

315 Impact of Energy on Society 3
Study of the development of energy and its impact on the evolution of modern society, history, and the environment. Discussion of world energy situation and current events.

320 Technical Communication 3
Application of written and oral aspects of technical communication geared especially toward the engineering profession. Students create documents and presentations for a variety of audiences and purposes. 3 recitations. Prereq: Engl 110.

402 Engineering Ethics and Social Responsibility 1
Philosophical basis for ethical decisions, guidance for ethical decision making in engineering practice, ethics of social responsibility, case studies, and codes of conduct for engineers.

489 Collaborative Engineering Capstone 3
Integration of engineering and architecture topics and job functions projects. Students will plan, design, develop, verify, produce/construct/service facilities and systems created to fulfill industrial, agricultural, urban, and business needs. Prereq: Senior standing and approval of major department.

715 Engineering Systems 3
Interdisciplinary systems analysis approach to engineering problems. Mathematical and physical stochastic process and control systems.

721 Mechanics of Fluid States 3
Basic laws of fluid motion in differential and integral forms, Navier-Stokes equations, potential flow, boundary layer theory, dimensional analysis, and similitude. Computational fluid mechanics.

741 Systems—Linear and Nonlinear Concepts 3
Nonlinear and linear programming methods for engineering design optimization. Formulation and optimization of design problems from all areas of engineering.

742 Optimal Control Theory 3
Formulation of general control problems; controllability and observability in discrete and continuous systems; performance functionals; applications.

744 Modern Material Science 3
Internal structure of materials, diffusion, phase transformation, and structure control. Mechanical, electrical, magnetic, and optical properties of materials; engineering applications.

760 Thermodynamics 3
General foundations of thermodynamics valid for small and large systems and equilibrium and nonequilibrium states. Emphasis on the concepts of availability and its engineering applications.

762 Heat and Mass Transfer 3
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.

780 Electromagnetic Theory 3
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.

789 Advanced Research Methods in Engineering 3
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.

ENGLISH (Engl)

Brown, Chair; Beck, Bergman, Bovard, Brooks, Cater (Emeritus), Cavins, Cosgrove, Fricker, Gronhovd, Johnston, Krishnan, Legowski, Martinson, Matchie, Nichols, O'Connor, Pandey, Sandland, Scott, Shaw, Strandness, Trump, Ward

COURSES

086 [100] **Basic Writing 3**
Basic work on word choice, sentence structure, paragraph development, and organization. *Does not satisfy any requirements for graduation.*

103 [105] **English for Non-Native Speakers: Grammar/Writing R-5**
Grammar, usage, syntax, and extensive work with sentence and paragraph structure, stressing unity, coherence, and emphasis for ESL students. *Does not satisfy any requirements for graduation.*

104 English for Non-Native Speakers: Vocabulary/Reading R-5
Intensive instruction in vocabulary and reading skills required for successful completion of university work by speakers of English as a second language (ESL). *Does not satisfy any requirements for graduation.*

106 English for Non-Native Speakers: Oral Skills R-5
Intensive instruction in speaking and listening skills required for successful completion of university work by ESL students. *Does not satisfy any requirements for graduation.*

107 English for Non-Native Speakers: Advanced Skills R-5
Development of advanced level English skills in speaking, listening, reading, and writing for non-native speakers. Emphasis on skills needed for academic work. May be repeated. *Does not satisfy any graduation requirements.*

110 College Composition I (CCN) 3
Guided practice in college-level reading, writing, and critical thinking. Includes process writing and an introduction to library research. (ND:Engl)

111 [110H] **Honors Composition I (CCN) 3 each**
Accelerated reading, writing, and critical thinking activities designed to enhance qualified students' well-developed skills of language use. Requires enrollment in the Scholars Program. Equivalent to Engl 110.

112 ESL College Composition I (CCN) 4
Guided practice in college level reading, writing, and critical thinking, with special attention to the issues of usage encountered by non-native speakers of English. Includes process writing and an introduction to library research. Equivalent to Engl 110.

120 [111] **College Composition II (CCN) 3**
Advanced practice in college-level writing from sources and in applying rhetorical strategies. Requires library research and use of summaries, paraphrases, and quotations from relevant sources in analysis and persuasion essays. Prereq: Engl 110. (ND:Engl)

121 [111H] **Honors Composition II (CCN) 3**
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.

122 [114] **ESL College Composition II (CCN) 4**
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.

215 [220] **Writing for Work (CCN)** **3**
Introduction to business and technical writing and to strategies for completing business-related writing projects.

220 [130] **Introduction to Literature (CCN)** **3**
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. Prereq: Engl 120. (ND:Hum)

222 [233] **Introduction to Poetry (CCN)** **3**
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.

225 [235] **Introduction to Film (CCN)** **3**
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.

226 The Poetry of Rock (CCN) **3**
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.

240 [334] **World Literature Masterpieces (CCN)** **3**
Study of representative cultural and literary materials from the ancient world to modern times.

251 [230] **British Literature I (CCN)** **3**
Survey of major works and writers in British literature from the Anglo-Saxon period through the 18th century.

252 [231] **British Literature II (CCN)** **3**
Survey of major works and writers in British literature from the romantic age to the present.

261 [240] **American Literature I (CCN)** **3**
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.

262 [241] **American Literature II (CCN)** **3**
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.

271 Literary Analysis (CCN) **3**
Introduction to traditional and contemporary approaches in the study of literature and the fundamental skills required for the analysis of literary texts.

320 Practical Writing **3**
Intensive practice of the writing needed in professional settings: writing to inform, analyze, evaluate, and persuade. Prereq: Engl 120, junior standing.

322, 323 Creative Writing I, II **3 each**
Writing poetry, short stories, and nonfiction, with the goal of publishing a manuscript. Exploration of contemporary genres and writing techniques. Prereq: Engl 120.

330 British and American Women Writers **3**
Investigation of the literary portrayal of women and its effects on society. Some consideration of problems specific to women writers.

331 Contemporary Women Writers **3**
Study of the language, imagery, themes, and genres in 20th century literature by women of various cultural, ethnic, and national backgrounds.

333 Fantasy and Science Fiction **3**
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.

335 Multicultural Writers **3**
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.

340 19th-Century American Novel **3**
Selected novels reflecting problems and ideas, including minority viewpoints, of the Westward Movement during the 1800s. Emphasis is on change from romantic to realistic/naturalistic genres.

341 20th-Century American Novel **3**
Selected novels reflecting social, psychological, and literary trends after World War I. Includes multicultural and women authors, as well as recent experiments in the genre.

342 19th-Century American Short Story **3**
Development of the American short story is traced from its hidden beginnings in Ben Franklin through the 19th-century romantics, regionalists, realists, and naturalists.

343 20th-Century American Short Story **3**
Development of the American short story is traced by focusing on psychological realists, social critics, regionalists, Freudians, and the story of manners.

344 American Drama **3**
20th-century traditions and experiments on the American stage. Includes classic writers like O'Neill, Williams, Miller, and Albee, as well as recent authors and techniques.

345 Themes in American Culture **3**
A multidisciplinary approach, including art, music, and literature, to various eras and themes in American cultural history.

358 Intermediate Composition **3**
Frequent essays emphasizing clear reasoning, effective structure, and a polished style for writing in the humanities and social sciences. Prereq: Engl 120, junior standing.

380 Shakespeare **3**
Study of representative comedies, histories, and tragedies.

450/650 Contemporary Linguistics **3**
Language characteristics (sound, structure, meaning, conversation), relation to culture, first and second language acquisition.

451/651 Advanced English Grammar **3**
Examination of the systematic structure and rules underlying English constructions; examination of current theories of syntactic analysis in both theoretical and pedagogical applications and issues concerning use and grammar. Prereq: Engl 450.

452/652 History of the English Language **3**
Development of the English language from its Germanic origins to the modern period.

453/653 Social and Regional Varieties of English **3**
Regional and social variables affecting language uses; attitudinal considerations with emphasis on the educational and sociopolitical ramifications of standardization policies. Focus on American English with reference to British and other English dialects.

454/654 Language Bias **3**
Examination of how social asymmetries of race, gender, and ethnicity are reflected and sustained in discourse practices. Use of current critical linguistics theories to examine how gender, racial, ethnic abilities/disabilities are manifested through language.

458/658 Advanced Writing Workshop **3**
Practice writing, revising, and editing essays for different audiences and purposes. Frequent response from peers and instructor. Analysis of selected readings and students' own writing. Prereq: Engl 358, junior standing.

462/662 Modern European Drama **3**
Study of representative modern plays and authors, including English and Irish, as well as those of continental Europe.

464/664 Comparative Literature **3**
Study of important works of world literature in a particular genre: epic, romance, drama, or novel.

467 English Studies Capstone Experience **3**
Cumulative and integrative study for English majors of English language, literature, and composition, which emphasizes the history of and the most current practices in English studies.

470/670 American Literary Renaissance **3**
Intensive study of major romantic and post-romantic figures, such as Hawthorne, Melville, Emerson, Thoreau, Stowe, Jewett, Whitman, and Dickinson. Combination varies.

471/671 American Realistic Literature 3
Principles of American literary realism as exhibited in the major works of Howells, James, Twain, Crane, Chopin, Gilman, Norris, Wharton, Dreiser, and others. Combination varies.

472/672 20th-Century American Writers 3
Intensive study of major American writers from 1900 to 1950.

473/673 Contemporary American Literature 3
American experimental and innovative literature from 1950 to the present, including existential, Black, women's, and social criticism works.

474/674 Native American Literature 3
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.

475/675 Regional Literature 3
Study of the literature and ideas of different regions of 20th-century America—South, West, and Midwest. Emphasis is on regional authors and unique genres.

477/677 Modern Poetry 3
Major poets in English during the 20th century up to World War II. Alternates between British and American poets, including Yeats, Auden, Smith, Eliot, Pound, Bishop.

480/680 Medieval Literature 3
British poetry and prose from the beginning of the Middle Ages to 1500, excluding Chaucer.

481/681 Chaucer 3
Intensive study of The Canterbury Tales plus selected readings from Chaucer's other works.

482/682 Renaissance Literature 3
Study of British writers of the 16th and 17th centuries, focusing on such writers as More, Sidney, Spenser, Shakespeare, Jonson, Donne, Browne, and Milton.

483/683 Elizabethan and Jacobean Drama 3
Renaissance tragedies and comedies, focusing on the works of such playwrights as Marlowe, Jonson, Middleton, and Webster.

484/684 Restoration and 18th-Century Drama 3
Comedy, tragedy, and farce from Dryden to Sheridan.

485/685 18th-Century Literature 3
Study of major writers: Dryden, Pope, Swift, and Johnson, with occasional excursions into the fictional territory of Richardson, Fielding, Sterne, and Smollett.

486/686 Romantic Literature 3
Study of major British writers from the French Revolution to the coronation of Queen Victoria.

487/687 Victorian Literature 3
Study of the nonfiction and poetry of 19th-century England. Focus on revolutionary ideas as they evolved and changed Victorian society.

488/688 20th-Century British Writers 3
Study of selected British writers from the Edwardian period to the present.

489/689 British Novel 3
Study of selected major British novels from the 18th century to the present.

755 Composition Theory 3
Study of contemporary theories of teaching writing with frequent summary/response papers on assigned readings and a research paper on composition theory.

756 Composition Research 3
Study of designs and basic statistics for writing research; analysis of current research; and a research project in composition. Prereq: Educ 481 and 482 or Engl 764 or departmental approval.

757 Composition Studies 3
Overview of major areas in composition studies (rhetoric and composition, theory and practice, research, and instructional trends).

758 Composition and Rhetoric 3
Introduction to sources and elements of classical rhetoric and their relevance to composition instruction today. Analysis of rhetorical elements, practice writing effective arguments, application to teaching writing.

759 Trends in Writing Instruction 3
Study of trends and movements in education that have influenced and continue to influence writing instruction in secondary schools and colleges in the United States.

760 Graduate Scholarship 3
Introduction to scholarship in English studies and to the nature and state of the discipline.

762 Critical Theory 3
Study of contemporary literary theory and criticism.

764 Classroom Strategies for TAs 3
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 English 120.

770 Studies in American Literature 3
Intensive study of a special period, theme, technique, or group of writers central to the formation, development, or flowering of American literature.

780 Renaissance Literary Studies 3
Intensive study of a special theme, form, or group of writers central to the formation and development of British literature in the Renaissance period.

781 18th-Century Literary Studies 3
Intensive study of a special theme, form, or group of writers central to the formation and development of British literature in the 18th century.

782 19th-20th Century British Literature 3
Intensive study of a special theme, form, or group of writers central to the formation and development of recent British literature.

ENTOMOLOGY (Ent)

Brewer, Chair; Boetel, Carlson, Foster, Glogoza, Harris, Olson, Rider

COURSES

210 Insects, Humans, and the Environment 3
Insects and their relationships to humans and the environment. 3 lectures. Spring.

350 General Entomology 5
Fundamental aspects of insect structure, classification, and biology with sections emphasizing horticultural entomology, crop protection, insect ecology, and aquatic entomology. 3 lectures, 1 three-hour laboratory. Fall.

731 Principles of Integrated Pest Management 3
Principles embodied in the implementation of multifaceted tactics designed to successfully manage pest populations. Offered even years; spring. Prereq: Ent 350.

732 Plant Resistance to Insects 2
Plant/insect interactions and their applications to plant breeding to increase resistance to pests. Offered even years; fall. Prereq: Ent 350.

741 Scientific Writing for Entomologists 2
Development of writing styles and skills and presentation of technical data. Offered odd years; spring.

742 Quantitative Biology 2
Philosophy and techniques for collecting, handling, and interpreting research data in the biological sciences. Offered odd years; spring. Prereq: Stat 330.

750 Systematic Entomology 5
Introduction to systematic methods and principles; identification of common families of insects. Offered even years; fall. Prereq: Ent 350.

751 Immature Insects 3
Characteristics of the immature forms of the orders and principal families of insects. Offered odd years; fall. Prereq: Ent 750.

760 Insect Structure 4
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. Offered odd years; fall. Prereq: Ent 350.

761 Insect Physiology **4**
Function of major insect organ systems and metabolism, growth, and molting of insects. Offered odd years; spring. Prereq: Ent 201, Chem 260.

765 Biological Control of Insects and Weeds **3**
The natural or applied regulation of pests by predaceous and parasitic insects and pathogens. Offered odd years; fall. Prereq: Ent 350.

770 Insect Ecology **3**
Role of insects in ecological communities. Emphasis on the importance of insects in development of ecological concepts and as primary herbivores, which provide an interface between plant and animal ecology. Offered even years; spring.

FAMILY AND CONSUMER SCIENCES EDUCATION

(See Human and Community Education.)

FINE ARTS

E. Miller, Director

COURSES

ART (Art)

Bromley, Kapplinger, Penuel, Swenson, Tollefson

Art Appreciation and History

110 Introduction to the Visual Arts (CCN) **3**
Study and analysis of artistic methods and meaning in the visual arts. (ND:Hum)

210, 211 [351, 352] **Art History I, II (CCN)** **3 each**
Survey of western art from Paleolithic to the Renaissance and from the Renaissance to the present.

451 History of American Art **3**
Study of American art from Pre-Columbian through contemporary (including Native American), emphasizing its highly individual nature and its effect on world art. Prereq: 210, 211.

452 Contemporary Art **3**
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.

Studio Art Foundations

122 [151] **Two-Dimensional Design (CCN)** **3**
Basic study of two-dimensional design for the studio artist.

124 [152] **Three-Dimensional Design (CCN)** **3**
Basic study of three-dimensional design for the studio artist.

130 [161] **Drawing I (CCN)** **3**
Study and application of different drawing media, methods, and techniques.

Studio Art Electives

220 [262] **Painting I (CCN)** **3**
Introduction to basic paints through a variety of materials. Includes historical examples, using acrylics, gouache, pastel, and mixed-media.

230 [261] **Drawing II (CCN)** **3**
Advanced study and application of different drawing media, methods, and techniques. Prereq: Art 130.

250 [265] **Ceramics I (CCN)** **3**
Introduction to basic ceramic techniques. Includes wheel-throwing and hand-building techniques, surface decoration, glazing, and firing.

265 [266] **Sculpture I (CCN)** **3**
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 hydrostone.

270 [263] **Printmaking I (CCN)** **3**
Introduction to basic printmaking techniques and materials. Includes monoprint, calligraphy, intaglio, relief, and serigraphy.

280 [264] **Photography I (CCN)** **3**
Introduction to basic photography. Includes visual issues of black and white and color photography. Experience with black and white processing and printing.

361 Drawing III **3**
Advanced study, studio practice, and critique. Use of mixed-media approaches. Emphasis on individual concept and content. Life drawing emphasis in the spring. May be repeated. Prereq: Art 230.

362 Painting II **3**
Intermediate study, studio practice, and critique. Use of oils, acrylics, water color, and mixed media. Development of individual concept and content. Prereq: Art 220.

363 Printmaking II **3**
Intermediate study, studio practice, and critique. Extension of process and media. Development of individual concept and content. Prereq: Art 270.

364 Photography II **3**
Intermediate study, studio practice, and critique. Use of traditional and alternative black and white and color processes. Emphasis on image gathering strategies. Development of individual concept and content. Prereq: Art 280.

365 Ceramics II **3**
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 250.

366 Sculpture II **3**
Intermediate study, practice, and critique. Further exploration of materials and processes. Development of individual concept and content. Prereq: Art 265.

462 Painting III **3**
Advanced study, studio practice, and critique. Exploration of mixed-media. Emphasis on individual concept and content. May be repeated. Prereq: Art 362.

463 Printmaking III **3**
Advanced study, studio practice, and critique. Exploration of mixed-media. Emphasis on individual concept and content. May be repeated. Prereq: Art 363.

464 Photography III **3**
Advanced study, studio practice, and critique. Professional practice, promotion, and presentation. Emphasis on individual concept and content. May be repeated. Prereq: Art 364.

465 Ceramics III **3**
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. May be repeated. Prereq: Art 365.

466 Sculpture III **3**
Advanced study, practice, and critique. Use of mixed-media. Specialization in materials and processes. Emphasis on individual concept and content. May be repeated. Prereq: Art 366.

489 [499] **Baccalaureate Project** **3-6**
Capstone research and creative experience within a specific area of interest with emphasis on refinement of aesthetic applications of techniques and media.

MUSIC (Musc)

Eyler, Froelich, Groves, Jones, Mack, J. Miller, Mueller, Olfert, Patnode, Queen

Music History and Literature

103 [140] **Introduction to Music History (CCN)** **3**
Introduction to the major works of music in the western tradition which define the stylistic elements of musical periods in history.

104 [126] **Introduction to Music Literature to 1825 (CCN)** **3**
Understanding and appreciating musical styles and composers up to circa 1825 with some emphasis on the relationship of music to concurrent social and artistic trends. Designed for non-music majors. (ND:Hum)

105 [127] **Introduction to Music Literature: 1825 to the Present (CCN)** **3**
Understanding and appreciating musical styles and composers from circa 1825 to the present with some emphasis on the relationship of music to concurrent social and artistic trends. Designed for non-music majors. (ND:Hum)

108 [128] **Roots of American Popular Music (CCN)** **3**
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. (ND:Hum)

141 Symphonic Literature **2**
Survey of the history of symphonic literature with emphasis on selected works. Prereq: Musc 140, ability to read music.

142 Operatic Literature **2**
Survey of the history of opera with emphasis on selected works. Prereq: Musc 140, ability to read music.

143 Keyboard Literature **2**
Survey of keyboard styles, instrumental development, and literature (excluding organ) from the early 14th century through the 20th century, with special emphasis on works from 1775 to 1925. Prereq: Music major or minor.

201 [129] **World Music (CCN)** **3**
Survey of the music cultures of major non-Western and non-Anglo North American ethnic groups of the world.

340 Music History I **3**
Study of the history of music from the Greek period through the Baroque. Prereq: Musc 103.

341 Music History II **3**
Study of the history of music from the Classical period through the 20th century. Prereq: Musc 340.

712 Survey of Choral Literature **2**
Study of the major genres, forms, and style periods of choral music, including major composers and their output. Concert programming included.

713 Band Literature, History, and Development **2**
In-depth study of band literature including history, trends, significant works, and related resources.

790 Seminar in Music History **2**
In-depth study of a specific period in music history. Involves specialized readings, score study, and listening. A research paper on some aspect of the period is required.

Music Theory

101 [125] **Fundamentals of Music (CCN)** **3**
Introduction to fundamental elements of music through the study of scales, chords, basic harmonic progressions, rhythms, and terminology.

130, 131 Elementary Harmony I, II **3 each**
Introduction to the compositional practices of the 18th and 19th centuries. Prereq for 131: Musc 130; Coreq: Musc 132, 133 respectively.

132, 133 Elementary Ear Training I, II **1 each**
Development of sight singing and ear training skills. Laboratory band and chorus required. Coreq: Musc 130, 131 respectively.

230, 231 Advanced Harmony I, II **3 each**
Advanced harmonic materials of the common practice period and analysis of small and large forms. Prereq for 230: Musc 130; Prereq for 231: Musc 230; Coreq: Musc 232, 233 respectively.

232, 233 Advanced Ear Training I, II **1 each**
Advanced work with ear training and sight singing materials. Laboratory band and chorus required. Coreq: Musc 230, 233 respectively.

330 Contemporary Harmonic Techniques **3**
Study of harmonic and contrapuntal techniques of contemporary composers, with exercises in writing in the various styles. Prereq: Musc 231.

331 Instrumental Arranging **2**
Arranging materials for bands. Prereq: Musc 231.

332 Choral Arranging **2**
Arranging materials for choral ensembles. Prereq: Musc 231.

411/611 [711] **Form and Analysis** **2**
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.

430 Counterpoint **3**
Contrapuntal techniques of Renaissance and Baroque composers and application through written assignments. Prereq: Musc 231.

Music Education

150 Vocal Methods and Pedagogy I **2**
Basic instruction in vocal pedagogy, methods, and literature for music majors.

160, 161 Piano Class I, II **1 each**
Group instruction in the basic fundamentals of playing the piano. Designed primarily to meet the basic piano proficiency requirements for music education majors.

162, 163 Voice Class I, II **1 each**
Group instruction in the fundamentals of singing. For music students who do not major in voice.

250 Basic Conducting **2**
Study and development of basic ensemble conducting skills.

260, 261 Piano Class III, IV **1 each**
Intermediate instruction in class piano. Prereq: Musc 161.

350 Vocal Methods and Pedagogy II **2**
Advanced instruction in vocal pedagogy and methods for music education majors. Prereq: Musc 150.

351 Instrumental Conducting and Literature **2**
Fundamentals and techniques of conducting instrumental ensembles with practical application through the study of instrumental literature.

352 Choral Conducting and Literature **2**
Fundamentals and techniques of conducting choral ensembles with practical application through the study of choral literature.

353 [152] **Woodwind Methods I** **2**
Class instruction in woodwind instruments for vocal and instrumental music education majors. Emphasis on pedagogical principles, applied competency of fundamentals, and literature.

354 [153] **Woodwind Methods II** **2**
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.

355 [154] **Brass Methods I** **2**
Class instruction in brass instruments for vocal and instrumental music education majors. Emphasis on pedagogical principles, applied competency of fundamentals, and literature.

356 [155] **Brass Methods II** **2**
Class instruction in brass instruments for instrumental music education majors. Emphasis on pedagogical principles, applied competency of fundamentals, and literature.

357 Marching Band Methods and Techniques **2**
Methods and materials for directing, charting, and fielding a high school marching band.

358 Jazz Methods **2**
History, methods, and materials for teaching jazz styles and improvisation.

359 [156] **Percussion Methods** **2**
Class instruction in percussion instruments for music education majors. Emphasis on pedagogical principles, applied competency, and literature.

701 Psychology of Music **2**
Study of acoustics, the anatomy and physiology of hearing, and how music and sound are perceived by the listener.

721 Advanced Vocal Pedagogy and Repertoire **2**
In-depth study of the physical and physiological considerations of vocal technique with application to specific voices and suitable repertoire.

722 Advanced Instrumental Music Pedagogy and Literature **2**
Advanced study in the pedagogy and literature of wind instruments. Emphasis on techniques of teaching winds in grades 5 through 12. Section 1: Brass pedagogy. Section 2: Woodwind pedagogy.

Applied Music

Private lessons. Prereq: Qualifying examination in performance.

Applied Piano **1**
165, 265, 365, 465. May be repeated twice.

Applied Organ **1**
166, 266, 366, 466. May be repeated twice. Tri-College course.

Applied Voice **1**
167, 267, 367, 467. May be repeated twice.

Applied Wind Instruments **1**
168, 268, 368, 468. May be repeated twice.

Applied Percussion Instruments **1**
169, 269, 369, 469. May be repeated twice.

Elementary Applied Voice, Wind Instruments, Percussion **1 each**
170, 171, 172. May be repeated.

Supplementary Applied **1**
173, 273, 373, 473. May be repeated.

174 Pronunciation for Singers I **1**
Instruction in the proper pronunciation of English, Italian, German, Latin, and Spanish for song, oratorio, and opera.

175 Pronunciation for Singers II **1**
Instruction in the proper pronunciation of French for song, oratorio, and opera. Prereq: Musc 174.

364 Jazz Improvisation **2**
Basic concepts necessary to play and teach the fundamentals of jazz improvisation.

480 Recital **1**
Capstone for performance majors.

731 Applied Study **1**
Private study in voice, woodwinds, brass, or conducting designed to refine performance skills and technical and musical proficiency.

Organizations

Membership in all organizations is subject to approval of the director. May be repeated.

111 Marching Band **1**
112 Varsity Band (ND:FA) **1**
114 University Summer Band **1**
115 University Chorus (ND:FA) **1**
303 Concert Band (ND:FA) **1**
306 Concert Choir (ND:FA) **1**
310 Brass Ensemble **1**
311 Jazz Ensemble **1**
312 Percussion Ensemble **1**
313 Trombone Ensemble **1**
314 Brass Chamber Ensemble **1**
315 Woodwind Chamber Ensemble **1**
316 String Chamber Ensemble **1**
317 Madrigal Singers **1**
318 Dakota Jazz (Vocal) **1**
319 Opera Workshop **1**
320 Vocal Chamber Ensemble **1**
321 Piano Chamber Music **1**
322 Jazz Combo **1**

THEATRE ARTS (Thea)

Anderson, Erickson, Fike, Horvik, Larew, Lifton

COURSES

110 Introduction to Theatre Arts (CCN) **3**
Basic orientation and historical perspective to the art of theatre. Includes the spectrum of dramatic literature, theatrical production, and performance.

115 World Film **3**
Study of the development and practice of the art of film and its relationship to the theater emphasizing performance and production angles.

160 Introduction to Acting **3**
Introduction to the experience and craft of acting; designed for the general student. Emphasis on enhancing spontaneity, imagination, and awareness. For non-majors only.

161 Acting I (CCN) **3**
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. (ND:FA)

201 [150] **Theatre Practicum (CCN)** **1**
Participation in various activities of theatrical production. May be repeated.

261 [260] **Acting II (CCN)** **3**
Practical application of fundamental skills to textual work. Prereq: Thea 160.

270 Stagecraft (CCN) **3**
Introduction to the crafts and technologies of theatre production. Includes fundamentals of scenery construction, tool usage, safety, and basic rigging. 2 lectures, 1 two-hour laboratory.

271 Costume Construction **3**
Introduction to costuming. Construction, alteration, and acquisition of costumes and costume accessories. 3 lectures, 1 two-hour laboratory.

275 Makeup Design I **3**
Fundamentals of stage makeup. Facial analysis and introduction to materials and techniques. Elementary character interpretation through two-dimensional application.

276 Makeup Design II **3**
Advanced study in makeup techniques and application, including prosthetics. More advance character interpretation through three-dimensional application. Concludes with major makeup projects. Prereq: Thea 275.

280 World Theatre **3**
Survey of dramatic literature from the Greeks to the 18th century with emphasis on historical and cultural context, production style, and problems inherent in contemporary production.

281 Dramatic Literature and Style **3**
Survey of dramatic literature from the 18th century to the present with emphasis on historical and cultural context, production style, and problems inherent in contemporary production.

350 Studio Theatre **1-2**
Workshops in specialized techniques or a showcase for individual creativity. Includes projects in acting, directing, design, movement, and play writing. May be repeated.

361 Movement for the Actor **2**
Introduction to basic stage movement techniques. Emphasis on bodily awareness and control, responsiveness, freedom from personal mannerism, and physical characterization. Offered alternate years. Prereq: Thea 261.

362 Voice for the Actor **2**
Vocal and articulatory techniques and character development are explored through a study of speech production and the use of physical exercises and performance. Offered alternate years. Prereq: Thea 261.

365 Directing I **3**
Introduction to the creative process of directing. Focus on script analysis, basic directing tools, and scene work. Prereq: Thea 261.

370 Technical Theatre Production **3**
Advanced study in technical theatre production. Emphasis on planning processes and individual duties/responsibilities for technicians at all levels of theatrical production. 2 lectures, 1 three-hour laboratory. Prereq: Thea 270, 271.

372 Stage Management **3**
Fundamentals of production stage management. Emphasis on the role, duties, and relationships of the stage manager as a member of the production team.

440 Advanced Projects in Production **3**
Advanced projects in acting, directing, and technical theatre. May be repeated. Prereq: Thea 370 or departmental approval.

450 Capstone Experience **3**
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.

460/660 Acting III **3**
Application of the skills of acting to period and non-realistic styles. Prereq: Thea 261.

465/665 Directing II **3**
Problems in directing, formulating production concepts, casting, working with actors, and aiding characterization. Includes preliminary work with thrust and arena staging. Prereq: Thea 365.

466/666 Directing III **3**
Period and non-realistic styles, thrust and arena staging, casting, and working with designers. Study of various directing methodologies. Prereq: Thea 465.

468 [363] **The Business of Acting** **3**
Selection, preparation, and performance of songs and classical and contemporary monologues for auditions; preparation of professional resume and cover letter; techniques of cold reading; research of theatre companies, union, agencies, and other job search resources. Prereq: Senior standing.

475/675 Design for the Stage I **3**
Basic drafting and design techniques used in theatrical design and technology. Includes script analysis and historical perspective on scenic, costume, lighting, and property design. 2 three-hour laboratories.

476/676 Design for the Stage II **3**
Interpretation of the theatrical script, evolving into design concepts for scenery, costumes, lighting, and properties. Continued historical perspective of theatrical design. 2 three-hour laboratories. Prereq: Thea 475.

477/677 Design for the Stage III **3**
Advanced study in the areas of scenic, costume, lighting, and/or property design, and technology. Offered alternate years. Prereq: Thea 476.

480/680 History and Literature of the Theatre I **3**
Historical study of theatre architecture, staging methods, individual artists, and plays from the Theatre's origins through the 17th century Offered alternate years. Prereq: Thea 110.

481/681 History and Literature of the Theatre II **3**
Historical study of theatre architecture, staging methods, individual artists and plays from the 18th century to the present. Offered alternate years. Prereq: Thea 480/680.

486/686 Theatre Theory and Criticism **3**
Historical survey of the major western theoretical and critical writing about theatre and drama from Aristotle to the present. Offered alternate years. Prereq: Thea 110, 280, or 480/680.

489/689 Advanced Studies in Theatre **3**
Intensive study of selected, specialized topics in theatre history, dramatic literature, and/or theory and criticism. Offered alternate years.

650 Advanced Projects in Production **3**
Advanced projects in acting, directing, and technical theatre. May be repeated. Prereq: Thea 460/660. Prereq: Graduate standing.

700 Introduction to Graduate Research **3**
Survey of library resources; research using original and published materials; practice reporting research; and writing criticism using accepted style.

FOOD AND NUTRITION (F&N)

Chang, Greeley, Hadley, Holm, North, Sarabakhsh, Winters, Wolf-Hall

COURSES

111 Wellness **3**
Examination of personal lifestyle choices related to emotional, nutritional, and mental well-being. 3 lectures.

141 Consumer Food Preparation **3**
Basic food selection and preparation principles and their application in laboratory exercises. Meal planning to meet daily dietary needs. Overview of food safety and sanitation. 2 lectures, 1 three-hour laboratory.

170 Introduction to Hospitality Industry **3**
Overview of the hospitality industry; its history, components, career opportunities, development, and future trends with application to food service, lodging, and travel. 3 lectures.

171 Tourism and Travel Management **3**
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.

210 Introduction to Food Science and Technology **2**
See Cereal Science for description.

Nutr 240 [F&N 110] **Principles of Nutrition (CCN)** **3**
Current nutrition facts and philosophy as a basis for meeting nutritional needs in a changing society. 3 lectures.

250 Nutrition Science **3**
Scientific principles of nutrition based on chemical structure and function of the nutrients. 3 lectures. Prereq: Chem 121.

261 Food Selection and Preparation Principles **4**
Scientific principles underlying food selection, preparation, and preservation; integration of nutrition principles, food standards, cost comparisons, and new food developments. 3 lectures. Prereq: Chem 117 or 121.

262 Food Selection and Preparation Principles Laboratory **3**
Illustrates and extends lecture topics and stresses practical application of scientific food preparation principles. 2 three-hour laboratories. Prereq or coreq: F&N 261.

319 Consumer Issues in Food and Nutrition **3**
Current developments in food and nutrition recommendations and consumer related concerns. 3 lectures.

351 Metabolic Basis of Nutrition **4**
Biochemical and physiological principles of human nutrition. Nutrients in relation to metabolic regulation. 4 lectures. Prereq: F&N 250, Chem 241, 260.

352 Nutrition, Growth, and Development **3**
Examination of the course of growth, maintenance, and senescence and nutrient needs during those periods. Prereq: Nutr 240.

354 Introduction to Nutrition Care **4**
Introduction to the role and skills in nutritional care and application of skills necessary for beginning competency as a clinical dietitian. 3 lectures, 1 two-hour laboratory. Prereq or coreq: F&N 351, 352.

355 Supervised Practice in Coordinated Program **1**
Supervised practice in dietetics in a health care setting. 1 four-hour laboratory. Prereq: F&N 354.

361 Food Production Management **4**
Principles and methods of purchasing, production, and management for quantity foodservice operations. 4 lectures. Prereq: F&N 262.

362 Food Sanitation **3**
Principles of safe food handling practices in the home and commercial operations. 3 lectures. Prereq: Biol 202, F&N 262.

370 Hospitality Controllership **3**
Basic hospitality accounting concepts and practices; emphasis on night auditing functions. 3 lectures. Prereq: Acct 200.

371 Front Office Management **3**
Front office procedures, reservations, selling strategies, and handling guest inquiries. Computer application is highlighted. Prereq: F&N 170, 171.

435/635 Nutrition in Disease for Health Professionals **2**
Principles of client assessment and care that reflect recent advances in nutrition management together with their application to practice. Prereq: F&N 250.

450/650 Nutrition Education in the Community **4**
Need for and objectives of nutrition education; assessing needs of the community; experience teaching nutrition in the community. 3 lectures, 1 four-hour laboratory. Prereq: F&N 351.

452/652 [453/653] **Nutrition, Health, and Aging** **3**
Physiological changes with aging and their relationship to food habits and nutritional need. Common nutritional health problems with emphasis on prevention and treatment. 2 lectures, 1 two-hour laboratory.

453/653 Food and Dairy Microbiology **3**
See Veterinary and Microbiological Sciences (microbiology) for description.

458/658 Clinical Nutrition **4**
Principles in the nutrition care of patients with conditions requiring nutrition care. 4 lectures. Prereq: F&N 351.

459 Clinical Nutrition Laboratory **3**
Supervised practice for CP students in nutrition care to accompany F&N 458. 2 four and one half-hour laboratories per week. Coreq: F&N 458/658.

460/660 Foodservice Systems **3**
Role of foodservice in today's society. Application of administration concepts in foodservice operation including equipment, layout, marketing, and budget management. 3 lectures. Prereq: Busn 350.

461 Foodservice Systems Laboratory **3**
Supervised practice for CP students in foodservice to accompany F&N 460. 1 six-hour laboratory. Coreq: F&N 460/660.

462 Food Production Laboratory **3**
Practical experience in applying principles of quantity food production service and food product development. 1 six-hour laboratory. Prereq: F&N 261, 262, 361.

464/664 Food Analysis **3**
Principles, applications, and practice of methods for quantitative determination of food components. 2 lectures and 1 three-hour laboratory. Prereq: Bioc 460; CS 460 recommended or departmental approval.

465 Professional Catering Management **3**
Study and application of advanced principles of foodservice management in the catering profession. 2 lectures and hours arranged. Prereq: F&N 361.

467 Innkeeper's Liability **3**
Legal considerations of hospitality property management using systemic methodology. Exploration of important legislation. Identification of legal pitfalls before they become legal entanglements.

470 Hospitality Marketing and Sales Promotion **3**
Basic marketing theory and contemporary practice as adapted to the hospitality industry. Prereq: F&N 170, 171.

471 Strategic Beverage Operations Management **3**
Basic principles and methods of operating a profitable bar and beverage operation in the hospitality setting. Includes analysis of equipment, layout, staffing, product inventory, pricing, and profitability.

479 Hospitality Industry Management Strategies **3**
Capstone course for HMR majors. Includes opportunities to analyze hospitality issues, make business decisions, and solve practical problems through case studies and real situations. Prereq: F&N 371, 470.

480 Dietetics Practicum **10**
Practical experience with the responsibility equal to that of an entry-level dietitian on the job. 40 hours laboratory per week in clinical facility. Prereq: F&N 459, 461.

481 Dietetics: Capstone Course **2**
Capstone seminar for dietetics majors concerning professional skills, services, and programs in dietetics. Prereq: Senior standing.

744 International Food and Nutrition Problems **2**
Malnutrition, hunger, and famine outside of the United States from a multi-disciplinary perspective.

750 Human Digestion and Metabolism **4**
Physiological and biochemical aspects of human digestion and metabolism. 4 lectures. Prereq: F&N 351, Bioc 701.

751 Minerals and Vitamins in Food and Diet **3**
Mineral and vitamin absorption, transport, utilization, and excretion in humans. 3 lectures. Prereq: F&N 750.

752 Proteins and Amino Acids in Food and Diet **2**
Nature of amino acids and protein in foods; their role in human physiological systems and contribution to nutritional quality of diet. 2 lectures. Prereq: F&N 750.

753 Lipids and Carbohydrates in Food and Diet **2**
Effects of changes in the types and amount of lipids and carbohydrates in the diet on human metabolism, particularly inborn errors and metabolic diseases. 2 lectures. Prereq: F&N 750.

754 Research Techniques in Nutrition Science **3**
Selected techniques for assessment and interpretations of nutritional status. 1 lecture, 1 four-hour laboratory. Prereq: Stat 330.

763 Food Product Development and Sensory Evaluation **3**
Concepts and methods of food product development. Sensory analysis of food qualities. Statistical analysis, interpretation, and presentation of data. 1 lecture, 2 two-hour laboratory. Prereq: F&N 462, Stat 330.

FOOD SAFETY (Safe)
Nolan

COURSES

450/650 Food Safety for the Food Industry and Consumers **3**
Overview of food safety hazards. Discussion of sanitation, handling, processing, and serving food. Explanation of Quality Assurance programs at the farm and HACCP in food processing and food service.

460/660 Etiology of Foodborne Illness **3**
Study of the etiology, prevention, pathogenesis, and disease manifestations of foodborne illnesses, including those caused by pathogens, allergens, toxins, and contaminants. Detection of the etiologic agents and their entrance into the food chain.

470/670 Economic, Epidemiologic, and Regulatory Issues in Food Safety **3**
Study of the economic impact of foodborne illness, its prevention and tracking, and the regulations governing food safety in the U.S. and their impact on global trade.

480/680 Food Safety Practicum **2**
Integrated, laboratory study of food safety. Includes field trips, speciality speakers, workshops, and case studies as sources for developing skill in solving food safety problems from farm to fork.

GEOSCIENCES
Ashworth, Chair; Hatzenbuhler, Saini-Eidukat, Schwert

COURSES

Geography (Geog)

151 [115] **Human Geography (CCN)** **3**
Non-ethnocentric understanding of geography of human lifestyles and activities; their place and role in human-environment interaction.

161 [110] **World Regional Geography (CCN)** **3**
Study of geographic processes shaping major world regions and inter-relationships in the global village; geographic bases and implications of current world events.

262 [314] **Geography of North America (CCN)** **3**
Spatial approach to the development of the United States and Canada, which stresses changing cultural landscapes and assessing impacts of planning for resource utilization.

315 Upper Midwest Geography **3**
Geography of the Upper Midwest region including Minnesota, North Dakota, South Dakota, and parts of adjacent states and provinces. Offered periodically.

412/612 Geomorphology **3**
See Geology for course description.

455/655 Geographic Information Systems **3**
Introduction to basic concepts of geographic information systems and their applications to various spacial problems. Lectures and laboratories.

Geology (Geol)

105, 105L [120, 121] **Physical Geology, Lab (CCN)** **3,1**
Study of the Earth as a physical body; its structure, composition, and the geologic processes acting on and within the Earth. (ND:LabSc)

106, 106L [130, 131] **The Earth Through Time, Lab (CCN)** **3**
Introduction to the Earth through time; its origin, history, and evolution of animal and plant life. (ND:LabSc)

300 Environmental Geology **3**
Human interaction with Earth's environment. Earthquakes, floods, volcanoes, landslides, water use, pollution, energy, mining, and land-use planning. Offered alternate years. Prereq: Geol 105, 105L.

301 Lake Superior Field Course **2**
Stratigraphy, mineralogy, and economic geology of northern Minnesota and northwestern Ontario. Weekly lecture, plus six-day field excursion. Offered periodically. Fee required. Prereq: Geol 105, 105L, 106, 106L, departmental approval.

302 Black Hills Field Course **2**
Stratigraphy, structure, and mineralogy of the Black Hills and Williston Basin. Weekly lectures, plus seven-day field excursion. Offered periodically. Fee required. Prereq: Geol 105, 105L, 106, 106L, departmental approval.

303 Paleontology Field Course **1**
Paleozoic stratigraphy and paleontology of southeastern Minnesota and northern Iowa. Lecture by arrangement, plus 1 three and one-half day field excursion. Offered alternate years. Fee required. Prereq: Geol 106, 106L, departmental approval.

304 Eastern North Dakota Field Course 1
Field study of Mesozoic and Cenozoic sediments of eastern North Dakota. Two-day field excursion and a report. Fee required. Prereq: Geol 105 or 106, departmental approval.

350 Invertebrate Paleontology 3
Survey of invertebrate fossils emphasizing systematics, environments and as stratigraphic markers. Offered alternate years. Prereq: Geol 106, 106L.

410 Sedimentology/Stratigraphy 4
Origin and classification of sedimentary rocks and their stratigraphic relationships. 3 lectures, 1 laboratory. Offered alternate years. Prereq: Geol 105, 105L, 106, 106L.

412/612 Geomorphology 3
Land forms and the processes by which they are formed and modified. 3 lectures, 1 two-hour laboratory. Offered alternate years. Prereq: Geol 105, 105L. Cross-listed with Geog.

413/613 Glacial Geology 3
Origin and operation of glaciers; geological work of glaciers, history of glaciations with emphasis on those of the Pleistocene Epoch. Offered periodically. Prereq: Geol 105, 105L, junior standing.

420/620 Mineralogy 4
Crystal forms, crystal chemistry, and formation of non-silicate and silicate minerals. Offered alternate years. Prereq: Chem 121 or 150.

421/621 Mineralogy Laboratory 2
Identification and classification of minerals using morphology, physical properties, XRF and XRD. Offered alternate years. Coreq: Geol 420/620.

422/622 Petrology 4
Principles of igneous and metamorphic petrology including geochemistry, phase relations, and rock forming processes. Offered alternate years. Prereq: Geol 420/620.

423/623 Petrography 2
Identification and classification of rocks in hand specimens and thin sections. Optical mineralogy. Field and laboratory projects required. Offered alternate years. Prereq: Geol 422/622.

426/626 Crystallography/Crystal Chemistry 2
See Chemistry for description.

427/627 X-Ray Diffraction 2
See Chemistry for description.

428/628 Geochemistry 3
Introduction to geochemistry: chemistry of the Earth, groundwater, isotopes, global geochemical cycles, geochemical modeling, and environmental geochemistry. Offered alternate years. Prereq: Chem 121 or 150. Cross-listed with Chem.

440/640 Quaternary Biology 4
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. Prereq: Geol 106 and 106L or departmental approval.

450/650 Field Geology 3
Interpretation of geology in the field; preparation of base maps and plotting geological data. Lectures and one week fieldwork. Offered alternate years. Fee required. Prereq: Geol 410, 421/621, 423/623, 457/657.

457/657 Structural Geology 4
Dynamics of rock deformation and analyses of Earth structure. Offered alternate years. Prereq: Geol 105, 105L, trigonometry, geometry.

HEALTH, PHYSICAL EDUCATION, AND RECREATION (HPER)

Strand, Chair; Ary, Barnhart, Bruenjes, Dolezal, Horejsi, Isrow, Maughan, McLeod, Terbizan

COURSES

100 [110] **Concepts of Fitness and Activities (CCN) 2**
Facts about exercise and physical fitness.

110 Introduction to Health, Physical Education, and Recreation 1
Introduction to career opportunities and requirements within the profession. Investigation of the various majors in health, physical education, and recreation. Coreq: HPER 150, 170, 180 or 200.

111 Activity I 1
Basic techniques and practice of fitness activities.

112 Activity II 1
Basic techniques and practice of individual and dual sports activities.

113 Activity III 1
Basic techniques and practice of team sports.

114 Racquetball 1
Basic techniques and practice of racquetball.

115 Bowling 1
Basic techniques and practice of bowling.

116 Weight Training 1
Basic techniques and practice of weight training.

117 Judo 1
Basic techniques and practice of judo.

118 Fall Semester First-Year Intercollegiate Sports 1
First-year participation on an intercollegiate sports team.

119 Beginning PADI Open Water Scuba 2
Beginning level scuba skills. Continuing Education course.

120 Swimming I 1
Technique and practice in Levels I-IV of the American Red Cross Swimming Program.

121 Swimming II 1
American Red Cross Level V-VII advanced level swimming techniques and practice. Prereq: HPER 120 or swimming proficiency.

122 Advanced PADI Open Water Scuba 1
Advanced level scuba skills. Continuing Education course.

123 Spring Semester First-Year Intercollegiate Sports 1
First-year participation on an intercollegiate sports team.

125 Folk and Square Dance 1
Basic techniques and practice of folk dances of selected countries.

126 Social Dance 1
Basic techniques and practice of social and ballroom dance forms such as foxtrot, waltz, jitterbug, polka, schottische, and Latin American dances.

129 Aerobic Dance 1
Basic techniques and practice in aerobic exercise and dance activities.

150 [155] **Foundations of Physical Education 2**
Introduction to developing a conceptual framework for teaching physical education. Includes an overview of the preparation needed and what is expected of physical education teachers. Coreq: HPER 110.

151 Professional Preparation in Recreational and Adventure Sports 3
Instruction in the fundamentals of recreational and adventure sports such as ultimate frisbee, archery, fencing, orienteering, new games, and cooperative activities. Limited to HPER majors and minors.

152 Professional Preparation in Team Sports 3
Instruction in the fundamentals of team sports such as soccer, football, volleyball, basketball, softball, and team handball. Limited to HPER majors and minors.

153 Professional Preparation in Dance 3
Instruction in the fundamentals of various types of dance such as line dances, folk dances, square dances, and other contemporary dances. Limited to HPER majors and minors.

154 [300] **Professional Preparation in Aquatics 3**
Development of skills for water safety instructors or water safety aid certification. Prereq: HPER 120 or swimming proficiency.

155 [150] **Professional Preparation in Individual and Dual Sports 3**
Instruction in the fundamentals of individual and dual sports such as badminton, golf, tennis, pickleball, and racquetball. Limited to HPER majors and minors.

Description of page 137

170 Introduction to Human Performance and Fitness **2**
Discussion of human performance and fitness as a career. Fundamentals include aerobic systems, strength, flexibility, and exercise prescription. Coreq: HPER 110.

180 Athletic Trainers' Profession **2**
Overview of athletic training and preparation required. Investigation of various career opportunities within the profession. Coreq: HPER 110.

181 Practical Applications for Protective Devices and Taping **2**
Practical exposure to evaluation and application of protective taping technique and individual devices. Use of various materials available in the athletic training room. Prereq: HPER 180, Zoo 120, 120L.

200 [139] **Introduction to Parks and Recreation (CCN)** **2**
Introduction to the professions in leisure studies and community recreation programming. Coreq: HPER 110.

210 [140] **First Aid and CPR (CCN)** **2**
Instruction and laboratory practice in first aid procedures, including CPR; healthy life styles; prevention. American Red Cross and American Heart Association standards.

213 Fall Semester Second-Year Intercollegiate Sports **1**
Second-year participation on an intercollegiate sports team.

217 [145] **Personal and Community Health (CCN)** **3**
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.

220 Lifeguard Training **2**
American Red Cross techniques and methods of aquatic safety and life guarding. Meets American Red Cross standards. Prereq: HPER 121 or swimming proficiency.

223 Spring Semester Second-Year Intercollegiate Sports **1**
Second-year participation on an intercollegiate sports team.

225 Camp Management and Outdoor Recreation Skills **2**
Theories of camp management and counseling. Camping skills and techniques. Prereq: HPER 200 or departmental approval.

226 Introduction to Therapeutic Recreation **3**
Survey of serving special populations, therapeutic recreation models, processes, rationales, terminology, and professional issues.

230 Sports Officiating **1**
Rules and techniques of officiating selected sports.

240 [141] **First Aid and CPR for the Professional Rescuer** **2**
Breathing and cardiac emergencies; two rescuer CPR; using resuscitation and bag-valve masks; caring for life threatening bleeding, sudden illness, and injuries; prevention. American Red Cross and American Heart Association Standards.

250 Movement Analysis **3**
Survey of conceptual and functional properties of motor systems, human performance, and biomechanics. Integration of biomechanics and motor systems for analysis of movement, motor, and sport skill acquisition. Prereq: HPER 150, Zoo 120, 120L.

260 Athletic Training Observation **1**
Observation and interaction with athletic trainers in a variety of professional health care settings. Prereq: HPER 180, 181, Zoo 120, 120L.

280 Sport Safety Training **3**
Basic first aid and CPR skills and information needed to care for sports related injuries.

281 Injury Recognition **3**
Introduction to athletic injuries. Treatment of injuries and illnesses associated with athletic participation. Prereq: HPER 180, 181, 240, Zoo 120, 120L.

282 Athletic Training Terminology and Equipment **2**
Medical terminology related to athletic training and proper methodology used in the fitting, maintenance, and operation of athletic training equipment. Prereq: HPER 181.

284 Fall Athletic Training Practicum I **3**
Practical work in basic taping and treatment of injuries in intercollegiate athletics. Prereq: HPER 181.

285 Spring Athletic Training Practicum I **3**
Practical work in basic taping and treatment of injuries in intercollegiate athletics. Prereq: HPER 282, 284.

286 Injury Recognition Laboratory **1**
Introduction to athletic injury assessment. Practical application of topics discussed in HPER 281 lecture. Coreq: HPER 281.

302 Water Safety Instruction **2**
Methods of teaching swimming and water safety. Meets American Red Cross standards. Prereq: HPER 121 or swimming proficiency.

313 Fall Semester Third-Year Intercollegiate Sports **1**
Third-year participation on an intercollegiate sports team.

323 Spring Semester Third-Year Intercollegiate Sports **1**
Third-year participation on an intercollegiate sports team.

326 Recreation Programming **3**
Principles of the process for designing leisure experiences. Art, crafts, music, dance, sport and games, special events, and environmental activities are examined. Risk management, intramural sports organization and program budgeting are stressed. Prereq: HPER 200 or departmental approval.

330 Coaching Football **2**
Rules, theory, principles, and fundamentals of coaching football. Prereq: Knowledge of the sport.

331 Coaching Basketball **2**
Rules, theory, principles, and fundamentals of coaching basketball. Prereq: Knowledge of the sport.

332 Coaching Track and Field **2**
Rules, theory, principles, and fundamentals of coaching track and field. Prereq: Knowledge of the sport.

333 Coaching Wrestling **2**
Rules, theory, principles, and fundamentals of coaching wrestling. Prereq: Knowledge of the sport.

334 Coaching Baseball and Softball **2**
Rules, theory, principles, and fundamentals of coaching baseball and softball. Prereq: Knowledge of the sport.

335 Coaching Volleyball **2**
Rules, theory, principles, and fundamentals of coaching volleyball. Prereq: Knowledge of the sport.

336 Methods of Coaching **3**
Provides information necessary to coach at any level from elementary to college. Includes broad overview of the philosophy, methodology, and management of sport.

345 Methods and Materials of Comprehensive School Health Education **3**
Development of methods and strategies for comprehensive school health education. Emphasis on lesson planning and delivery as they pertain to the content areas within health education. Prereq: HPER 217.

350 Fitness Education Activities and Materials **3**
Topics related to teaching concepts-based fitness in high school physical education. Prereq: HPER 150-155, 250.

351 [251] **Elementary Physical Education Activities and Materials** **3**
Study of elementary physical education activities and materials that physical education majors and minors will use in Educ 482. Prereq: HPER 150-155, 250, or departmental approval.

352 [252] **Secondary Physical Education Activities and Materials** **3**
Study of secondary physical education activities and materials that physical education majors and minors will use in Educ 481. Prereq: HPER 150-155, 250.

365 Kinesiology and Biomechanics 3
Study of movement analysis with emphasis on anatomical, biomechanical, and physical principles. Prereq: Zoo 120, 120L.

366 Kinesiology and Biomechanics Laboratory 1
Bone and muscle identification, movement analysis, biomechanical application. Coreq: HPER 365.

367 Principles of Conditioning 3
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: HPER 250.

380 Emergency Response and Transportation 2
Recognizing and caring for breathing and cardiac emergencies, injuries, and sudden illness; preventing disease transmission automated external defibrillation; transporting the sick or injured to advanced medical care. Prereq: HPER 240.

384 Field Evaluation of Athletic Injuries 3
Guidance and practice in the evaluation of athletic injuries. Prereq: HPER 281.

385 Therapeutic Modalities 3
Practical use of various therapeutic modalities used in treating athletic injuries. Emphasis on physiological effects, indications, and contradictions of each form of treatment. Prereq: HPER 384.

386 Fall Athletic Training Practicum II 3
Development of athletic injury recognition and evaluation skills. Prereq: HPER 384, 385.

387 Spring Athletic Training Practicum II 3
Development of athletic injury recognition and evaluation skills. Prereq: HPER 386.

413 Fall Semester Fourth-Year Intercollegiate Sports 1
Fourth-year participation on an intercollegiate sports team.

423 Spring Semester Fourth-Year Intercollegiate Sports 1
Fourth-year participation on an intercollegiate sports team.

426 Parks and Recreation Administration 3
Topics include marketing, planning, organizing, directing, coordinating, reporting, and budgeting in parks and recreation programs. Ethics, policy making, and philosophy issues are also discussed. Prereq: HPER 200, junior standing, or departmental approval.

427 Leisure and Society 3
Survey of leisure problems and opportunities in society. Emphasis on critical analysis of completed writing and research in parks and recreation. Historical foundations and development of a personal philosophy of parks and recreation are stressed. Prereq: HPER 200, junior standing.

429 Recreation Internship 12
Capstone course for recreation management majors. Supervised professional internship in an approved parks and recreational setting. Prereq: HPER 491.

430 Psycho-Social Aspects of Physical Activity and Sport 3
In-depth appreciation of the individual difference factors that affect a person's psyche and behavior in sport and physical activity contexts. Emphasis on social-environmental factors that influence a participant's behavior in sport and physical activity. Prereq: Senior standing.

433 Fall Semester Fifth-Year Intercollegiate Sports 1
Fifth-year participation on an intercollegiate sports team.

434 Spring Semester Fifth-Year Intercollegiate Sports 1
Fifth-year participation on an intercollegiate sports team.

435 Organization and Management of Sports Teams 2
Principles, policies, procedures, and organization of sports teams. Prereq: Senior standing.

440 Health and Safety Services 3
American Heart Association and American Red Cross Instructor's Course in responding to emergencies. Prereq: HPER 210, 240, 380.

445 Organization and Administration of Coordinated School Health Programs 3
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: HPER 345.

450/650 Coaching Young Athletes 2
Designed to help potential or present coaches reassess or develop a solid coaching philosophy. American Sport Effectiveness Program procedures are used and include three parts: a clinic, self-study, and the Coaches Certification Test.

460 Program Administration and Curriculum Design 3
Study of principles and procedures for developing physical education curricula. Organization and administration of physical education and extracurricular activities. Prereq: HPER 350, 351, 352, senior standing.

465 Physiology of Exercise 3
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: HPER 365, 366.

466 Physiology Exercise Laboratory 1
Laboratory exercises to test aerobic and anaerobic capacity, strength, body composition, dietary analysis. Coreq: HPER 465.

467 EKG Monitoring 2
EKG monitoring and interpretation. Prereq: HPER 465, 466.

470 Activity Benefits and Exercise Prescription 3
Evaluation of the benefits of physical activity to health and well-being. Discussion of the development of exercise prescription for individuals with special medical problems.

471 Program Implementation 3
Development and implementation of health promotion programs in a worksite setting. Prereq: HPER 470.

472 Exercise Testing and Application 2
Physiological testing procedures applicable to physical activity settings. Coreq: HPER 467.

475 Human Performance and Fitness Internship 12
Capstone course for human performance and fitness majors. Supervised field work in a professional setting with emphasis on administration, supervision, and program leadership. Prereq: HPER 491.

486 Rehabilitation and Reconditioning 3
Planning and implementing a comprehensive rehabilitation/ reconditioning program of athletes with injuries/illnesses. Prereq: HPER 385.

487 Administration of Athletic Training Programs 3
Planning, coordinating, and supervising all administrative components of an athletic training program. Prereq: HPER 486.

488 Fall Athletic Training Practicum III 3
Capstone experience providing students the opportunity to deliver athletic training care to an assigned athletic team under the direct supervision of a member of the certified athletic training staff. Prereq: HPER 387.

489 Spring Athletic Training Practicum III 3
Capstone experience providing students the opportunity to deliver athletic training care to an assigned athletic team under the direct supervision of a member of the certified athletic training staff. Prereq: HPER 488.

701 Theories and Ethical Issues of coaching 2
Study of the values and ethical considerations at various levels of competition. Topics include youth sports programs, booster clubs, coaching philosophy, legal aspects, and recruiting.

703 Organization and Administration of Sport and Physical Education 2
Comprehensive study, including current research in physical education, recreation, and sports organization and administrative techniques.

710 Recent Literature and Research 3
Directed readings and class discussions of recent literature, steps involved in problem solving, and critical analysis of research in the field.

711 The Physical Education Curriculum 2
Instruction on the role and importance of physical education in today's society; steps involved in curriculum planning; trends and issues in curriculum; various approaches to curriculum design.

712 Supervision of Physical Education, Recreation, and Sports 2
Study of the scope of supervision, techniques for improvement of various phases of the learning process of teaching or coaching, and means of evaluating the effectiveness of supervision in the field.

714 Legal Liability in HPER 2
Focused on risk management and legal liability in health, physical education, and recreation. Overview of civil and criminal law related to sport and recreation. Offered alternate years.

715 Teaching Concepts-Based Fitness 2
Theoretical and practical aspects of the role of fitness education in contemporary physical education in a public school setting. Offered alternate years.

716 Analysis of Teaching Physical Education 2
Theoretical and practical aspects of the role of the physical education teacher in educational settings in contemporary society. Offered alternate years.

718 Community Relations and Communication Strategies 2
Development of communication skills necessary for the professional success of prospective and current athletic coaches and administrators. Offered alternate years.

HISTORY (Hist)

Peterson, Chair; Anderson, Danbom, Harvey, Helgeland, Isern, Justitz, Norris

COURSES

101 [140] **Western Civilization I (CCN) 3**
Introductory survey of western civilization from prehistory to 1648, emphasizing major political, social, cultural, and intellectual developments. (ND:Hist)

102 [141] **Western Civilization II (CCN) 3**
Introductory survey of western civilization from 1648 to the present, emphasizing major political, social, cultural, and intellectual developments.

103 [110] **U.S. to 1877 (CCN) 3**
Survey of United States history to 1877, emphasizing major political, economic, social, and cultural developments. (ND:Hist)

104 [111] **U.S. Since 1877 (CCN) 3**
Survey of United States history since 1877, emphasizing major political, economic, social, and cultural developments.

220 North Dakota History (CCN) 3
Survey of North Dakota history. Includes social, economic, cultural, and political history of North Dakota from prehistoric times to the present.

251 [201] **Introduction to Public History (CCN) 3**
Introduction to history career paths outside of the classroom including museums, historical societies, historic preservation, and historic sites.

252 [202] **Introduction to Museum Work (CCN) 3**
Introduction to the variety of careers available and procedures used in museums and historical societies: curatorial, administrative, conservation, research, and educational. Prereq: Hist 251.

253 [203] **Archival Photography (CCN) 3**
Application of archival theory and practice to photographs, film, and video. Includes preservation and care methods of curating photographs in museums and libraries. Prereq: Hist 251.

257 The Cold War (CCN) 3
Causes and ideological background of the Cold War. Development of the superpowers. The ideological nature of these opposing societies and how and why the Cold War ended are examined.

259 Women in European History 1400-1800 (CCN) 3
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.

260 [230] **Women in America (CCN) 3**
Women in America from pre-colonial times to the present. Focuses on experiences of typical women of the past, including minorities.

261 [231] **American Indian History (CCN) 3**
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.

265 [235] **Families in America (CCN) 3**
Varieties of family experiences in America from European colonization to the present.

267 [237] **U.S. Environmental History (CCN) 3**
History of the interrelationships of humans and the natural world in America. Emphasis on the emergence of the conservation and environmental movements from 1830s to the present.

268 [238] **Rural America (CCN) 3**
American rural institutions and culture, agricultural practices, economic developments, politics, and public policies from the colonial period to the present.

270 [250] **American Religious History 3**
See Religious Studies for description.

271 Introduction to Latin American History 3
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.

320 History of Christianity 3
See Religious Studies for description.

381 Australia and New Zealand 3
Comprehensive, but not exhaustive, historical comparison of Australia and New Zealand. Organized topically to facilitate comparisons.

401/601 Archival Theory and Practice 3
Archival theory and its practical application in supervised projects utilizing the resources of the Institute for Regional Studies.

410/610 U.S. Intellectual History I 3
American intellectual trends in areas such as religion, education, racism, science, feminism; social and political thought; 1600-1860. Prereq: Hist 103, 104.

411/611 U.S. Intellectual History II 3
American intellectual trends in areas such as religion, education, racism, science, feminism; social and political thought; 1860-present. Prereq: Hist 103, 104.

412/612 U.S. Economic History I 3
Developments in colonial economies, international trade, slavery, labor, finance, agriculture, transportation, regional integration, and economic aspects of the Revolution, Civil War, and Reconstruction; 1670-1870. Prereq: Hist 103.

413/613 U.S. Economic History II 3
Transportation, agriculture, labor, mergers and consolidation, government regulation, the Great Depression, modern wars, inflation, debt, deficit, and the global economy; 1870-present. Prereq: Hist 104.

422/622 U.S. History 1829-1917 I 3
Political, social, and economic history of the United States 1829-1877; emphasizing socioeconomic change, the sectional crisis, the Civil War, and Reconstruction.

423/623 U.S. History 1829-1917 II 3
Political, social, and economic history of the United States 1877-1917; emphasizing industrialization, urbanization, and progressive reform.

424/624 U.S. History 1917-Present I 3
Political, social, and economic history of the United States 1917-1960; emphasizing the New Deal, the world wars, and the Cold War era.

425/625 U.S. History 1917-Present II 3
Political, social, diplomatic, and economic history of the United States since 1960; emphasizing foreign policy and domestic developments.

431/631 The North American Plains 3
Historical treatment of the Great Plains of North America as an international region, comprising the Canadian prairies and the American plains.

436/636 American Frontier to 1850 3
Key aspects of the early American frontier from 1500s to mid-1800s, emphasizing Indian-White relations, colonial wars, social life in the backcountry, and exploration and settlement.

437/637 American West Since 1850 3
The time period 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 frontier, the urban west, and environmental history.

439/639 History of American Agriculture 3
American agriculture from its Native American and European roots to the present.

440/640 European Intellectual History I 3
Important changes in ideas about science, religion, ethics, political thought, and the arts; Medieval world view, Renaissance, Reformation, Scientific Revolution, the Enlightenment, Romanticism. Prereq: Hist 101, 102.

450/650 Ancient History 3
Cultural, political, economic, and social history of the ancient Near East, Greece, and Rome.

451/651 Medieval History 3
Cultural, political, economic, and social history of the Middle Ages.

454/654 Renaissance and Reformation 3
Political, social, and economic history of continental Europe from 1400 to 1650; with a focus on Renaissance and Reformation.

455/655 The Eighteenth Century 3
Political, social, and economic history of continental Europe from 1650 to 1815; with a focus on Enlightenment and French Revolution.

456/656 Europe 1815-1914 3
Political, social, and economic history of Europe from the defeat of Napoleon to outbreak of World War I.

457/657 Europe Since 1914 3
Political, social, and economic history of Europe including World War I, the Russian Revolution, Nazism, World War II, and the postwar era.

460/660 History of England I 3
England from ancient times to the Hanoverian Succession (1714); emphasis on the Middle Ages and the Tudor-Stuart period.

461/661 History of England II 3
England from 1714 to the present; emphasis on the Georgian Era industrialization, liberalism, social reform, and the impact of World War I and World War II.

466/666 History of Russia I 3
Cultural, diplomatic, intellectual and political history of Russia; evolution of the Russian state, expansion of imperial Russia, Great Reforms, populism, and socialism.

467/667 History of Russia II 3
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.

470/670 Modern Latin America I 3
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.

471/671 Modern Latin America II 3
Study of important social, economic, political, and cultural developments in Latin America from the late 19th century through the modern epoch.

473/673 Mexico I 3
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.

474/674 Mexico II 3
Study of the important social, economic, political, and cultural developments in Mexican history from independence in 1821 through the contemporary era.

476/676 Southwestern Borderlands to 1848 3
Study of the important social, economic, political, and cultural developments of the American southwest from the pre-Columbian epoch, through Spanish and Mexican ownership, to U.S. acquisition in 1848.

480/680 Recent East Asia I 3
Political and diplomatic history of China, Japan, Korea, and Vietnam; interactions between East Asian countries and Western powers, World War I and aftermath in East Asia.

481/681 Recent East Asia II 3
Political and diplomatic history of China, Japan, Korea, and Vietnam; World War II in the Pacific, Communism in China, Korea, and Vietnam, and the industrialization of Japan and Korea.

489 [499] **Senior Seminar 3**
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.

701 Methods of Historical Research 3
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.

705 Directed Research 1
Directed research on the student's thesis prospectus. Taken close to the end of the student's course work. Prereq: Hist 701, 730, and 760 or 780.

730 Readings in United States History 3
Historiographical survey of a selected topic in U.S. history. Topics vary by semester. May be repeated. Prereq or Coreq: Hist 701.

760 Readings in European History 3
Historiographical survey of a selected topic in European history. Topics vary by semester. May be repeated. Prereq or Coreq: Hist 701.

780 Readings in World History 3
Historiographical survey of a selected topic in world history. Topics vary by semester. May be repeated. Prereq or Coreq: Hist 701.

HORTICULTURE

(See Plant Sciences)

HUMAN AND COMMUNITY EDUCATION (H&CE)

Wilhelm

COURSES

232 Philosophy and Policy 3
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.

341 Leadership and Presentation Techniques (CCN) 3
Development of youth leadership professionals in educational settings; methods, principles, and practices in organizing, developing, conducting, and evaluating community-based student organizations and student leadership programs.

345 Extension Education 2
Includes purpose, philosophy, and organizational structure of Extension Service nationwide; roles of extension workers and professional ethics; program development, implementation, and evaluation.

381 Early Experience (CCN) 1
See Education for description.

444 Planning the Community Program in Agricultural Education 3
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 the School of Education.

445 Technology Transfer in Agriculture 3
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.

468 Family Life and Adult Education Programs 3
Philosophy, issues, curricula, and techniques for teaching and evaluating family life and sex education programs K-12 and adult/parenting programs. Includes common program and instructional planning elements. Prereq: Educ 451 or departmental approval.

469 Housing Education and Issues 3
Issues, curricula, and techniques for teaching and evaluating K-12 and adult housing programs .

474 Extension Internship **4**
Supervised full-time family and consumer sciences extension internship in an approved location. Prereq: H&CE 345.

481 Methods of Teaching Agriculture **3**
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, 322, admission to the School of Education.

482 Methods of Teaching Family and Consumer Sciences **3**
Methods of planning and teaching consumer/homemaking and occupational family and consumer sciences in middle and secondary schools in diverse cultural settings. Professional ethics will be addressed. Includes advisory committees and vocational student organizations. Prereq: Educ 321, 322, 381, admission to the School of Education.

483 Student Teaching Seminar **1**
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: H&CE 482; Coreq: H&CE 487.

487 Student Teaching **10**
See Education for description.

720 Supervision of Student Teachers **2**
Planning and carrying out effective supervision techniques when supervising student teachers in respective subjects. Cross-listed with Educ.

724 Program Development in Vocational Education **2**
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.

740 Vocational Philosophy and Policy **3**
Philosophy in developing, planning, and conducting vocational education programs at federal, state, and local levels. Importance of legislation on state and local policy making.

743 SAE/Adult Programs **3**
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.

746 International Extension **3**
The ideological and theoretical basis of world agricultural assistance programs and their effects on different sectors and classes. Prereq: H&CE 345.

751 Rural Survey in Agricultural Education **3**
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.

756 Program Development and Evaluation **3**
Methods and procedures of long-range planning, strategic planning techniques, integrating new/emerging biotechnology, guidance and counseling, and evaluating program effectiveness.

772 Curriculum Development in Family and Consumer Sciences **2**
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.

775 Internship **1-3**
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. Prereq: Admission to Graduate School.

777 Evaluation in Family and Consumer Sciences **2**
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.

781 Professional Development in Agricultural Education **1-3**
Continued professional development in technical and pedagogical subjects of current importance for professionals in agricultural education.

787 Issues in Education **1-3**
Exploration and assessment of a current issue associated with middle and secondary applied academic programs. Prereq: Current employment or experience as middle/secondary teacher.

HUMAN DEVELOPMENT AND EDUCATION (HD&E)

Dean's Office

COURSES

120 Orientation to Human Development and Education **1**
Introduction to opportunities and professional advancement in human development and education careers. Overview of majors, activities, and support systems. 1 lecture. Coreq: HD&E 189.

189 [199] **Skills for Academic Success** **1**
See University Interdisciplinary Studies for description. Coreq: HD&E 120.

220 Individual and Family Wellness **2**
Integrative investigation of the wellness of individuals and families in today's complex society. The interdisciplinary nature of human wellness is examined critically and means of optimizing lifelong wellness are addressed. 2 lectures.

320 Professional Issues **1**
Analysis and integration of professional perspectives and trends; life career development skills (self-assessment, resume writing, interviewing, and correspondence.) 1 lecture. Prereq: Junior standing.

HUMANITIES (Hum)

Cater (Emeritus), Laliberte, Penna, Weiler

COURSES

256 Questions of Philosophy **3**
Introduction to philosophy, some of its major problems and personalities.

257 Traditional Logic **3**
Study of the art and science of critical thinking; scientific method emphasized.

304 Humanities Tutorial **R-6**
Development of an individual project based on the theme of the student's program. This project must be submitted and approved during the junior year.

356 Greek Philosophy **3**
The philosophies of Plato and Aristotle as perennial philosophies.

357 Augustine **3**
Study of Augustine's thought, especially philosophical, in its historical context.

358 Early Medieval Philosophy **3**
Examination of the main philosophical world views of the first millennium with an emphasis on Neo-Platonism. Prereq: Junior standing.

359 Thomas Aquinas **3**
The philosophy of Thomas Aquinas as a perennial philosophy. Prereq: Junior standing.

366 Metaphysics **3**
Historical and systematic philosophical study of fundamental principles of reality, especially as concerns the human person.

367 Ethics: The Acting Person **3**
Philosophical study of the foundations of human actions, virtue, and vice.

371 The Law and the Prophets **3**
How to interpret the central documents of the faith of Israel for contemporary readers by attending to their distinctive literary structures.

372 Wisdom and the New Testament **3**
Study of special themes in Wisdom and Apocrypha. Introduction to principal New Testament authors.

385 Comparative Arts **3**
Study of Western arts in light of the aesthetic, social, and philosophical ideas that nurtured them.

476 Kant and Hegel **3**
Principles of Kant and Hegel philosophies in the context of eighteenth and nineteenth century thought and society. Prereq: Departmental approval.

477 20th Century Philosophy **3**
Emphasis on themes such as existentialism, process, and the "linguistic turn." Prereq: Departmental approval.

478 Belief and Unbelief **3**
Philosophic study of the acceptance or rejection of religion as a way of life.

486 Philosophy and Literature 3
Philosophical elements of selected works from Western literature, such as those of Dante, More, Milton, and Newman.

487 Aesthetics 3
Principles of aesthetics as revealed by artists, writers, and philosophers.

702 Introduction to College Teaching in the Humanities and Social Sciences 3
Techniques for effective teaching and assessing learning at the college level. Includes special issues and responsibilities related to college-level teaching.

INDUSTRIAL AND MANUFACTURING ENGINEERING (IME)

Wells, Chair; Bartlett, Bilen-Green, Chinnam, Cook, Ding, Ebeling, Isgrig, Lall

COURSES

111 Introduction to Industrial and Manufacturing Engineering 1
Orientation to job functions, environments, resources, and academic tools of the engineering and technical management professions. Emphasis on roles for manufacturing and interfacing industries. Personal computer usage.

112 Computer/Software Applications in Engineering 2
Use of computers to solve typical engineering problems, prepare reports, budgets, schedules, presentations, and databases. Learned skills are used in subsequent courses. Prereq: IME 111.

310 Survey of Industrial and Systems Engineering Applications 3
Systems for manufacturing, service, health care, and information industries are introduced. Includes products, processes, plants, and distribution. Enhances industrial literacy.

311 Work/Station Design and Measurement 3
Methods of work design and measurement, human factors, ergonomics, and industrial safety. Development of work procedures within work station context. Includes people and machine interfaces. 2 recitations, 1 laboratory. Prereq: IME 310.

320 Aircraft Corrosion: Theory and Control 2
Fundamental mechanisms of corrosion and its prevention and control are explored. Emphasis on aircraft and aircraft manufacturing. Includes laboratory experiences. Prereq: ME 331 or equivalent.

330 Manufacturing Processes I 2-3
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 221.

335 Welding Technology 2
Study of arc and gas welding technology together with related metallurgy. Laboratory instruction in welding techniques and skills. 1 recitation, 1 two-hour laboratory.

380 CAD/CAM for Manufacturing 3
Coverage of CAD, numerical control, and CAM software. Use of manufacturing standards for geometric dimensioning and tolerancing. Prereq: ME 212.

411/611 Human Factors Engineering 2
Investigation of issues concerning people, machines, and environments for productivity, fatigue, and safety factors. Includes work stations, information format and flow, controls, and displays; instructions and training. Prereq: IME 311, 460.

420 Aircraft Design for Manufacturing Engineers 3
Structural design for aircraft repair and overhaul (remanufacturing). Study of design for manufacturing, loads, materials, buckling/stability, cutouts, and fasteners/joints and their application in wing, empennage, fuselage, landing gear, and engine structure. Includes weekly laboratory. Prereq: ME 223.

422 Aircraft Structural Repair and Overhaul 3
Applied design and manufacturing engineering methods are used to write Federal Aviation Administration (FAA) approvable airframe/engine repair and overhaul (remanufacturing) procedures. Weekly laboratory. Prereq: IME 430, 473.

425 Aircraft Component Failure Analysis 3
Presentation of metallurgical failure conditions and analysis methods. Study of airframe and engine component failures. Includes weekly laboratory. Prereq: ME 223, IME 320.

430/630 Manufacturing Processes II 3
In-depth study of modern manufacturing processes and related topics. Includes plastics, composites, ceramics, power metallurgy, surface properties, and CNC machine tools. Use of computer and graphic tools (CAD, CAM, and GDT). Prereq: IME 330.

431/631 Designing for Production 3
Methods of design for fixtures, dies, and tooling for economical production. Illustrates design of bending and drawing dies together with other press working methods. 2 recitations, 1 two-hour laboratory. Prereq: IME 330.

432 Composite Materials Manufacturing 3
Introduction to advanced composite materials and the tooling, manufacturing, joining, environmental, design, structural testing, quality assurance, and repair aspects. Aircraft applications. Includes weekly laboratory. Prereq: ME 223.

435/635 Plastics and Injection Molding Manufacturing 3
Addresses the material properties, process, and devices for the fabrication of parts from plastics. Contrasts and compares to processes for other materials. Coordinated with ME 463 and 464. Prereq: IMD 330. Cross-listed with ME.

440/640 Engineering Economy 2-4
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.

450/650 Systems Engineering and Management 3
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.

451/651 Logistics Engineering and Management 2
Extends systems, methods, production, inventory, and facility topics to integrated logistics support. Emphasis on reliability, maintainability, tools, test equipment, spares, operating and maintenance instructions, and training. Prereq: IME 450.

452/652 Integrated Industrial Information Systems 3
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.

453/653 Hospital Management Engineering 3
Emphasis on productivity improvement and quality control. Review of hospital methods improvement. Analysis of management engineering techniques concerned with work, materials, and information.

455/655 Management of People Systems 2
Integration of technical, business, and operational specialties in a project consulting firm. Serve as a member of multiple disciplinary teams that design, plan, and present for a variety of industrial clients. Prereq: Departmental approval.

456/656 Program and Project Management 3
IE&M capstone experience. Integration of technical, business, and operational specialties in a project consulting firm. Work with multidisciplinary teams that design, plan, and present for a variety of industrial clients. Prereq: Departmental approval.

460/660 Evaluation of Engineering Data 3
Design of engineering experiments and evaluations, curve fitting, regression, hypothesis testing, ANOVA, Taguchi methods in engineering design. Prereq: Math 166.

461/661 Quality Assurance and Control 3-4
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.

462/662 Total Quality in Industrial Management **3**
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. Prereq: IME 461, 455.

470/670 Operations Research I **3**
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 265.

471/671 Operations Research II **2-3**
Study of probabilistic operations research topics including queuing analysis, decision analysis, and Markov decision processes. Prereq: IME 460, 470.

472/672 Simulation of Business and Industrial Systems **3**
Development of the fundamentals and techniques of simulating business and industrial systems. Monte-Carlo techniques and computer usage. Prereq: IME 460, BASIC or FORTRAN.

480/680 Production and Inventory Control **3**
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, 470.

482/682 Automated Manufacturing Systems **3**
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, 330, ECE 303.

485/685 Industrial and Manufacturing Facility Design **3**
Capstone integration of analysis and design tools to convert product design into production plans and plants. Prereq: IME 311, 330, 440, 450, 472, 480.

489 Manufacturing Engineering Capstone **3**
Capstone experience. Student projects in design, analysis, and experimental investigation related to manufacturing. Prereq: Senior standing and adviser approval.

711 Advanced Human Factors Engineering **3**
Study and application of human factors concepts to improve worker efficiency, safety, and well-being in industrial work environments. Emphasis on modeling human-machine interactions related to advanced manufacturing systems.

740 Advanced Engineering Economy **3**
Advanced topics in engineering economy including replacement analysis, capital budgeting, income tax effects on equipment selection, probabilistic models, and manufacturing costing. Prereq: IME 440.

761 Quality, Reliability, and Safety **3**
Advanced topics in statistical quality control. Includes sampling plans, reliability, and topics such as expert systems in quality control. Prereq: IME 461.

770 Advanced Operations Research Topics **3**
Study of the theory and applications of linear programming, network flows, and nonlinear programming. Prereq: IME 470.

772 Advanced Simulation **3**
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 472.

774 Neural Networks **3**
See Computer Science 735 for descriptions.

780 Advanced Production and Inventory Control **3**
Study of the theory and applications of production scheduling, inventory management, production planning, just-in-time production, and materials requirement planning. Prereq: IME 460, 470, 480.

782 Robotics/CAD/CAM/Control Systems **3**
Study of automation, integration of fabrication, and assembly systems. Includes automated material handling and intelligent control systems.

784 Computer Integrated Manufacturing (CIM) **3**
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.

786 Manufacturing Systems Analysis **3**
Study of advanced manufacturing engineering techniques in machining, composites, CAD/CAM, FMS, scheduling, integrated manufacturing, and artificial intelligence.

INTERIOR DESIGN

(See Apparel, Textiles, and Interior Design.)

LANDSCAPE ARCHITECTURE (LA)

Colliton, Director; Kennedy, Krohn, Walter

COURSES

132 Introduction to Landscape Architecture Studio **2**
Laboratory surveying the profession of landscape architecture and exploring problem solving through the design process. Graphic, oral, and written design presentation skills including the use of computer applications.

171 Environmental Design I **3**
See Architecture for description.

172 Environmental Design II **3**
See Architecture for description.

231 Landscape Architecture Graphics **1**
Two- and three-dimensional computer skills using required software applications. Emphasis on traditional, computer graphic, and written design communication techniques used in problem solving. Prereq: LA major, LA 132, 172; Coreq: LA 271.

271 Landscape Architecture I **4**
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, LA 131, 172; Coreq: LA 231.

272 Landscape Architecture II **4**
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 231, 271.

322 History of Landscape Architecture **4**
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.

331 Introduction to Planting Design **2-3**
Exploration of principles and design methods involved with a wide-range of planting zones and plant habitats throughout North America. 2 credits: Lecture, open to LA majors. 3 credits: Lecture and laboratory; open to LA majors and minors only.

341 Site Development and Detailing I **3**
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.

342 Site Development and Detailing II **3**
Intermediate-level focus on fundamental site landscape and engineering issues within the construction process. Emphasis on site grading and stormwater management. Lecture. Prereq: Junior standing for non-majors.

344 Site Development and Detailing Laboratory **2**
Applied practical exercises focusing on site layout, site grading and stormwater management, and site materials. Emphasis on construction techniques and the preparation of construction drawings and specifications. Coreq: LA 342.

371 Landscape Architecture III **4**
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.

372 Landscape Architecture IV **4**
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. Prereq: LA major, LA 371.

441 Site Development and Detailing III **3**
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.

471 Advanced Landscape Architecture I **6**
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.

472 Advanced Landscape Architecture II **6**
Natural resource and land reclamation management techniques as part of contemporary design in landscape architecture. Emphasis on presentation and communication. Studio. Prereq: LA major, LA 471.

531 Advanced Landscape Architecture Planting Design **4**
Exploration into the complexity of planning, design, and management of plant communities with an emphasis on natural systems ecology. Lecture and laboratory. Offered odd years; fall. Prereq: LA major, LA 331.

552 Advanced Landscape Planning **2**
Theories and practices facing landscape architects and planners in the design of urban, suburban, and rural landscapes. Seminar/field trip. Prereq: Senior standing or departmental approval.

561 Landscape Architecture Programming **2**
Discussion and application of a comprehensive design process for production of the capstone design project. Emphasis on preparing a design program. Coreq: LA 571. Cross-listed with Arch.

571 Advanced Landscape Architecture Design III **6**
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 561.

572 Design Thesis **8**
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 561, 571.

LIBRARY SCIENCE (Lib)

COURSE

121 Introduction to Library Research **1**
Basic information on libraries and their services. Exploration of sources of information in print and computer format; explanation of basic search strategies.

MATHEMATICS (Math)

Cömez, Chair; Aktosun, Brennan, Calvo, Cope, Coykendall, Foguel, Johnson, Kornfeld, Martin, Mathsen, Olsen, Sahin, Shreve, Ungar, Xu

COURSES

099 [100] **Elementary Algebra** **3**
Fundamental operations, factoring, fractions, exponents and radicals, equations. For students with little or no background in algebra. *Does not satisfy any requirements for graduation.* Offered through Continuing Education. Special fee required.

102 Intermediate Algebra (CCN) **3**
Properties of the real number system, factoring, linear and quadratic equations, functions, polynomial and rational expressions, inequalities, systems of equations, exponents, and radicals. *Does not satisfy any requirements for graduation.* Offered through Continuing Education. Special fee required. Prereq: Math 099 or placement test.

103 College Algebra (CCN) **3**
Relations and functions, equations and inequalities, complex numbers; polynomial, rational, exponential and logarithmic functions; systems of equations, matrices and determinants, sequences and summation. Prereq: Math 102 or placement test. (ND:Math)

104 [124] **Finite Mathematics (CCN)** **3**
Systems of linear equations and inequalities, matrices, linear programming, mathematics of finance, elementary probability and descriptive statistics. Prereq: Math 102 or placement test.

105 [142] **Trigonometry (CCN)** **3**
Angle measure, trigonometric and inverse trigonometric functions, trigonometric identities and equations, polar coordinates and applications. Prereq: Math 103 or placement test.

146 Applied Calculus I (CCN) **4**
Limits, derivatives, integrals, exponential and logarithmic functions and applications. Prereq: Math 103 or placement test. (ND:Math)

147 Applied Calculus II (CCN) **4**
Definite integrals, double integrals, trigonometry, introduction to differential equations, infinite sequences and series, probability and applications. Prereq: Math 146.

165 [160] **Calculus I (CCN)** **4**
Limits, continuity, differentiation, Mean Value Theorem, integration, Fundamental Theorem of Calculus and applications. Prereq: Math 105 or placement test. (ND:Math)

166 [161] **Calculus II (CCN)** **4**
Applications and techniques of integration; polar equations; parametric equation; sequences and series, power series. Prereq: Math 165.

228 Introduction to Linear Algebra **1**
Systems of linear equations, row operations, echelon form, matrix operations, inverses, and determinants. Prereq: Math 105 or equivalent. *Credit awarded only for Math 228 or 229, not both.*

229 Basic Linear Algebra **2**
Includes content of Math 228 with the addition of vectors in n-space, subspaces, homogeneous systems, linear independence, rank, and dimension. Prereq: Math 105 or equivalent. *Credit awarded only for Math 228 or 229, not both.*

259 University Calculus III **3**
Functions of several variable, 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 265, not both.*

265 [260] **Calculus III (CCN)** **4**
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 265, not both.*

266 [261] **Introduction to Differential Equations (CCN)** **3**
Solution of elementary differential equations by elementary techniques. Laplace transforms, systems of equations, matrix methods, numerical techniques, and applications. Prereq: Math 259 or 265; Coreq: Math 228 or 229.

270 Introduction to Abstract Mathematics **3**
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.

327 Applied Linear Algebra (CCN) **3**
Systems of linear equations, matrices, and linear programming, numerical applications. Prereq: Math 103 and 146 or 165.

329 Linear Algebra **3**
Vector spaces, linear transformations eigenvalues and eigenvectors, canonical forms, inner product spaces, and selected applications. Prereq: Math 270.

340 Axiomatic Geometry **3**
Hilbert's axioms for Euclidean geometry, projective geometry, history of parallel axiom, hyperbolic geometry, elliptic geometry. Prereq: Math 270.

374 Special Problems in Mathematics **1**
Diverse and challenging mathematical problems are considered with the intent of preparing the student for the Putnam Mathematics competition. May be repeated. Pass/Fail only. Prereq: Math 270.

376 Actuarial Exam Study 1
Selected material from calculus, linear algebra, numerical analysis, and other areas that appear on national actuarial exams. May be repeated. Pass/Fail only. Prereq: Math 266, 329.

378 History of Mathematics 3
Historical consideration emphasizing the source of mathematical ideas, growth of mathematical knowledge, and contributions of some outstanding mathematicians. Prereq: Math 270.

420/620 Abstract Algebra I 3
Groups, permutations, quotient groups, homomorphisms, rings, ideals, integers. Prereq: Math 270.

421/621 Abstract Algebra II 3
Division rings, integral domains, fields, field extensions, Galois Theory. Prereq: Math 420.

430/630 Graph Theory 3
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.

436/636 Combinatorics 3
Recurrence relations, formal power series, generating functions, exponential generating functions, enumeration, binomial coefficients and identities, hypergeometric functions, floor and ceiling functions, Sterling and Eulerian numbers. Prereq: Math 270.

440/640 Differential Geometry 3
Basic properties of curves, intrinsic theory of curves and surfaces, extrinsic properties of surfaces, geodesics, Gauss-Bonnet Theorem, applications. Prereq: Math 266.

446/646 Introduction to Topology 3
Topological spaces, bases and neighborhoods, continuous maps, product spaces, Hausdorff spaces, compactness, connectedness; metric spaces, complete metric spaces. Prereq: Math 270.

450/650 Real Analysis I 3
Sequences and convergence in R, continuity, uniform convergence, spaces of continuous functions, compactness, fixed point theorems, differentiability, inverse and implicit function theorems, applications. Prereq: Math 266, 270.

451/651 Real Analysis II 3
Riemann and Riemann-Stieltjes integration, convergence theorems, multiple integration and Fubini's Theorem, elements of Fourier analysis, applications. Prereq: Math 450.

452/652 Complex Analysis 3
Complex number systems, analytic and harmonic functions, elementary conformal mapping, integral theorems, power series, Laurent series, residue theorem, and contour integral. Prereq: Math 265.

472/672 Number Theory 3
Properties of integers, number theoretic functions, quadratic residues, continued fractions, prime numbers and their distribution, primitive roots. Prereq: Math 270.

480/680 Applied Differential Equations 3
Power series expansions and the method of Frobenius, special functions and their use (Bessel functions, Legendre polynomials); phase plane analysis. Prereq: Math 266.

481/681 Fourier Analysis 3
Discrete and continuous Fourier transforms, Fourier series, convergence and inversion theorems, mean square approximation and completeness, Poisson summation, Fast-Fourier transform. Prereq: Math 265.

482/682 Survey of Mathematical Models 3
Lagrangian and Hamiltonian dynamics, potential theory, diffusion, hydrodynamics, elasticity; dimensional analysis, tensors; emphasis on how physical concepts are formulated mathematically rather than solution methods. Prereq: Math 266.

483/683 Partial Differential Equations 3
Solution methods for potential, diffusion and wave equations; treatments of homogeneous and nonhomogeneous equations; boundary conditions; separation of variables, Greens' functions, transform techniques. Prereq: Math 480.

488/688 Numerical Analysis I 3
Numerical solution of nonlinear equations, interpolation, numerical integration and differentiation, numerical solution of initial value problems for ordinary differential equations. Prereq: Math 266.

489/689 Numerical Analysis II 3
Numerical solutions of linear and nonlinear systems, eigenvalue problems for matrices, boundary value problems for ordinary differential equations, selected topics. Prereq: Math 329, 488.

720, 721 Algebra I, II 3 each
Graduate level survey of algebra: groups, rings, fields, Galois theory, and selected advanced topics. Prereq: Math 421/621 or departmental approval.

724, 725 Theory of Rings I, II 3 each
The ideal theory of commutative rings, structure of (non-commutative) rings, and selected advanced topics. Prereq: Math 721.

728, 729 Linear Algebra I, II 3 each
Theory of linear transformations and matrices, canonical forms, inner product spaces, unitary spaces, symmetric forms, generalized inverses, and selected advanced topics. Prereq: Math 329 or departmental approval.

730, 731 Graph Theory I, II 3 each
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 430/630 or departmental approval.

736, 737 Discrete Mathematics I, II 3 each
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.

746, 747 Topology I, II 3 each
Topological spaces, convergence and continuity, separation axioms, compactness, connectedness, metricizability, complete metric spaces, homotopy, uniform spaces, and selected advanced topics. Prereq: Math 451.

750, 751 Analysis I, II 3 each
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 451.

752, 753 Complex Analysis I, II 3 each
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 451.

754, 755 Functional Analysis I, II 3 each
Normed spaces, linear maps, Hahn-Banach Theorem and other fundamental theorems, conjugate spaces and weak topology, adjoint operators, Hilbert spaces, spectral theory, and selected topics. Prereq: Math 751.

760, 761 Ordinary Differential Equations I, II 3 each
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 751.

762, 763 Integral Equations I, II 3 each
Existence and uniqueness of solutions of Fredholm and Volterra integral equations, Fredholm Theory, singular integral equations, and selected advanced topics. Prereq: Math 751.

772, 773 Number Theory I, II 3 each
Number theoretic functions, algebraic number fields, prime numbers and their distribution, the Prime Number Theorem and related results, Fermat's Theorem. Prereq: Math 472/672 or departmental approval.

778 Modern Probability Theory 3
See Statistics for description.

782, 783 Mathematical Methods in Physics I, II 3 each
Tensor analysis, matrices and group theory, special relativity, integral equations and transforms, and selected advanced topics. Prereq: Math 329, 452. Cross-listed with Phys 752, 753.

784, 785 Partial Differential Equations I, II 3 each
Classification in elliptic, parabolic, hyperbolic type; existence and uniqueness for second order equations; Green's functions, and integral representations; characteristics, nonlinear phenomena. Prereq: Math 751.

786, 787 Mixed Boundary Value Problems I, II **3 each**
Methods for transient and steady-state solutions of diffusion problems with mixed boundary conditions; integral transforms; Green's function and integral equations formulations, asymptotics. Prereq: Math 452 or 752.

788, 789 Numerical Analysis I, II **3 each**
Numerical solutions to partial differential and integral equations, error analysis, stability, acceleration of convergence, numerical approximation, and selected advanced topics. Prereq: Math 489.

MECHANICAL ENGINEERING (ME)

Pieri, Chair; Alimi, Danescu, Gessel, Goplen, Gronhovd, Kallmeyer, Mahinfalah, Mehta, Rizza, Song, Stewart, Stone, Vaidya, Ziejewski

COURSES

189 [199] **Skills for Academic Success** **1**
See University Interdisciplinary Studies for description.

212 Fundamentals of Visual Communications for Engineers **3**
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.

213 Modeling of Engineering Systems **3**
Introduction to numerical methods used in the solution of engineering problems; computer methods, programming, and graphics; engineering system modeling and simulation; case studies. Prereq: Math 166, 229.

221 Engineering Mechanics I **3**
Scaler and vector approaches to trusses, frames and machines, internal forces, friction forces, center of gravity, centroid, and moment inertia. Prereq: Math 165.

222 Engineering Mechanics II **3**
Dynamics of particles and rigid bodies, work-energy, impulse-momentum, principles of conservation of energy and momentum. Prereq: ME 221, Math 166.

223 Mechanics of Materials **3**
Introduction to stress, strain, and their relationships; torsion of circular shafts, bending stresses, deflection of beams, stress transformations, buckling. Prereq: ME 221.

226 Statics for Technologists **3**
Equilibrium of rigid-body and coplanar force systems, trusses, three-dimensional force systems, friction, centroids, and centers of gravity. Prereq: Math 105.

227 Dynamics for Technologists **3**
Study of kinematics and kinetics of particle motion, rigid body dynamics, work-energy, and impulse-momentum principles. Prereq: ME 226.

228 Strength of Materials for Technologists **3**
Introduction to the concepts of stress, strain, torsion, horizontal shear stress, flexural stress, beam deflections, and Mohr's Circle. Prereq: ME 226.

311 Introduction to Aviation **3**
General introduction to aviation and preparation for FAA examination for Private Pilot License, study of FAA regulations, weather conditions, visual and radio navigation.

312 Introduction to Flight **2**
Instruction in flight procedures, operation of aircraft, and introduction to solo flight. Completion of 15 hours of dual flight instruction required. Coreq: ME 311.

313 Commercial Instrument Ground School **3**
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.

331 Engineering Materials I **4**
Characterization of microscopic structures and associated macroscopic properties and performance of mechanical engineering design materials (metals, ceramics, plastics) and processing effects. Includes laboratory. Prereq: Chem 122, ME 223.

332 Engineering Materials II **3**
Characterization of properties and processes in metals; diffusion, phase diagrams, phase transformation, creep, wear, corrosion, fracture, and fatigue. Prereq: ME 331.

341 Mechanics of Machinery **3**
Application of solid mechanics principles and computer methods in designing mechanisms for function and performance. Prereq: ME 213, 222.

350 Thermodynamics and Heat Transfer **3**
Basic concepts, first and second laws of thermodynamics. Introduction to heat transfer principles. Prereq: ME 222.

351 Thermodynamics I **3**
Basic concepts, properties of pure substances and ideal gases. First and second law, entropy, and availability. Prereq: ME 222, Math 259.

352 Fluid Dynamics **3**
Foundations of the science of fluid dynamics. Basic concepts including thermodynamic principles applied to fluids. Development of conservation principles and applications. Prereq: ME 351.

353 Thermodynamics II **3**
Continuation of thermodynamics. Cycle analysis, thermodynamic relations, mixtures, chemical reactions, and related topics. Prereq: ME 351.

411/611 Introduction to Nuclear Engineering* **3**
Study of the basic principles of nuclear engineering and reactors. Special topics on modern power plants utilizing nuclear energy. Prereq: Phys 252.

412/612 Engineering Measurements* **3**
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.

421/621 Theory of Vibrations* **3**
Fundamentals of vibrations; free, forced, and damped vibration of single and multiple degrees-of-freedom systems. Prereq: ME 213, 222, Math 266.

435/635 Plastics and Injection Molding Manufacturing **3**
See Industrial and Manufacturing Engineering for description.

442/642 Machine Design I* **3**
Application of engineering mechanics, material properties, and failure theories to the design of reliable machine components. Prereq: ME 213, 331, IME 460.

443/643 Machine Design II* **2**
Use of computer-aided engineering tools to generate and analyze engineering designs. Prereq: ME 341, 442.

454/654 Heat and Mass Transfer* **3**
Principles of heat transfer by conduction, convection, and radiation. Introduction to mass transfer principles. Prereq: ME 213, 352, Math 266.

**Courses ME 611, 612, 621, 642, 643, and 654 are not acceptable for credit in graduate programs in Mechanical Engineering (M.S. or Ph.D.).*

455 Mechanical Systems Laboratory I **1**
Investigation of behavior of fluid flows as well as devices for generating, controlling, and measuring fluid flow. Prereq: ME 352.

456 Mechanical Systems Laboratory II **1**
Investigations, tests, and reports based upon ME 353, 454. Prereq: ME 353, 454, 455.

461, 462 Design Project I, II **3 each**
Capstone student project in design, analysis, and experimental investigation in mechanical engineering. Prereq for 461:ME 442; Coreq: ME 454 and senior standing in ME curriculum. Prereq for 462: ME 461.

463, 464 Plastics Design Project I, II **3 each**
Capstone student project in analysis, design, and experimental investigation in the Polymers and Coatings option of ME. Prereq for 463: ME 442; Coreq: ME 473, 474, and senior standing in ME curriculum. Prereq for 464: ME 463.

465, 466 Power Plant Design I, II **3 each**
Capstone design philosophy, criteria, and procedures; emphasis on coal-fired electric generating units with system simulation and optimization; case studies of recent engineering designs. Prereq for 465: ME 353; Coreq: ME 454, senior standing in ME curriculum. Prereq for 466: ME 465.

471/671 Stress Analysis **3**
Coordination of mathematical and modern experimental analysis as applied to engineering materials. Includes laboratory. Prereq: ME 223.

473/673 Engineering Plastics for Design **3**
Mechanical and thermal properties of plastics materials as needed to design and manufacture plastics components to support constant and time-varying loads. Prereq: ME 331.

474/674 Mechanics of Composite Materials **3**
Materials, properties, stress, and strength analyses; engineering design and manufacturing aspects of short and continuous fiber-reinforced materials. Prereq: ME 442/642.

475/675 Automatic Controls **3**
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.

477/677 ME Finite Element Analysis **3**
Introduction to the finite element method and its application to problems in mechanical engineering, including stress analysis. Prereq: ME 213 or ABEn 255.

479/679 Fluid Power Systems Design **3**
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 222, 352.

481/681 Fundamentals of Energy Conversion **3**
Introduction to electric power generating systems and their major components such as turbines, boilers, condensers, and cooling towers. Prereq: ME 353.

484/684 Gas Turbines **2**
Theory and design of gas turbines and components. Prereq: ME 353, 454/654.

485/685 Heating, Ventilation, and Air Conditioning **3**
Application of the basic fundamentals of thermodynamics, heat transfer, and fluid flow to heating, ventilating, and air conditioning. Prereq: ME 353, 454/654, senior standing.

487/687 Internal Combustion Engines **3**
Theory and practice of power and propulsion engines utilizing gas as a working substance. Study of gas turbines, spark, and compression ignition engines. Prereq: ME 353.

489/689 Vehicle Dynamics **3**
Fundamental science and engineering underlying the design and operation of vehicles. Use of previous knowledge of statics, kinematics, dynamics, and machine design. Prereq: ME 341.

711 Advanced Engineering Analysis **3**
Mathematical analysis and numerical treatment of engineering problems, eigenvalue problems in lumped and distributed parameter systems, advanced mathematics applied to engineering design. Prereq: ME 465 or departmental approval.

712 Advanced Finite Element Analysis **3**
Application of finite element methods to problems of plasticity, viscoplasticity, fracture, vibrations, fluids, material and geometric nonlinearity, and heat transfer. Prereq: ME 477/677.

717 PC Based Measurements and Controls **3**
Introduction to digital electronics. Discussion of sensors, personal computers, signal conditioning, analog to digital converters, and digital to analog converters; selection of commercial hardware and software. Prereq: ME 412/612.

720 Continuum Mechanics **3**
See Civil Engineering for description.

721 Advanced Dynamics and Vibrations **3**
Kinematics and dynamics of a particle, a system of particles and a rigid body, orbital motion. Lagrange's equations, vibration theory. Prereq: ME 421/621.

722 Mechanics of Deformable Solids **3**
Special problems in theories of failure, contact stresses, thick-walled cylinders, thin tubes, curved beams, energy methods. Prereq: ME 223.

723 Experimental Stress Analysis **3**
Measurement of deformations that are of significance in the engineering design of load resisting members. Use of optical, electrical, and mechanical instrumentation; brittle coating and photoelastic techniques. Includes laboratory. Prereq: ME 471/671.

751 Advanced Thermodynamics **3**
Rigorous treatment of thermodynamic principles. Emphasis on the concept of availability methods as applied to various engineering systems. Prereq: ME 353.

752 Statistical Thermodynamics **3**
Microscopic treatment of thermodynamics. Introduction to quantum mechanics, kinetic theory; applications to gases, liquids, and solids; transport phenomena; introduction to irreversible process. Prereq: ME 353.

753 Gas Dynamics **3**
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. Prereq: ME 352.

754 Boundary Layer Theory **3**
Fundamental laws of motion of a viscous fluid are derived and used in the consideration of laminar boundary layers, transition phenomena, and turbulent boundary layer flows. Prereq: ME 352.

761 Heat Transmission I **3**
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. Prereq: ME 454/654 or equivalent.

779 Selected Topics in Mechanical Engineering **3**
Topics or studies require departmental approval.

MICROBIOLOGY

(See Veterinary and Microbiological Sciences.)

MILITARY SCIENCE (MS)

Rosten, Chair; Cuffy, Peterson, Remus

COURSES

110 Army ROTC Physical Fitness **2**
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 one's life.

111 Introduction to ROTC **1**
Increase self-confidence through team study and activities in basic drill, physical fitness, leadership reaction course, first aid, and making presentations. Fundamental concepts of leadership in classroom and outdoor laboratory environments. Weekly lab required. Coreq: MS 310.

112 Introduction to Leadership **1**
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. Coreq: MS 320.

114 Basic Pistol Marksmanship 1
Fundamentals of military pistol marksmanship techniques, firearms safety, range safety, marksmanship programs, and methods of instruction.

115 Basic Rifle Marksmanship 1
Fundamentals of military rifle marksmanship techniques, firearms safety, range safety, marksmanship programs, and methods of instruction.

211 Self/Team Development 2
Apply ethics-based leadership skills; develop skills in oral presentations, writing concisely, planning events, coordinating group efforts, advanced first aid, land navigation, and basic military tactics. Includes ROTC Leadership Assessment Program. Weekly lab required. Coreq: MS 310.

212 Individual/Team Military Tactics 2
Introduction to individual and team military tactics in small unit operations: use of radio communications, making safety assessments, movement techniques, planning team safety/security, and pre-execution check methods. Includes practical exercises. Weekly lab required. Coreq: MS 320.

213 Basic Camp: Camp Challenge 3
A paid six-week summer camp at an Army post. Travel, lodging, and most meal expenses are defrayed by the Army. Rigorous environment similar to Army Basic Training. No military obligation incurred. Application required.

214 United States Military History 2
Overview of all United States military operations with emphasis on technology, leadership, strategy, tactics, and logistics of several selected campaigns.

310 Leadership Laboratory 1
Individual and collective drill, small unit leadership experience, and tactical training.

311 Leading Small Organizations I 3
Series of practical opportunities 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. Coreq: MS 310.

312 Leading Small Organizations II 3
Analyze tasks, prepare written/oral guidance for team members, delegate tasks, and supervise. Plan for and adapt to the unexpected under stress. Examine leadership case studies and value of ethical decision making. Weekly lab, physical fitness program, and field exercises required. Coreq: MS 320.

313 Advanced Camp 3
A paid five-week summer camp at an Army post. Highly structured, demanding environment. Emphasis on individual leadership and basic skills performance under challenging conditions. Performance contributes to level of commission upon graduation. Prereq: MS 311 or 312.

320 Leadership Laboratory 1
Small unit drill, as well as tactical application of leadership fundamentals at the squad/patrol leader level.

410 Leadership Laboratory 1
Assumption of command and staff positions within the cadet battalion.

411 Leadership Challenges and Goal Setting 3
Plan, conduct, and evaluate activities of the ROTC cadet organization. Articulate goals, put plans into action. Assess organizational cohesion and develop improvement strategies. Lead people and manage resources. Apply Army policies. Weekly lab, physical fitness program, and field exercises required. Coreq: MS 410.

412 Transition to Lieutenant 3
Identify and resolve ethical dilemmas. Refine counseling and motivating techniques. Examine tradition and law related to an Army officer. Prepare for Army lieutenant. Weekly lab, physical fitness programs, and field exercises required. Coreq: MS 420.

420 Leadership Laboratory 1
Assumption of command and staff positions within the cadet battalion.

MODERN LANGUAGES

Homan, Chair; Hageman, Hawley, Pearson, Saar, Soria-Dufner, Sparks, Uebel, Zenner

COURSES

French (Fren)

101, 102 [111, 112] **First-Year French I, II (CCN) 4 each**
Basic structures and vocabulary of French. Practice in the fundamentals of listening, speaking, reading, and writing. No previous knowledge of French required. 101:(ND:Hum)

201, 202 [211, 212] **Second-Year French I, II (CCN) 3 each**
Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary readings. Prereq: Fren 102 or equivalent.

311, 312 French Conversation and Composition I, II 3 each
Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: Fren 202 or equivalent.

315 Introduction to French Civilization 3
Introduction to the political, social, and cultural history of France. Includes important schools of art, music, and architecture. Taught in French. Prereq: Fren 312.

350 Introduction to French Linguistics and Pronunciation 3
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.

380 Women in French Literature 3
Study of works by French women writers of different literary periods; portrayal of women by French male and female authors. Taught in English; counts toward French major/minor; counts toward women's studies minor.

381 Masterpieces of French Literature in Translation 3
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.*

410 French Literature to 1600 3
From La Chanson de Roland, courtly romances, and early poetry and theatre to Rabelais, the Pleiade, and Montaigne. Taught in French. Prereq: Fren 312.

411 17th and 18th Century French Literature 3
Literature of le grand siecle, the Enlightenment, and the pre-Revolutionary years. Taught in French Offered alternate years. Prereq: Fren 312.

412 19th and 20th Century French Literature 3
From 19th-century romanticism, naturalism, and symbolism to the literature of modern France. Taught in French. Offered alternate years. Prereq: Fren 312.

489 [499] **Senior Thesis 1-6**
Capstone experience option. Research and original investigation under the guidance of a faculty member. Student work to be written in French.

German (Germ)

101, 102 [111, 112] **First-Year German I, II (CCN) 4 each**
Basic structures and vocabulary of German. Practice in the fundamentals of listening, speaking, reading, and writing. No previous knowledge of German required. 101:(ND:Hum)

201, 202 [211, 212] **Second-Year German I, II (CCN) 3 each**
Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary reading. Prereq: Germ 102 or equivalent.

311, 312 German Conversation and Composition I, II **3 each**
Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: Germ 202 or equivalent.

315 Introduction to German Civilization **3**
Introduction to the political, social, and cultural history of German-speaking lands. Includes important schools of art, music, and architecture. Taught in German. Prereq: Germ 312.

350 Introduction to German Linguistics and Pronunciation **3**
Study of the basic nature and function of languages as applied to German. Application of principles of phonetics to the pronunciation of the German language. Extended practice in diction and intonation. Prereq: Germ 312.

381 Masterpieces of German Literature in Translation **3**
Introduction to important writers of several periods. Taught in English. *Does not count toward German major or minor.*

401 Advanced German Grammar and Writing **3**
Writing with primary focus on form, syntax, and style. Taught in German. Offered alternate years. Prereq: Germ 312.

410, 411, 412 Survey of German Literature I, II, III **3 each**
Literature from 800-1680, 1680-1880, 1880 to present, respectively. General view of periods, movements, and cultural background using representative authors. Taught in German. Prereq: Germ 312.

489 [499] **Senior Thesis** **1-6**
Capstone experience option. Research and original investigation under the guidance of a faculty member. Student work to be written in German.

Modern Language (Lang)

Uniform numbered courses offered irregularly. Initiated by the department.

Spanish (Span)

101, 102 [111, 112] **First-Year Spanish I, II (CCN)** **4 each**
Basic structures and vocabulary of Spanish. Practice in the fundamentals of listening, speaking, reading, and writing. No previous knowledge of Spanish required. 101:(ND:Hum)

201, 202 [211, 212] **Second-Year Spanish I, II (CCN)** **3 each**
Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary readings. Prereq: Span 102 or equivalent.

311, 312 Spanish Conversation and Composition I, II **3 each**
Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: Span 202 or equivalent.

315 Introduction to Spanish/Latin American Civilization **3**
Introduction to the political, social, and cultural history of Spanish-speaking lands. Includes important schools of art, music, and architecture. Taught in Spanish. Prereq: Span 312.

401 Advanced Spanish Grammar and Writing **3**
Writing practice with primary focus on form, syntax, and style. Taught in Spanish. Prereq: pan 312.

410 Introduction to Spanish Literature **3**
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.

411 Introduction to Spanish American Literature **3**
Representative works from the pre-conquest era to the 20th century. Overview of literary movements, genres, and cultural background. Taught in Spanish. Prereq: Span 312.

412 Contemporary Spanish American Literature **3**
Developments and techniques in major 20th-century texts through representative works. Overview of cultural, historical, and socio-political aspects, as well as literary background. Taught in Spanish. Prereq: Span 312.

489 [499] **Senior Thesis** **1-6**
Capstone experience option. Research and original investigation under the guidance of a faculty member. Student work to be written in Spanish.

MUSIC

(See Fine Arts.)

NATURAL RESOURCES MANAGEMENT (NRM)

Grygiel, Chair; Ashworth, Barker, Berryhill, Biondini, Bleier, Brun, Cheng, Clambey, Kirby, J. Leitch, Lin, B. Nelson, Nuechterlein, Padmanahban, J. Richardson, Shultz, Steele, Stegman, Walter

COURSES

150 [190] **Natural Resources Management Orientation** **1**
Introduction to natural resources management issues, concepts, and careers.

225 Natural Resource and Agro-ecosystems **3**
See Animal and Range Sciences for description.

264 Natural Resource Management Systems **3**
See Agricultural Systems Management for description.

381 Resource Economics **2**
See Agricultural Economics for description.

NURSING (Nurs)

Nelson, Chair; Gilles, Gross, Kiser-Larson, McCullagh, Torgerson, Waldhaus

COURSES

341 Client Concepts **4**
Emphasizes the physiologic, psychologic, and pathophysiologic concepts which provide the foundation for professional nursing care.

342 Adult Health Nursing I **4**
Focuses on the etiology, pathophysiologic mechanisms, and nursing care of adult clients experiencing common disorders of body system function.

351 Nursing Concepts **4**
Introduction to the major, encompassing concepts integral to the nursing process including communication, legal issues, values and ethics, spirituality, pain management, and immobility issues.

352 Family Nursing I **4**
Focuses on nursing care and promotion for the childbearing family and includes identification and care of high risk clients.

360 [361] **Health Assessment (CCN)** **4**
Focuses on health assessment and health promotion of individual clients through utilization of the nursing process and basic nursing concepts.

362 Family Nursing II **4**
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.

401 Community Health Nursing **4**
Synthesis and application of nursing and public health concepts to promote the wellness of communities, families, and individuals.

402 Mental Health Nursing **4**
Synthesis and application of nursing and psychiatric-mental health concepts to promote the wellness of individuals and groups.

403 Adult Health II **4**
The etiology, pathophysiologic mechanisms, and nursing care of critically ill adult clients.

404 Adult Health III **4**
The etiology, pathophysiologic mechanisms, and organization of nursing care of adult clients experiencing selected complex stressors.

411, 412 Role Development I, II **2 each**
Capstone integration of nursing concepts into the complex professional practice role. Nursing program themes are applied and reinforced. Critical thinking and decision-making skills are emphasized in analysis of patients' health status.

420 Nursing Research **2**
Introduction to the research process and its application to nursing practice.

430 Nursing Management **2**
Study of concepts and issues related to management and leadership in professional nursing.

NUTRITION

(See Food and Nutrition)

PHARMACEUTICAL SCIENCES (PSci)

Shelver, Chair; Balaz, Lee, O'Rourke, Schnell, Sehgal, Sharma, Singh, Wagner

COURSES

340 Pathophysiology I **4**
Comprehensive study of the normal and abnormal physiological processes and the mechanisms important to the understanding of pharmacology and drug therapy. Prereq: Zoo 120, 120L, departmental approval.

341 Pathophysiology II **4**
Normal and abnormal physiological processes and the mechanisms important to the understanding of pharmacology and drug therapy. Prereq: PSci 340.

368, 369 Pharmaceutics I, II **4,3**
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 the professional program.

370 Laboratory Techniques in Pharmaceutical Sciences **1**
Scientific principles applied to preparation of dosage forms. Includes mathematical procedures for preparation, physical principles for stability and appropriate physical characteristics, and chemical principles governing the stability, formulation, and proper biopharmaceutical aspects of dosage form.

401 Pharmacodynamics and Applied Therapeutics I **5**
Basic chemical and pharmacological principles applied to the study of therapeutic agents; pharmacologic and therapeutic properties of drugs that affect the autonomic nervous system. Prereq: Bioc 460, 461, PSci 341.

402 Pharmacodynamics and Applied Therapeutics II **4**
Pharmacologic and therapeutic properties of chemotherapeutic agents, anti-infectives, and drugs that affect the endocrine system. Prereq: PSci 341, Bioc 461.

403 Pharmacodynamics and Applied Therapeutics III **5**
Pharmacologic and therapeutic properties of drugs that affect the gastrointestinal and genitourinary tracts, integumentary/connective tissues, and the central nervous system. Prereq: PSci 401.

404 Pharmacodynamics and Applied Therapeutics IV **4**
Pharmacologic and therapeutic properties of drugs that affect the cardiovascular, respiratory, and renal systems. Prereq: PSci 401.

409/609 Isotope Tracer Techniques **3**
Theory and techniques for the use of radioactive and stable isotopes in research.

443/643 Toxicology **2**
Poisons, their mode of action, detoxification, and treatment. Prereq: PSci 401, 402.

470/670 Pharmaceutics III: Pharmacokinetics **3**
Concepts and mathematical techniques for describing the time course of drugs in biological systems.

545 Clinical Toxicology **2**
Toxic potential of various poisonous substances including mechanism of toxicity, toxic doses, clinical presentation, clinical and laboratory monitoring and their specific treatment.

701 Quantitative Drug Design **2**
Basic physiochemical laws and molecular pharmacology for a competent understanding of drug action. Prereq: PSci 718.

703 Drug Metabolism **2**
Drug biotransformations and their effects on drug properties such as duration of action, potency, toxicity, and specificity. Prereq: Bioc 720.

718 Techniques in Pharmaceutical Research **3**
Application of modern instrumental techniques in the pharmaceutical sciences; qualitative and quantitative determination of physiologically and pharmacologically important substance.

741 Techniques of Pharmacological Research **3**
Techniques of long-term pharmacological investigation and experimentation.

746 Neuropharmacology **3**
Study of action mechanisms of drugs affecting the central and peripheral nervous systems.

747 Cardiovascular Pharmacology **3**
Study of action mechanisms of drugs affecting the circulatory systems, including their pathology.

762 Advanced Biopharmaceutics **2**
Stability and kinetic factors involved in absorption, distribution, metabolism, and excretion of drug products. Prereq: PSci 470.

PHARMACY PRACTICE (Phrm)

Miller, Chair; Biberdorf, Chapman, Christensen, R. Clarens, Hanel, Harrington, Kuzel, Low, Magarian, Omvig, Patterson, Strandberg, Strommen, Sylvester

COURSES

170 Common Medicines and Diseases **2**
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.*

300 Principles of Clinical Pharmacology **3**
Principles of pharmacology and therapeutics for nursing and other non-pharmacy health professions. *Does not count toward a pharmacy major.*

373 Health Care Systems **2**
Health care provider's present and future roles and relationships with the total health care system in the United States. Prereq: Departmental approval.

401 [501] **Consultation and Pharmaceutical Care** **2**
Effective strategies and techniques in clinical consultation with physicians and patients, including patient medication counseling.

436/636 Drugs of Abuse Potential **2**
Psychosocial, financial, and physical consequences of drug abuse including alcohol, narcotics, psychotropics, stimulants, and depressants. *Does not count toward a pharmacy major.*

458 Introduction to Clinical Practice **2**
Study and application of techniques necessary to monitor patient care. Distinction between normal and abnormal findings associated with common disease processes is analyzed. Prereq: PSci 340, 341.

460 Hospital Pharmacy Services **2**
Management procedures of hospital pharmacies.

471 Clinical Pharmacokinetics **2**
Discussion of multiple dosing, determination of dosage regimens, and factors influencing these; drug monitoring, clinical pharmacokinetics of various drug groups. Prereq: PSci 470.

472 Pharmacy Law/Ethics **4**
Pharmaceutical jurisprudence. State and federal laws and regulations concerned with the practice of pharmacy. Ethical issues in pharmacy.

480 Drug Literature Evaluation **2**
Survey of clinical drug literature sources and evaluation of the original literature.

520 [420] **PTDI:Pediatrics-Geriatrics** **2**
Focused on providing pharmaceutical care for patients from prenatal period to geriatric years. Specific therapy common to the very young or very old.

531 PTDI: Cardiovascular **2**
Pharmacotherapy of cardiovascular disease. Study of the pathophysiology, clinical presentation, and treatment of various cardiovascular diseases. Prereq: PSci 404, Phrm 471.

532 PTDI: Infectious Disease **3**
Clinical, patient-oriented approach to infectious disease. Review of antimicrobial agents combined with specific infectious disease processes and therapies to help the student make sound judgments on infectious disease problems.

533 PTDI: Pulmonary and Gastrointestinal **2**
Emphasis on a clinical, patient-oriented approach to various pulmonary and gastrointestinal processes and disease states. Case-study approach for diagnosis, treatment, and monitoring parameters of varied therapeutic modalities.

534 PTDI: Rheumatology, Endocrine, and Reproduction **2**
Pathophysiology, diagnostic evaluation, and therapeutic approach to major rheumatology disorders (bones, joints, and musculoskeletal disorders); endocrine disorders (diabetes, mellitus, thyroid, adrenal, and endocrine-based gynecological disorders) and contraceptive pharmacotherapy.

535 PTDII: Hematology and Neoplastic Diseases **3**
In-depth study of the pathophysiology, pharmacotherapy, diagnostic evaluation, and therapeutic approach to major hematologic disorders and neoplastic diseases. Prereq: PSci 402, Phrm 471.

536 PTDII: Neurology and Psychiatry **3**
Pathophysiology and pharmacotherapy of the major neurologic and psychiatric disorders. Prereq: PSci 403.

537 PTDI: Renal/Fluid and Electrolyte **2**
Pathophysiology and pharmacotherapy of the major renal diseases and fluid and electrolyte disorders.

557 PTDII: Home Health Care/Parenteral and Enteral Therapy **3**
Methods and provisions for providing pharmaceuticals in the home health care setting and extended care facilities. Provision of parenteral and enteral therapy to patients requiring specialized clinical support. Prereq: Phrm 532, 537.

575 Pharmacy Management **3**
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.

578 Non-Prescription Medications **2**
Introduction to over-the-counter medications including indications, contraindications, dosage forms, interactions, side effects, warnings, and precautions.

579 Prescription Practice **2**
Dispensing of prescription and non-prescription medication via a computerized model-pharmacy and the pharmacist's professional, ethical, and legal responsibility. Prereq: Phrm 472.

581, 582, 583 Clinical Clerkship I, II, III **6-18 each**
Experiential clinical training for pharmacy practice. Prereq: Successful completion of third professional year.

PHILOSOPHY (Phil)

Cater (Emeritus)

COURSES

101 [211] **Introduction to Philosophy (CCN)** **3**
Basic problems, concepts, and methods of philosophy.

321 Greco-Roman Philosophy **3**
Greco-Roman philosophy from pre-Socratics to the Stoics and Epicureans.

322 Medieval Philosophy **3**
Western philosophy from St. Augustine to Ockham and Marsilius of Padua.

323 Modern Philosophy **4**
Western philosophy from Descartes to Kant.

481/681 Philosophy of Science **3**
Philosophical aspects of science.

482 Formal Logic **4**
Sentential and predicate logic. Prereq: Phil 311.

PHYSICAL EDUCATION

(See Health, Physical Education, and Recreation.)

PHYSICS (Phys)

Hammond, Chair; Kelly, Kurtze, Rottman, Sawicki, Swenson

COURSES

110, 110L [110, 111] **Introductory Astronomy, Lab (CCN)** **3,1**
Qualitative survey of the current understanding of the universe including planetary explorations, solar phenomena, stars, black holes, nebulas, galaxies. (ND:Sci)

120 [118], **120L Fundamentals of Physics, Lab (CCN)** **3,1**
Application of physics concepts and principles to the real world. Topics selected from mechanics, heat, optics, electricity, and magnetism. (ND:Sci)

211, 211L [121, 122] **College Physics I, Lab (CCN)** **3,1**
Beginning course for students without a calculus background. Includes basic principles of bodies at rest and in motion, fluids, vibrations, waves, and sound. Prereq: Math 105. (ND:LabSc)

212, 212L [123, 124] **College Physics II, Lab (CCN)** **3,1**
Second course for students without a calculus background. Includes optics, electricity, magnetism, and thermodynamics. Prereq: Phys 211, 211L.

215 Research for Undergraduates **1-3**
Special research studies in physics under the supervision of an instructor.

251, 251L [251, 252] **University Physics I, Lab (CCN)** **5,1**
Newtonian mechanics of translational and rotational motion, work, energy, power, momentum, conservation of energy and momentum, periodic motion, waves, sound, heat, and thermodynamics. Prereq or coreq: Math 165.

252, 252L [253, 254] **University Physics II, Lab (CCN)** **4,1**
Electric charge, field, potential, and current; magnetic field; capacitance; resistance; inductance; RC, RL, LC and RLC circuits; EM waves; optics. Prereq: Phys 251, 251L; Coreq: Math 166.

328 Basic Physics for Teachers **2-3**
Investigation of basic principles of geometric optics, static and current electricity, and heat and temperature. Includes laboratory work. Prereq: Departmental approval.

350 Introduction to Modern Physics 3
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 266.

351, 352 Mechanics I, II 3 each
Rigid bodies and systems of particles analyzed with Lagrangians, Hamiltonians, and methods from vector calculus; gravitation; central field problems; wave motion; fluid dynamics. Prereq for 351: Phys 252, Math 266; Prereq for 352: Phys 351.

361 Electromagnetic Theory 4
Electrostatics, magnetostatics, dielectrics, electric circuits, time varying electric and magnetic fields, electromagnetic induction, physical content, and application of Maxwell's equations. Prereq: Phys 252, Math 266.

363 Optics 3
Introductory modern optics at an intermediate level. Geometrical optics and matrix methods applicable to computer ray-tracing techniques. Light as electromagnetic waves: interference, coherence, and diffraction. Characteristics of laser beams. Prereq: Phys 252.

371 Intermediate Laboratory 1
Classical physics, electrical measurements, electronics, and optics with emphasis on error analysis and experimental techniques.

401 Engineering Physics I: Fundamental Properties of Solids 3
Schrodinger's equation and quantum mechanics of simple systems. Properties of solids including band theory of metals and semiconductors, Fermi-Dirac statistics, properties of p-n junction, light emitting diodes and laser diodes. Prereq: Phys 252.

402/602 Engineering Physics II: Optical Electronics 3
Classical and linear optics, physical origin of optical nonlinearities, optical second harmonic and parametric generation, phase matching, electro-optic effect and laser modulation, optical phase conjugation and four wave mixing theory Prereq: Phys 252.

429 Advanced Physics for Teachers 3
Departmental approval required.

462/662 Heat and Thermodynamics 3
Classical principles and laws of thermodynamics. Cyclic processes and entropy functions. Legendre differential transformations. Clausius equations, and principles of Maxwell's equations. Prereq: Phys 252.

463/663 Statistical Mechanics 2
The Maxwell-Boltzmann distribution function and its applications to thermodynamic problems. Introduction to Bose-Einstein and Fermi-Dirac statistics. Prereq: Phys 462.

471/671 Advanced Laboratory 2
Advanced laboratory in modern physics: experiments such as electron diffraction, nuclear spectroscopy, magnetic domains, and bubbles. Data analysis and fitting and solutions of differential equations using Math CAD software package.

485/685 Modern Physics I 3
Operators, one-dimensional wells and barriers, Schrodinger equation, uncertainty, duality, Born interpretation, unstable states, bosons and fermions, central force problems, angular momentum, spin. Prereq: Phys 252, Math 266.

486/686 Modern Physics II 3
Continuation of Physics 485/685. Perturbation theory, angular momentum addition, variational schemes, WKB method, scattering theory, time-dependent problems. Prereq: Phys 485/685.

489 Physics Projects 1-4
Capstone experience in physics.

752, 753 Mathematical Methods in Physics I, II 3 each
See Mathematics 782, 783 for description. Prereq for 753: Phys 752.

755 Classical Mechanics 3
Variational principles, Lagrange's equations, two body central force problem, rigid body motion, Hamilton's equations, canonical transformation, Hamilton-Jacobi theory. Prereq: Phys 352.

758 Statistical Physics 3
Review of the laws of thermodynamics, Bose-Einstein and Fermi-Dirac statistics, and applications. Prereq: Phys 463.

761 Electromagnetism 3
Review of Maxwell's Equations, radiation, collisions between charged particles, dynamics of relativistic particles and fields. Prereq: Phys 361.

771, 772 Quantum Physics I, II 3 each
Schrodinger equation, wave packets, uncertainty, angular momentum, spin, second quantization, harmonic oscillator. Prereq for 771: Phys 486; Prereq for 772: Phys 771.

775 Nuclear Physics 3
Nuclear properties, nuclear force, nuclear models, nuclear decay, nuclear reactions, nuclear collisions, radioactivity, fission, fusion. Prereq: Phys 486.

781, 782 Solid State Physics I, II 3 each
Crystal structure and binding, reciprocal lattices and x-ray diffraction, lattice vibrations, thermal properties, free electron model, band theory, magnetism, superconductivity. Prereq for 781: Phys 486; Prereq for 782: Phys 781.

PLANT PATHOLOGY (PPth)

Statler, Chair; Francl, Freeman, Gudmestad, Nelson, Rasmussen, Ruby, Secor, Stack, Steffenson

COURSES

324 Introductory Plant Pathology 3
Etiology, symptomatology and control of representative plant diseases and demonstrations. 2 lectures, 1 laboratory. Fall. Prereq: Bot 170, 170L.

452/652 Plant Structure 3
Study of the development and structure of cells, tissues, and organs of vascular plants. 2 lectures, 1 laboratory. Offered even years; fall. Prereq: Bot 170, 170L. Cross-listed with Bot.

453/653 Microscopy 3
Principles, advantages, and limitations of light and electron microscopic techniques, including sample preparation, data acquisition, interpretation, and photographic techniques. 2 lectures, 1 laboratory. Offered odd years; spring. Prereq: Bot 150.

454/654 Diseases of Field and Forage Crops 3
Etiology, symptomology, control, and importance of field and forage crop diseases. 2 lectures, 1 laboratory. Offered even years; spring. Prereq: PPth 324.

455/655 Plant Disease Management 3
Diagnosis and control of horticultural crop diseases. 2 lectures, 1 laboratory. Offered odd years; spring. Prereq: PPth 324.

456/656 Forest and Shade Tree Pathology (CCN) 3
Biotic and abiotic sources of tree decline are included, as are some pathogens of forest products. Recognition and treatment techniques will be covered. Emphasis of field diagnostic skills. Prereq: PPth 324.

460/660 Fungal Biology 3
Fungal ecology, morphology, genetics, physiology, taxonomy, and relevance to humans. 2 lectures, 1 laboratory. Offered even years; fall. Prereq: Biol 150, PPth 324.

750 Plant Virology 2
Lecture: structure, function, and control of plant viruses and disease. Laboratory: Morphology, purification, and characterization of viruses. 2 lectures, 1 laboratory. First half semester. Offered even years; spring. Prereq: PPth 324.

751 Physiology of Plant Disease 3
Infection, penetration, recognition, nutrient transfer, toxins, photosynthesis, and physiological resistance mechanisms. 2 lectures, 1 laboratory. Offered odd years; fall. Prereq: PPth 324.

752 Plant Nematology 2
Isolation, identification, biology, and controls of plant parasitic nematodes and techniques used in nematology. 3 lectures, 1 laboratory. Last half semester. Offered odd years; fall. Prereq: PPth 324.

753 Bacterial Diseases of Plants 2
Identification, epidemiology, symptomology, control, and techniques for studying plant diseases caused by bacteria. 3 lectures, 1 laboratory. First half semester. Offered odd years; fall. Prereq: PPth 324.

754 Plant Disease Epidemiology 3
Temporal and spatial dynamics of diseases and causative pathogens in plant populations. 2 lectures, 1 laboratory. Offered even years; fall. Prereq: PPth 324.

756 Techniques in Electron Microscopy 3
Operation of transmission and scanning electron microscopes and ancillary equipment. Techniques include fixation, dehydration, critical point drying, embedding, ultrathin sectioning, and metallic sample coating. 1 lecture, 2 laboratories. Offered odd years; fall. Prereq: Bot 456/656, departmental approval.

759 Host-Parasite Genetics 3
Host-parasite genetics including genetics of plant and pathogens and gene-for-gene relationships. 3 lectures. Offered even years; spring. Prereq: PlSc 311.

760 Advanced Mycology 4
Biology and classification of fungi. Emphasis on identification, growth and development, physiology, and etiology of fungi. 2 lectures, 2 laboratories. Offered odd years; spring. Prereq: PPth 460.

761 Advanced Plant Pathology 2
Analysis of advanced and integrated concepts in host-parasite relationships, disease control, mechanisms of resistance, biotechnology, and professionalism. 3 lectures. Offered even years; spring. Prereq: PPth 324.

PLANT SCIENCES (PlSc)

Schneiter, Chair; Berglund, Berzonsky, Carena, Cheng, Deckard, Dexter, Elias, Franckowiak, Frohberg, Grafton, Hammond, Helms, Herman, Horsley, Howatt, Johnson, Kegode, Kianian, Laschkewitsch, Lee, Lorenzen, Lym, Maan, McClean, McMullen, McWilliams, Messersmith, Meyer, Peel, Smith, Spilde, Whited, Zollinger

COURSES

Crop and Weed Sciences

110 World Food Crops (CCN) 3
Scientific principles of crop growth, worldwide production, management alternatives, and processing for domestic and international consumption. 2 lectures, 1 discussion, 1 tutorial laboratory. Offered fall, spring.

111 Genetics and You 2
Basic concepts in genetics with emphasis on current human genetics. 2 lectures. Offered spring.

225 [220] **Principles of Crop Production (CCN) 3**
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. Offered spring. Prereq: PlSc 110.

315, 315L [311, 312] **Genetics, Lab 3,1**
Study of the basis of heredity with emphasis on structure and function of DNA and Mendelian genetics. 3 lectures. Offered fall, spring. Cross-listed with Biol (CCN), Bot, and Zoo.

320 Principles of Forage Production (CCN) 3
Introduction to several forage crops and their management, forage quality characteristics, use of legumes in rotations, and preservation of forages. 3 lectures, 1-hour recitation. Offered fall. Prereq: PlSc 110 or departmental approval.

321 Human Karyotyping 1
Culture of white blood cells to stain and characterize chromosomes. Laboratory by arrangement. Offered fall, spring. Prereq: PlSc/Biol/Bot/Zoo 315. Cross-listed with Biol and Zoo.

323 Principles of Weed Science (CCN) 3
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. Offered spring.

335 [330] **Seed Technology and Production 2**
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. Offered spring; last half semester. Prereq: PlSc 110.

340 Grain Grading 2
Description and interpretation of the Grain Standards Act and instruction in grading of grain. 3 lectures, 3 two-hour laboratories. Offered spring; first half semester. Prereq: PlSc 225 or departmental approval.

350 Sugarbeet Production 2
History, growth, and development; soil and fertility management; weeds, insect, and disease control; cultivars; harvesting, storage, and processing of sugarbeets. Offered fall. Prereq: PlSc 110 or 210, and 225 or departmental approval.

431/631 Intermediate Genetics 3
Expansion of classical and molecular concepts of genetics; basic concepts of Mendelian, quantitative, population, molecular, and evolutionary genetics. 2 lectures. Offered fall. Prereq: PlSc 315. Cross-listed with Bot and Zoo.

446/646 [346, 726] **Genetics and Plant Improvement 3**
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. Offered fall.

453/653 Advanced Weed Science 2
Integrated weed control programs for crops, pastures, non-cropland, and aquatic environments. Herbicide formulation and mixtures. Herbicide absorption, translocation, and action. 2 lectures. Offered fall. Prereq: PlSc 323.

455/655 Cropping Systems: An Integrated Approach 3
Integrative capstone focus on the scientific professional and ethical issues associated with crop production and management practices using decision case studies. 3 lectures. Offered spring. Prereq: Junior standing.

724 Field Design I 3
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. Offered fall. Prereq: Stat 330 or 725.

727 Crop Breeding Techniques 1
Hybridization of North Dakota crops. Laboratory by arrangement. Offered odd years; summer. Prereq: PlSc 726.

731 Plant Molecular Genetics 3
Molecular aspects of plant genome organization and expression; basic and applied usages of molecular markers and gene transfer techniques. 3 lectures. Offered even years; spring. Prereq: PlSc 431/631.

734 Field Design II 2
Application of incomplete block designs, confounding and covariance analyses to biological problems. 2 lectures. Offered odd years; spring. Prereq: PlSc 724.

741 Cytogenetics 4
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. Offered even years; fall. Prereq: PlSc 315.

750 Advanced Crop Production **3**
Advanced crop production and management considerations with emphasis on the science. Current literature emphasized. Offered even years; spring. Prereq: PlSc 455/655, 724.

751 Advanced Genetics **3**
Classical and modern genetic concepts, nature and induction of mutations linkage, and application of chi-square. 3 lectures. Offered odd years; spring. Prereq: PlSc 315.

753 Action and Fate of Herbicides **2**
Herbicide mode of action and fate of herbicides in plants and soil, physiology of herbicide resistance, and herbicide antidotes. 3 lectures. Offered even years; spring. Prereq: PlSc 453/653, Bioc 460/660.

755 Applied Crop Physiology **2**
Application of physiological principles to identification of yield limiting components for crop production. 2 lectures. Offered even years; fall.

763 Laboratory Methods—Weed Science **2**
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. Offered odd years; spring. Prereq: PlSc 453/653, Bioc 460/660.

776 Advanced Plant Breeding **4**
Application of genetic principles to improvement of self- and cross-pollinated crops. 4 lectures. Offered odd years; spring. Prereq: PlSc 724, 726.

781 Quantitative Genetics **4**
Concepts of inheritance in random and non-random mating populations and applications to plant breeding. 4 lectures. Offered even years; spring. Prereq: PlSc 724, 726.

Horticulture

177 [215] **Floral Design (CCN)** **2**
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. Offered spring.

210 Horticulture Science (CCN) **3**
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. Offered fall.

211 Horticulture Science Laboratory **1**
Exercises in plant identification, propagation, nutrition, gardening, greenhouses, lawn care, landscape design, interior plants, pruning, and culture of horticulture. 1 two-hour laboratory. Offered fall.

219 Introduction to Prairie and Community Forestry (CCN) **2**
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. Offered odd years; fall.

341 Landscape Bidding and Contracting **1**
Introduction to the business structures of landscape contracting. Emphasis on understanding the rationale behind pricing, bidding, and completing landscape projects with a net profit. 1 lecture. Offered odd years; fall.

355 Woody Landscape Plants **3**
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. Offered fall. Prereq: Biol 150, PlSc 210; Bot 170 recommended.

360 Horticultural Food Crops **4**
History, classification, culture, physiological principles, postharvest handling, and marketing of major fruit and vegetable crops. 4 lectures. Offered odd years; spring. Prereq: Bot 170, PlSc 210.

362 Potato Science **2**
History, botany, cultural practices, harvesting, breeding, physiology, storage, and processing of the potato. 2 lectures. Offered odd years; fall. Prereq: Biol 150, PlSc 110 or 210.

365 Herbaceous Landscape Plants (CCN) **2**
Production, identification, and uses of annual, perennial, and bulbous ornamentals in home and public landscapes with consideration to insect and disease problems. 2 two-hour lecture/laboratories. Offered odd years; fall. Prereq: Biol 150, PlSc 210.

368 Plant Propagation (CCN) **3**
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. Offered spring. Prereq: PlSc 210.

375 [348] **Turfgrass Management** **3**
Species characteristics of cool and warm season turfgrasses, including cultural requirements for home lawns, parks, and sports turf. 2 lectures, 1 two-hour laboratory. Offered even years; fall. Prereq: Biol 150 and PlSc 110 or 210.

412 [382] **Nursery Production and Management** **3**
Industry overview, production-management practices, facilities, equipment, nursery stock standards, storage, and overwintering. Field trips, 2 lectures. Offered odd years; spring. Prereq: Bot 170; Coreq: PlSc 368.

422 [372] **Greenhouse Production and Management** **3**
Study of identification and production of greenhouse crops, including pot, cut flower, bedding, and foliage plants. Field trips. 2 lectures, 1 two-hour laboratory. Offered even years; spring. Prereq or Coreq: PlSc 368.

465/665 Advanced Landscape Plants **2**
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. Offered even years; fall. Prereq: PlSc 355.

484/684 Plant Tissue Culture and Micropropagation **2**
Principles, techniques, and applications of plant tissue, organ, cell, protoplast, and embryo culture. Emphasis on micropropagation. 1 lecture, 1 two-hour laboratory. Offered fall. Prereq: PlSc 315.

485/685 [473/673] **Arboriculture Science** **3**
Tree, shrub, and vine care based on the physiology of the plant and the limitations of the environment. Includes pruning, fertilizing, bracing, planting, removal and selection of plant materials, and related subjects. 3 lectures. Offered even years; spring. Prereq: Bot 170, 170L, PlSc 355.

486/686 Eco-Physiology of Horticultural Crops **2**
Influence of environmental factors, stress and hardiness on plant growth and development, and their relationship to production practices. 2 lectures. Offered even years; fall. Prereq: PlSc 210 or 225.

759 Biotechnology Applications to Plant Breeding **2**
Current and potential application of plant cell culture and genetic transformation technologies for the improvement of agronomic and horticultural crops. Emphasis on current literature. 2 lectures. Offered even years; spring. Prereq: PlSc 346, Bot 484.

POLITICAL SCIENCE (PolS)

Wood, Chair; Amlund, Monzingo, O'Regan, Stambough

COURSES

110 Introduction to Political Science (CCN) **3**
Problems of political science as a discipline, political systems, and political behavior. Includes causes and consequences of individual and group political behavior. (ND:SS)

115 [120] **American Government (CCN) 3**
Principles of American government, political behavior, and institutions. (ND:SS)

120 [141] **Terrorism (CCN) 3**
Examination of problems of terrorism. Includes its historical perspectives; terrorist motivations, organizations, tactics, strategies; role of media; government responses; future trends, prospects.

210 [245] **Current Politics (CCN) 3**
Study of current national and state political issues.

215 [260] **Problems and Policies in American Government (CCN) 3**
Study of the functioning of American government focusing on the policy process.

220 [140] **International Politics (CCN) 3**
Concepts, theories, and issues in international relations. (ND:SS)

225 Comparative Politics 3
Comparative analysis of contemporary political systems, practices, institutions, and actors.

230 Judicial Process (CCN) 3
Role of lawyers, judges, and courts in the political system. Special emphasis on judicial decision-making and the ideas behind law.

240 [210] **Political Ideologies (CCN) 3**
Study of ideas, belief systems, and basic principles of idealogies.

351 Women in Politics 3
Study of women leaders; their roles and perspectives within a national and international framework.

360 Principles of Public Administration 3
Empirical study of public administrators in their diverse roles and functions.

420/620 Political Behavior—Executive-Legislative Process 3
Behavioral study of executives and legislators with emphasis on examination of empirical data.

421/621 Political Behavior—Political Parties 3
Behavioral study of political leaders with emphasis on examination of empirical data.

430/630 Constitutional Law—Civil Liberties 3
Examination of First Amendment rights including freedom of speech, press, religion, association, and assembly. Due process and equal protection concerns are also addressed.

431/631 Constitutional Law—Criminal Justice 3
Study of Fourth, Fifth, and Sixth Amendment rights. Emphasis on the law of arrest, search and seizure, self-incrimination, and right to counsel.

442/642 Global Policy Issues 3
Analysis of the impact of planetary limits to growth, increasing globalization of the world economy, and changing control over resource systems on global politics.

443/643 Politics of Development 3
Introduction to topics of development and underdevelopment and to special circumstances facing the political systems of Third World countries.

450/650 Politics of the Developing Countries 3
Comparative examination of the government and politics of developing countries. Attention is given to special economics and cultural circumstances facing the political systems of these countries.

451/651 Politics of the Industrialized Countries 3
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.

452/652 Comparative Political Economy 3
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.

489 [499] **Senior Seminar 3**
Capstone experience. Emphasis on integrative skills needed to interrelate the concepts of the discipline.

700 Qualitative Methods 3
See Sociology for course description.

701 Quantitative Methods 3
See Sociology for course description.

720 Theoretical Perspectives to the Study of Political Science 3
Designed to guide beginning graduate students through the dominant paradigms and emerging subject areas of political science scholarship.

POLYMERS AND COATINGS (P&C)

Bierwagen, Chair; Glass, Soucek; Adjunct Faculty: Donley, Hill, Provder

COURSES

472/672 Environment and Chemical Industries 2
Environmental issues as they pertain to chemical industries, including regulations, bioremediation, safety, disposal of materials, and design of environmentally compliant chemicals and chemical processes. Prereq: Chem 341.

473/673 Polymers Synthesis 3
Catalysts and mechanisms in the chain-growth and step-growth synthesis of macromolecules from polyesters of the 30s to current engineering polymers. Prereq: Chem 342.

474/674 Coatings I 3
Principles of film formation, synthesis, structure-property relationships, coating solvents; pigments and their dispersion. Prereq: Chem 342.

475/675 Coatings II 3
Physical properties of coatings and their components; formulation, design, testing, and applications; color, adhesion, and rheology. Prereq: P&C 474/674.

478/678 Carbohydrate Polymers 1
Variation in carbohydrate polymers, derivation of most abundant carbohydrate polymers for industrial uses, and utilization of polymers in petroleum recovery.

484/684 Coatings I Laboratory 2
Polymer synthesis, coating characterization, and properties. Laboratory counterpart to P&C 474. Coreq: P&C 474/674.

485/685 Coatings II Laboratory 2
Coating formulation; testing, color measurements, synthesis, application methods. Laboratory counterpart to P&C 475. 1 six-hour laboratory. Hours flexible. Prereq: 484/684; Coreq: P&C 475/675.

486/686 Corrosion and Its Control by Coatings 2
Corrosion science: electrochemistry of corrosion, corrosion effects, measurement of corrosion, corrosion control by coatings, characterization of coating protection, accelerated testing. Prereq or Coreq: Chem 430; Coreq: P&C 474/674, 475/675. Cross-listed with Chem.

771 Modern Methods of Polymer Characterization 3
Modern spectroscopic (FT-IR, solid state NMR, light scattering, and others) and physical (dynamic mechanical analysis, chromatographic and thermal analysis) methods for characterization of polymers and coatings. Prereq: Chem 365 or departmental approval.

773 Organic Chemistry of Coatings 3
Organic reactions involved in film formation and degradation. Prereq: Chem 741 or departmental approval.

775 Color and Appearance 3
Topics in color and appearance in coatings and weathering of coatings, including photochemical principles. Prereq: P&C 675.

777 Water-Soluble Polymers 2
Structure of water and its influence on aqueous solution behavior of polymers. Synthetic, carbohydrate, protein, and other bioengineered water-soluble polymers. Prereq: P&C 473/673.

778 Physical Chemistry of Polymers 4
Introduction to rheological concepts and the flow behavior of macromolecules. Transitions in polymers, molecular weight characterization, blend compatibility, composite behavior, and other topics, e.g., drug release and liquid crystals. Prereq: P&C 673.

782 Physical Chemistry of Coatings 3
Surface chemistry diffusion in coatings, colloid stability, advanced CPVC concepts, film formation, particle size effects, and theories of coating application methods. Prereq: Chem 365; Coreq: P&C 474/674.

PSYCHOLOGY (Psyc)

Council, Chair; Arnell, Gould, Hinsz, McCaul, McCourt, Miltenberger, Nawrot, O'Neill, Rokke, Smyth, Wilson, Wittrock

COURSES

111 [110] **Introduction to Psychology (CCN) 3**
Survey of the scientific study of behavior and mental processes. (ND:SS)

210 Human Sexuality 3
Survey of biological, developmental, and psychological aspects of human sexuality. Prereq: Psyc 111.

211 Introduction to Behavior Modification 3
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.

212 Psychological Aspects of Drug Use and Abuse 3
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.

214 Social Interaction 3
See Sociology for description.

221 Psychology in Business and Industry 3
Applications of psychology to work/business. Topics include personnel selection/placement, job satisfaction and morale, motivation, leadership, group performance, and organizational theory/development. Prereq: Psyc 111.

250 [213] **Developmental Psychology (CCN) 3**
Survey of the psychology of human life span development. Coverage also includes heredity and prenatal development. Prereq: Psyc 111.

270 [231] **Abnormal Psychology (CCN) 3**
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.

322 Thinking and Making Decisions 3
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.

350 Research Methods I 3
Introduction to scientific method, ethics, principles of observation, measurement, survey research, and correlation. Laboratory training on conducting research, analyzing data, and preparing research reports. Prereq: Psyc 111, Math 103, CSci 147; Coreq: Stat 330.

351 Research Methods II 3
Experimental and quasi-experimental designs in psychological research. Laboratory includes performance of experiments, data analysis, and preparation of research reports. Prereq: Psyc 350.

360 Animal Behavior 3
See Zoology for description.

380 Clinical Psychology 3
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.

440/640 Experimental Methods 3
Intermediate experimental design and data analysis with emphasis on the analysis of variance. Laboratory includes data analysis on the computer. Prereq: Psyc 351, Stat 331.

453/653 Organizational Psychology 3
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. Prereq or coreq: Psyc 351.

460/660 Sensation and Perception 3
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 and equivalent of 2-hour laboratory. Prereq: Psyc 351.

461/661 Memory and Knowledge 3
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 351.

463/663 Experimental Development Psychology 3
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: 351.

465/665 Psychobiology 3
Fundamental anatomy (structure) and physiology (function) of the nervous system. Physiological bases of behavior. 2 lectures, equivalent of 2-hour laboratory. Prereq: Psyc 351.

468/668 Personality 3
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.

470/670 Experimental Social Psychology 3
Examination of historical and contemporary theory and research in social psychology. Study of the relationship between the individual and social context. 2 lectures and equivalent of 2-hour laboratory. Prereq: Psyc 351.

471/671 The Psychology of Aging 3
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.

472/672 Advanced Psychopathology 3
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.

473/673 Child Psychopathology and Therapy 3
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 351.

474/674 Behavior Analysis in Developmental Disabilities 3
Overview of developmental disabilities with emphasis on mental retardation. Application of behavior analysis procedures for skills training, functional assessment and treatment of problem behaviors and staff management. Students participate in assessment and treatment projects. Prereq: Psyc 211.

480/680 History and Systems 3
Historical development of scientific psychology. Emphasis on the development of various systems of psychology in America. Capstone experience. Prereq: Psyc 350 and two 400-level psychology courses.

481/681 Health Psychology 3
Application of behavioral procedures to the prevention, treatment, and rehabilitation of medical disorders. Emphasis on contemporary research findings. Prereq: Psyc 211 or 350.

486/686 Neuropsychology 3
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 351.

488/688 Human/Computer Interaction 3
See Computer Science for description.

489 [499] **Honor Thesis 2-6**
Capstone experience option.

718 Visual and Cognitive Neuroscience 3
Fundamentals of current visual and cognitive neuroscience research including detailed survey of ideas, methods, and models used to understand function of the human nervous system.

727 Advanced Topics in Visual Perception 3
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. Prereq: Psyc 460 or equivalent.

731 Fundamental Processes in Cognition 3
Explores the underlying architecture of the human cognitive system—how it takes in, processes, stores, and retrieves information.

732 Applied Cognitive Processes 3
Explores the ways cognitive principles operate in ecologically valid (real-world) situations.

733 Judgment and Decision Making 3
Explores issues and topics related to judgment and decision making.

735 Neural Networks 3
See Computer Science for description.

750 Introduction to Clinical Issues and Practices 1
Instruction and practice in clinical interview techniques and discussion of clinical issues including ethics, laws, and crisis intervention.

755 Behavior Therapy and Assessment I 4
Introduction to the nature and characteristics of behavioral assessment and behavior therapy. Laboratory includes behavioral interviewing and training in assessment and treatment procedures.

756 Behavior Therapy and Assessment II 4
In-depth coverage of behavioral assessment and treatment approaches, emphasis on their empirical status. Laboratory includes instruction with practice in implementation of these procedures. Prereq: Psyc 755.

761 Applied Research Methods 3
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.

762 Advanced Research Methods and Analysis 3
Advanced experimental design and data analysis. Emphasis on regression models as applied to psychological data and designs. Includes analysis on the computer. Lecture and laboratory. Prereq: Psyc 640.

770 Advanced Psychological Assessment 3
Comprehensive approach to assessment in clinical psychology. Includes administration, interpretation, and report writing. Primary focus on Wechsler intelligence scales and personality testing by objective and projectile methods.

771 Social/Health Psychology Research 3
Covers research designs frequently utilized in conducting social psychology related research with particular emphasis on health psychology.

782 Emotions 3
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. Prereq: Departmental approval.

787 Advanced Social Psychology and Health 3
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 and 681 or departmental approval.

RELIGIOUS STUDIES (RelS)

Helgeland

COURSES

100 [150] **Introduction to Religion (CCN) 3**
Introduction to the ways religious concerns are expressed, to religious values as a basis for human action, and to a spectrum of ethical styles. (ND:Hum)

220 Old Testament (CCN) 2
Study of the religious, political, and social history of ancient Israel as reflected in the Hebrew Bible.

230 New Testament (CCN) 3
Overview of the developments in the primitive Christian community as reflected in the New Testament.

243 Religion and Self (CCN) 3
Psychological and ethical issues involved in growth to religious maturity. Attention to basic human activities such as love, faith, marriage, sexuality, death, and grief.

260 Introduction to Ethics 3
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.

270 [250] **American Religious History (CCN) 3**
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.

315 Contemporary Religion 3
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.

320 History of Christianity 3
Major developments in the Christian religion including scriptures, persecution, monasticism, papacy, Reformation, science and religion, and the ecumenical movement. Cross-listed with Hist.

401 Sociology of Religion **3**
See Sociology for description.

453 Magic and Religion **3**
See Anthropology for course description.

RESPIRATORY CARE (RC)

P. Olson

COURSE

111 Introduction to Respiratory Care **1**
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 the scope of professional practice.

ROTC

(See Aerospace Studies and Military Science.)

SOCIOLOGY AND ANTHROPOLOGY

Goreham, Chair; Brunton, Burkland, Clark, Corwin, Klenow, Kloberdanz, Lindgren, McDonald, Query, Rathge, Sherman, Slobin, Thompson, Youngs

COURSES

Anthropology (Anth)

111 Introduction to Anthropology (CCN) **3**
Introductory overview of the major divisions of anthropology: cultural and physical anthropology, archaeology, and linguistics. (ND:SS)

204 Archaeology and Prehistory **3**
Introduction to archaeological methods, followed by a survey of world prehistory.

205 Human Origins **3**
Examination of the evolution of humans through the investigation of fundamental principles of evolution, human variation, comparative primate behavior, and the fossil record.

206 Peoples of the World **3**
General survey of cultural anthropology and cultures of various regions of the world.

208 Folklore and Culture **3**
Examination of folk traditions (oral, customary, and material) within their cultural context.

444/644 Peoples of the Pacific Islands **3**
General survey of cultures, past and present, in Melanesia, Polynesia, and Micronesia.

450/650 Cultural Anthropology **3**
Examination of the nature of culture, the dynamics of culture, cultural subsystems, and cultural data collection and analysis. Prereq: Anth lll or departmental approval.

451/651 Anthropological Linguistics **3**
Anthropological uses of linguistic data, methods, and theory. Includes phonetic transcription and phonemic, morphemic, and synthetic analysis.

452/652 North American Indians **3**
General survey of native North American Indian cultures. Focuses on cultural systems as anthropologists have reconstructed them for the precontact period.

453/653 Magic and Religion **3**
Comparative religion, religious concepts, practices, and practitioners. In-depth study of selected religious systems with a focus on shamanic religions. Prereq: Anth lll or departmental approval. Cross-listed with RelS.

458/658 Indians of the Plains **3**
Ethnographic/ethnohistorical survey of major Indian tribes in the Great American Plains region from ancient times to the present.

461/661 Germans from Russia **3**
Study of the cultural and historical background of an important ethnic group in the Great American Plains region—German-speaking people from Russia.

462/662 Cultural Ecology **3**
Analysis of the systematic relationship between human populations and their ecological surroundings. Prereq: Any Anth course.

480/680 Development of Anthropological Theory **3**
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 or departmental approval.

489 Senior Capstone in Anthropology **1**
Synthesis of social research methods, anthropological theory, and subdiscipline content material. Emphasis on integrative skills needed to interrelate the basic concepts of the discipline. Prereq: Senior standing.

Sociology (Soc)

110 [112] **Introduction to Sociology (CCN)** **3**
Introductory analysis of the nature of society, the interrelationship of its component groups, and the process whereby society persists and changes. (ND:SS)

115 [201] **Social Problems (CCN)** **3**
Sociological analysis of major social problems.

CJ 201 [Soc 160] **Introduction to Criminal Justice (CCN)** **3**
Examination of the criminal justice system and process. Includes crime, law-making, criminality, prosecution, police, courts, and corrections.

202 Minorities and Race Relations **3**
Analysis of lifestyles and characteristics of racial, cultural, and ethnic groups in society. Review of processes of discrimination, prejudice, and related dehumanizing biases toward minority groups including women. Prereq: Soc 110.

214 Social Interaction **3**
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.

233 Social Organization **3**
Examination of major institutional characteristics of modern societies. Emphasis on social issues as they relate to the organization of societies.

340 [301] **Social Research Methods** **3**
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.

341 Social Research Methods Laboratory **1**
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.

350 Social Work I **3**
Orientation to social work and the study of common human needs.

351 Social Work II **3**
Advanced discussion of social work and human service administration. Prereq: Soc 350.

401/601 Sociology of Religion **3**
Study of religion viewed as a social institution with a characteristic history, ecology, structure, behavior, and purpose. Cross-listed with RelS.

403/603 Sociology of the Great Plains **3**
Social and cultural patterns, trends, and problems peculiar to life in the semi-arid Great Plains.

405/605 Community Development **3**
Study of communities viewed as social systems. Includes political, economic, social, and economic factors affecting community growth and decline. Community development methods are addressed.

406/606 Crime and Delinquency **3**
Study of the nature and extent of juvenile delinquency and adult crime. Analysis of causes of juvenile and adult offending and an exploration of policies to combat crime and delinquency. Prereq: Soc 110.

407/607 Deviant Behavior 3
Analysis of the sociological aspects of the antecedents, the social/human relations processes, and the consequences of deviance in Western society. Prereq: Soc 110.

408/608 Criminology 3
Consideration of social and human relations regarding the causation, societal reaction, and prevention of adult crime. Prereq: Soc 110.

409/609 Social Policy 3
Investigation of the socio-cultural conditions that affect social policy formation in the areas of medicine-mental health, criminal justice, social welfare, and community and social change.

410/610 Social Inequality 3
Analysis of social and economic inequities and investigation of the relationship between inequity and life chances.

412/612 Sociology of Sex Roles 3
The socialization of men and women; an analysis of institutional norms, values, and attitudes and their effects on gender role development. Prereq: Soc 110.

413/613 Sociology of Work 3
Analysis of contemporary work-related issues concerning changing organizational structures and cultural expectations. Prereq: Soc 110.

416/616 Sociology Through Literature 3
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.

417/617 Sociology of the Family 3
Comparative family types, member relationships, family dynamics in relation to personality, social change, and social values.

418/618 Social Psychology 3
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.

422/622 Development of Social Theory 3
Sociological theories and systems from Comte, Marx, Durkheim, and Weber through the 20th century. Prereq: Soc 110.

424/624 Feminist Theory and Discourse 3
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.

426/626 Sociology of Medicine 3
Analysis of the social aspects of health and illness, the health care professions, organization of health care, and related issues.

427/627 Sociology of Mental Health 3
Social factors affecting the nature and incidence of mental disorders, the meaning of social disorders as social phenomena, methodological problems, and the social context of psychiatry. Prereq: Soc 110.

439/639 Social Change 3
Analysis of the complex nature of social change. Prereq: Soc 110.

440/640 Sociology of Aging 3
Examination of sociological perspectives on aging. Topics include social theories of aging, retirement, long-term care, chronic illness, and death.

441/641 Sociology of Death 3
Examination of research on social psychological and social organizational dimensions of death and dying. Additional topics include hospice movement, grief and bereavement, and communicating death news.

442/642 Current Issues in Medicine 3
Overview of current sociology of medicine issues such as chronic illness, bioethics, medical technology, changes in health care organizations, and women's health issues.

460/660 Criminalization 3
Analysis of historical and contemporary developments in the functions of police and courts. Focuses on societal, inter- and intra-organization contexts.

461/661 Corrections 3
Analysis of institutional- and community-centered corrections. Emphasis on historical, contemporary, and developing trends regarding structures, program content, and problems.

462/662 Cases in Criminal Justice 2
Case study approach to principles of criminal justice policies and operations. Analysis of contemporary functions in police, courts, and corrections via the case study method.

465/665 Applied Demographics 3
Overview of demographic concepts and principles and their application to business and planning decisions. Emphasis on using data bases and information sources available on the Internet.

489 Senior Capstone in Sociology 1
Synthesis of social research methods, sociological theory, and subdiscipline content material. Emphasis on integrative skills needed to interrelate the basic concepts of the discipline. Prereq: Soc 340 or senior standing.

700 Qualitative Methods 3
Advanced analysis of the methods used in qualitative research projects such as intensive interviewing, focus groups, and participant observation. Prereq: Soc 340. Cross-listed with PolS.

701 Quantitative Methods 3
Advanced analysis of the methods used in quantitative research projects, such as survey design, experimental design, and evaluation research. Prereq: Stat 330 or 725, Soc 340. Cross-listed with PolS.

723 Social Theory 3
Examination of contemporary social theories and theory construction. Prereq: Soc 422/622.

SOIL SCIENCE (Soil)

Brun, Chair; Cihacek, Deibert, Enz, Franzen, Giles, Goos, Hopkins, Khan, Moraghan, Prunty, Richardson, Todd

COURSES

210 Introduction to Soil Science (CCN) 4
Physical, chemical, and biological properties of soils, as related to use, conservation, and plant growth. 3 lectures, 1 laboratory, including 2 field trips on soil development and variability. Offered fall.

217 Introduction to Meteorology and Climatology 3
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. Offered spring.

321 Soil Management and Conservation (CCN) 3
Principles and practices of soil management and conservation planning in relation to government programs, the environment, erosion, tillage systems, crop production, and sustainability of soil, water, and air resources. 3 lectures. Offered fall. Prereq: Soil 210 recommended.

332 Soil Fertility and Fertilizers (CCN) 3
Principles of plant nutrition and soil nutrient availability; soil testing and fertilizer recommendations and management. Macronutrient emphasis. 2 lectures, 1 two-hour laboratory. Offered spring. Prereq: Soil 210, Chem 121, 121L.

333 Managing Soil Physical Properties 2
Study of principles and measurement of soil physical properties: density, texture, structure, aggregation, compaction, porosity, water content, water characteristic, hydraulic conductivity. 2 lectures. Offered fall. Prereq: Soil 210.

339 Managing Soil Physical Properties Laboratory 1
Sampling and measurement procedures for determination of various soil physical properties. 1 two-hour laboratory, plus arrangement. Offered fall. Prereq: Soil 210; Coreq: Soil 333.

410/610 Soil and the Environment 2
Soil as part of the ecosystem, soil classification, land use, waste disposal, environmental quality. *Not acceptable for graduate credit for Soil Science majors.* 2 lectures. Offered spring. Prereq: Junior standing, 6 credits of physical or biological sciences.

444/644 Soil Genesis and Survey 4
Introduction to soil genesis, morphology, geography, techniques of soil survey; field studies and description of soils. 3 lectures, 1 three-hour laboratory. One Saturday field trip. Offered fall. Prereq: Soil 210.

447/647 Microclimatology 3
Characteristics and causes of the climate near the ground and its interaction with living organisms. Energy and mass transfer concepts. Lectures, discussions, demonstrations. Offered even years; spring. Prereq: Phys 211.

455/655 Soil Chemistry 3
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. Offered fall. Prereq: Soil 332, Chem 122, 122L.

465/665 Soil and Plant Analysis 3
Laboratory analysis of soil and plant material for constituent elements. 2 lectures, 1 laboratory. Offered odd years; spring. Prereq: Soil 210, Chem 330, 331.

480/680 Soil and Waste Disposal 2
Role of soil as a reactor and roles of chemical, physical, hydrological and biological soil properties that influence waste transformation in soil. 2 lectures. Offered even years; spring. Prereq: 16 credits of physical sciences including one year of chemistry, senior or graduate standing or departmental approval.

733 Environmental Modeling 2
Mathematical simulation and computer model development for analysis of current environmental problems. Emphasis on mechanics of model construction, calibration, and validation. 2 lectures. Offered odd years; fall. Prereq: Computer programming.

763 Soil Physics 3
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. Offered even years; spring. Prereq: Soil 333, 339, Phys 211, Math 146 or 165.

782 Advanced Soil Fertility 2
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. Offered even years; fall. Prereq: 455/655.

783 Advanced Soil Physics 3
Mathematics of saturated and unsaturated soil water flow, including use of computer models. 3 lectures. Offered odd years; spring. Prereq: Soil 763, Math 147 or 266.

784 Advanced Soil Genesis, Morphology and Classification 2
Advanced study of processes of soil development, soil morphology, and principles of soil classification. 2 lectures. Offered even years; fall. Prereq: Soil 444/644.

785 Advanced Soil Chemistry 2
Advanced study of chemical properties of soil. 2 lectures. Offered even years; spring. Prereq: Soil 455/655.

SPEECH COMMUNICATION

(See Communication.)

STATISTICS (Stat)

R. Magel, Chair; Bhandary, Degges, McQuarrie, Rao, Terpstra

COURSES

330 Introductory Statistics 3
Frequency tables, histograms, probability, well-known probability distributions, one and two sample tests of hypotheses, confidence intervals, and contingency tables. Prereq: Math 103 or 104. (ND:Math)

331 Regression Analysis 2
Simple and multiple regression techniques and correlation coefficients. Extensive use of SAS. Emphasis on applications. Prereq: Stat 330. (ND:Sci)

367 Probability 3
Probability, probability distributions for discrete random variables, probability density functions, marginal joint probability density functions, expected value and variance, and transformations. Prereq: Math 166.

368 Statistics 3
Moments, moment generating functions, central limit theorem, one and two sample tests of hypotheses, estimation, and simple linear regression and correlation. Prereq: Stat 367.

450/650 Stochastic Processes 3
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.

451/651 Bayesian Statistical Decision Theory 3
Bayesian approach to statistics including utility and loss, prior and posterior densities, and Bayesian inference. Comparisons with classical statistical methods. Prereq: Stat 368 or 468.

460/660 Applied Survey Sampling 3
Simple random, stratified, systematic and cluster sampling; two-stage sampling. Estimation of population means and variances. Ratio and regression estimators. Prereq: Stat 330, or 368.

461/661 Applied Regression Models 3
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 368.

462/662 Introduction to Experimental Design 3
Fundamental principles of designing an experiment, randomized block, Latin square, and factorial. Also covers analysis of covariance and response surface methodology. Prereq: Stat 330 or 368.

463/663 Nonparametric Statistics 3
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 368.

464/664 Discrete Data Analysis 3
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.

465/665 Meta-Analysis Methods 3
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 330 and 331 or 461/661 or 725.

467 Probability and Mathematical Statistics I 3
Random variables, discrete probability distributions, density functions, joint and marginal density functions, transformations, limiting distributions, central limit theorem. Prereq: Stat 368 or Math 265.

468 Probability and Mathematical Statistics II 3
Properties of estimators, confidence intervals, hypotheses testing, Neyman-Pearson lemma, likelihood ratio tests, complete and sufficient statistics. Prereq: Stat 467.

470/670 Statistical SAS Programming 3
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 or coreq: 461/661 or 462/662.

476 Actuary Exam Study II 1
Selected material from probability and mathematical statistics in preparation for the national actuarial exam. Prereq: Stat 368, 468.

520 Statistical Methods for Pharmacy 3
Descriptive statistics, life tables, probability, binomial and normal distributions, estimation, hypothesis testing, introduction to regression and ANOVA. Examples from the medical/pharmaceutical area. Prereq: Math 103.

725 Applied Statistics 3
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. *Note: This course is not intended for statistics or mathematics majors.*

730 Biostatistics 3
Direct assays, parallel line assays, slope ratio assays, multiple assays, and quantal assays. Model, estimation, and testing. Probit and logit analysis. Prereq: Stat 461, 520 or 725.

750 Time Series 3
Estimation of trend in time series data. Seasonal models. Stationary models. Moving average, autoregressive, and ARMA models. Model identification. Forecasting. Intervention analysis. Prereq: Stat 367 or 467 and 461/661.

761 Advanced Regression 3
Multiple regression, analysis of residuals, model building, regression diagnostics, multicollinearity, robust regression, and nonlinear regression. Prereq: Stat 367 or 467 and 461/661.

762 Messy Data Analysis 3
One-way classification models with heterogeneous errors. Two-way classification analysis in the unbalanced case. Analysis of mixed models. Split-plot, nested, and crossover designs. Prereq: Stat 462/662.

764 Multivariate Methods 3
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 461 or 462.

767 Probability and Mathematical Statistics I 3
Random variables, discrete probability distributions, density functions, joint and marginal density functions, transformations, limiting distributions, central limit theorem. Additional project required. Prereq: Math 265 or Stat 368.

768 Probability and Mathematical Statistics II 3
Properties of estimators, confidence intervals, hypotheses testing, Neyman-Pearson lemma, likelihood ratio tests, complete and sufficient statistics. Additional projects required. Prereq: Stat 767.

770 Survival Analysis 3
Basic methodology in the analysis of Censored Data, two basic types of censoring, parametric estimation, nonparametric estimation, and life table methods. Prereq: Stat 768.

774 Linear Models I 3
General linear models. Full rank models. Estimation, confidence ellipsoids, and tests of hypotheses. Not full rank models. Applications to regression and design of experiments. Prereq: Stat 768.

775 Linear Models II 3
Repeated measurements models. Variance components models. Response surfaces. Growth curve models, unbalanced designs. Prereq: Stat 774.

777 Multivariate Theory 3
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.

778 Modern Probability Theory 3
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.

780 Asymptotics, Bootstrap, and Other Resampling Plans 3
Development of large sample and small sample properties of a variety of estimators. Prereq: Stat 768.

786 Advanced Inference 3
Further discussion of properties of estimators, theory of estimation, and hypotheses testing. Prereq: Stat 768.

TEXTILES AND CLOTHING

(See Apparel, Textiles, and Interior Design.)

THEATRE

(See Fine Arts.)

UNIVERSITY INTERDISCIPLINARY STUDIES (Univ)

COURSES

189 [199] **Skills for Academic Success 1**
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, Agri, HD&E, and ME.

350 Perspectives on Women's Studies 3
Exploration of personal and feminist perspectives on a range of social issues; development of a critical framework for thinking and writing about women and gender. Prereq: Sophomore standing.

402 Power of Narrative 3
Examination of the power of narrative in family stories from the viewpoint of literature, anthropology, and family studies. Exploration of the formation and basis for individual, family, and cultural identity through stories.

403 Weighing the Evidence 3
Examination of evidence from a variety of viewpoints representing different academic disciplines and vocations. Incorporation of a broader perspective in increasingly complex situations.

404 Spatial Conflicts in Global Society 3
Exploration of the utilization of space and spatial harmony and conflict on a personal, local, national, and global basis through readings, up-to-date news coverage, and recent films. Includes a spectrum of critical issues.

405 Problems of World Hunger: An Integrated Approach 3
Exploration of multiple dimensions of hunger from a variety of academic and international perspectives: geographic, political, economic, agricultural, nutritional/health, and social/cultural.

VETERINARY AND MICROBIOLOGICAL SCIENCES

Berryhill, Interim Chair; Berry, Bratanich, Casper, Colville, Dyer, Glass, Logue, Newell, Nolan, Robinson, Rust, Schamber, Stoltenow

COURSES

Microbiology (Micr)

Biol 202, 202L [Micr 110, 111]
Introductory Microbiology, Lab (CCN) 2
Study of the characteristics and importance of microorganisms with emphasis on their identification, control, and relationships to health and disease. (ND:LabSc)

350, 350L [350, 351] **General Microbiology, Lab (CCN)** **3**
Principles of microbiology for students requiring a rigorous professionally oriented course.

363 Clinical Parasitology **2**
Protozoan, helminthic, and arthropodal parasites of humans. Emphasis on clinical identification, life histories, and control. Prereq: Biol 150, 150L.

435 Hematology **2**
Origin, maturation, and function of the formed elements of human blood. Emphasis on identification of normal cells. Prereq: Biol 202L or Micr 350L.

445/645 Animal Cell Culture Techniques **2**
Methods of animal cell culture propagation and uses for cell culture systems.

452/652 Microbial Ecology **3**
Influence of natural environments on microbial growth. Environmental selection and microbial succession of different species, population interactions, and environmental modification via microbial metabolism. Prereq: Micr 350, 350L.

453/653 Food and Dairy Microbiology **3**
Microbiology of preservation, manufacture, and spoilage of food and dairy products from commercial and domestic viewpoints. Prereq: Biol 202L or Micr 350L. Cross-listed with F&N.

460/660 Pathogenic Microbiology (CCN) **3**
Study of the microorganisms that cause disease and of disease processes. Prereq: Biol 202 or Micro 350.

460L/660L [461/661] **Pathogenic Microbiology Laboratory (CCN)** **2**
Isolation and identification of pathogenic microorganisms. Prereq: Biol 202L or Micr 350L.

470/670 Basic Immunology **3**
Principles of immunology, antigen-antibody reactions, and immune response in host. Prereq: Micr 350.

471/671 Immunology and Serology Laboratory **2**
Basic immunological and serological procedures. Prereq: Micr 350.

475/675 Animal Virology **3**
Basic presentation in laboratory culture and fundamentals of animal virology. Prereq: Biol 202L or Micr 350L.

480/680 Bacterial Physiology **3**
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, 350L, Bioc 460.

482/682 Bacterial Genetics and Phage **3**
Principles of bacterial genetics and phage-host relationships. Prereq: Micr 350, Bioc 460.

486 Capstone Experience in Microbiology **3**
Capstone experience to integrate the principles of microbiology with the development of skills in experimental design and scientific discourse. Prereq: Senior standing.

561 Microbiology Laboratory for Pharmacy **1**
Students are exposed to laboratory procedures currently used in clinical microbiology laboratories.

572 Clinical Immunology **1**
Basic concepts in immunology including special attention to clinical conditions that may appear as a result of immune system activity. Prereq: Biol 202 or Micr 350.

762 Advanced Pathogenic Bacteriology **3**
Biophysical and biochemical mechanisms by which microorganisms cause infectious disease and hot reactions to the disease. Prereq: Micr 460, 460L.

781 Advanced Bacterial Physiology **3**
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: Micro 480/680.

783 Advanced Bacterial Genetics and Phage **3**
Mechanisms of genetic rearrangement and regulation in bacteria and phage. Recombinant DNA. Prereq: Micr 482/682.

Veterinary Science (VetS)

115 Medical Terminology for the Paraprofessional **1**
Medical terminology explored through a systematic study of word parts and the combinations used to build medical terms.

125 Animal Restraint **2**
Study of behavioral characteristics and handling techniques of farm, companion, and laboratory animals.

135 Anatomy and Physiology of Domestic Animals **3**
Introduction to the anatomy and physiology of common domestic mammals. Emphasis on how the body's normal structures and functions contribute to health.

136 Anatomy and Physiology Laboratory **1**
To accompany VetS 135.

150 Introduction to the Veterinary Profession **1**
Exploration of the many educational and career opportunities in veterinary medicine available to both veterinarians and veterinary technicians.

255 Fundamentals of Veterinary Radiography **3**
Diagnostic radiograph production including X-ray machine operation, dark room procedures, radiographic positioning, and radiation safety. Veterinary technicians only.

256 Veterinary Clinical Techniques and Instruments **3**
Clinical procedures and instrumentation used in the day-to-day operation of a veterinary practice. Veterinary technicians only.

259 Small Animal Diseases **2**
Basic principles of common dog and cat diseases with emphasis on client education. Veterinary technicians only.

357 Veterinary Pharmacology **3**
Study of drugs used in veterinary medicine with particular emphasis on commonly used drug groups. Veterinary technicians only.

358 Veterinary Surgical Nursing Techniques **4**
Preparation for and assistance with veterinary surgical procedures. Provision of proper aftercare for veterinary surgical patients. Veterinary technicians only.

359 Veterinary Hospital Information and Procedures **2**
Principles of veterinary hospital management and client relations/education. Veterinary technicians only.

365 Fundamentals of Animal Disease **4**
Basic principles of disease processes and prevention with emphasis on zoonotic and domestic animal diseases of infectious, parasitic, metabolic, toxicologic, and neoplastic origin. Prereq: VetS 135.

385 Veterinary Clinical Pathology I **3**
Study of urine analysis and serum chemistry principles and procedures commonly utilized in veterinary medicine. Veterinary technicians only.

386 Veterinary Clinical Pathology II **3**
Study of hematology principles and procedures commonly utilized in veterinary medicine. Veterinary technicians only.

387 Veterinary Clinical Pathology III **3**
Study of parasitology principles and procedures commonly utilized in veterinary medicine. Veterinary technicians only.

485 Veterinary Technology Externship **6-12**
Capstone experience for veterinary technology students. Continued development of skills through supervised work in a veterinary practice or other appropriate clinical setting.

ZOOLOGY (Zoo)

Bleier, Chair; Butler, Gerst, Grier, Montplaisir, Nuechterlein, Olson, Sheridan, Stewart, Stockwell

COURSES

120, 120L [121] **Human Anatomy and Physiology, Lab** **4,1**
Introduction to structure and function of human organ systems. Offered fall. (ND:LabSc)

126 [115] **Human Biology** **3**
See Biology for description. *Does not count toward major or minor.* (ND:Sci)

170, 170L General Zoology, Lab **3,1**
Introduction to various vertebrate and invertebrate animals and various aspects of animal evolution and biology. For majors in zoology or other biologically-related areas. Offered spring. Prereq: Biol 150.

280 Comparative Chordate Morphology **4**
Introduction to the systematics, history, and structure of chordates, especially the vertebrates. Offered spring. Prereq: Zoo 170, 170L.

315, 315L [311, 312] **Genetics, Lab** **3,1**
See Plant Sciences for description.

321 Human Karyotyping **1**
See Plant Sciences for description. Prereq: Zoo 315L. *Does not count toward major or minor.*

360 Animal Behavior **3**
Description of the principal behavior patterns of animals with consideration of ecological, evolutionary, and internal mechanisms. Offered even years; spring. Prereq: Zoo 170, 170L. Cross-listed with Psyc.

364 General Ecology **3**
See Biology for description.

370 Cell Biology **3**
Structure and function of cells, including cell surfaces, membranes, organelles, cytoskeleton, cell division, cell physiology, and methods used in cell studies. Prereq: Zoo 170, 170L, Chem 341.

380 Vertebrate Histology **3**
Study of the microscopic anatomy of vertebrate tissues and organs, especially mammals. Offered odd years; fall. Prereq: Zoo 170, 170L.

431/631 Intermediate Genetics **3**
See Plant Sciences for description. Prereq: Zoo 315.

450/650 Invertebrate Zoology **4**
Survey of the biology, classification, and evolution of invertebrates. Emphasis on major phyla, marine, and parasitic taxa. Offered spring. Prereq: Zoo 170, 170L.

452/652 Ichthyology **3**
Biology and taxonomy of fishes. Offered even years; fall. Prereq: Zoo 170, 170L.

454/654 Herpetology **3**
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. Offered odd years; fall. Prereq: Zoo 170, 170L.

456/656 Ornithology **3**
Introduction to the biology, classification, and identification of birds, especially local forms. Early morning field trips required. Offered fall. Prereq: Zoo 170, 170L.

458/658 Mammalogy **3**
Biology and taxonomy of mammals. One all-day and one overnight field trip. Offered fall. Prereq: Zoo 170, 170L.

460/660 Animal Physiology **4**
Development of basic quantitative descriptions of physical and chemical principles governing cell and organ function. Offered fall. Prereq: Zoo 170, 170L, Chem 341.

462/662 Physiological Ecology **3**
Comparative physiology of the vertebrates. Study of biochemical, morphological, and behavioral mechanisms involved with compensatory changes in response to changes in ontogeny and/or external environment. Offered spring. Prereq: Zoo 170, 170L.

463/663 Physiology of Reproduction **4**
See Animal and Range Sciences for description.

464/664 Endocrinology **3**
Physiology and anatomy of endocrine glands; chemistry and interrelations of their secretions. Offered odd years; fall. Prereq: Zoo 170, 170L.

470/670 Limnology **4**
Biological, physical, and chemical features of freshwater ecosystems. Offered odd years; fall. Prereq: Zoo 170, 170L, Biol 364; one year chemistry.

472/672 Fisheries Biology **3**
Principles of ecology and limnology applied to fish production. Offered odd years; spring. Prereq: Biol 364.

474/674 Fisheries Management **3**
Techniques used in the study and management of fish. Offered even years; spring. Prereq: Zoo 472.

475/675 Conservation Biology **3**
Integrative approach to the study and conservation of biodiversity. Application of principles from various sub-disciplines of the biological and social sciences to current conservation problems. Prereq: Zoo 315, 315L.

476/676 Wildlife Ecology and Management **3**
Application of ecological principles to management of game and nongame wildlife populations. Field trips required. Offered fall. Prereq: Biol 364.

482/682 Developmental Biology **3**
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. Offered even years; fall. Prereq: Zoo 170, 170L.

720 Advanced Cell Biology **3**
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.

760 Evolutionary Ecology **3**
Lecture-discussion course on recent developments in evolutionary theory and their implications in the study of animal adaptation, ecology, and behavior. Offered odd years; spring. Prereq: Biol 364.

764 Neuroendocrine and Endocrine Systems **3**
Topics in molecular endocrinology. Emphasis on signal transduction and effects of hormones on gene expression. Offered even years; spring. Prereq: Zoo 464.

766 Neurophysiology **3**
Function of neurons and simple neural networks. Emphasis on quantitative description of processes and characterization of the neurological basis of simple behaviors. Offered even years; spring. Prereq: Zoo 460 or Psyc 465.

770 Aquatic Community Ecology **4**
Nature and ecological roles of the freshwater biota. Discussion of contemporary issues in aquatic ecology. Offered even years; fall. Prereq: Zoo 470.

776 Animal Population Dynamics **4**
Principles and mechanics of animal population dynamics. Offered even years; fall. Prereq: Biol 364 and an interest in working with numbers.

784 Animal Research Principles **3**
Discussion, analysis of published research papers, lectures on selected topics, and student project. Offered odd years; fall. Prereq: Stat 725 or 330 and 331.

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Created by constitutional amendment in 1939, the State Board of Higher Education is the governing body of North Dakota State University and all other state supported institutions of higher education in North Dakota.

Members are appointed for a seven-year term with the term so arranged that one appointment expires each year. The Board's chief executive officer is the Chancellor of the North Dakota University System with offices in the State Capitol in Bismarck.

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Oriska, North Dakota . . . . . June 30, 2001

Richard Kunkel — term expires
Devils Lake, North Dakota . . . . . June 30, 2002

Beverly Clayburgh — term expires
Grand Forks, North Dakota . . . . . June 30, 2003

John Korsmo — Term expires
Fargo, North Dakota — June 30, 2003

William B. Isaacson — term expires
Stanley, North Dakota . . . . . June 30, 2003

Craig J. Caspers — term expires
Wahpeton, North Dakota . . . . . June 30, 2004

Chancellor of the North Dakota University System
Larry A. Isaak, Bismarck, North Dakota

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Laura Oster-Aaland, M.S., Director of Project Success
Jill Wilkey, B.S., Director of the Career Center

College of Agriculture

Aakre, Dwight G., Farm Management Specialist, Agricultural Economics
M.S., 1982, North Dakota State University

Adams, Terrance S., Adjunct Professor of Entomology
Ph.D., 1966, University of California, Riverside

Albus, Walter L., Research Associate in Soil Science
M.S., 1977, North Dakota State University

Anderson, Albin W., Emeritus Professor of Entomology
Ph.D., 1969, Iowa State University

Anderson, Donald E., Emeritus Professor of Agricultural Economics
Ph.D., 1968, University of Minnesota

Anderson, James V., Adjunct Professor of Plant Sciences, USDA
Ph.D., 1990, Virginia Polytechnic Institute

Anderson, Ronald, Emeritus Professor of Agricultural Economics
Ph.D., 1971, Washington State University

Askew, Robert G., Emeritus Professor of Plant Sciences
M.S., 1968, North Dakota State University

Backer, Leslie F., Associate Professor of Agricultural and Biosystems Engineering
M.S., 1972, North Dakota State University

Ball, William S., Emeritus Professor of Plant Sciences
Ph.D., 1974, University of Nebraska

Banasik, Orville, J., Emeritus Professor of Cereal Science
M.S., 1947, North Dakota State University

Bangsund, Dean A., Research Scientist in Agricultural Economics
M.S., 1987, North Dakota State University

Barker, William T., Professor of Animal and Range Sciences
Ph.D., 1968, University of Kansas

Bauer, Marc L., Assistant Professor of Animal and Range Sciences
Ph.D., 1996, University of Kentucky

Berg, Ivan E., Emeritus Professor of Veterinary and Microbiological Sciences
D.V.M., 1960, University of Minnesota

Berg, Paul T., Associate Professor of Animal and Range Sciences
Ph.D., 1975, North Dakota State University

Berglund, Duane R., Professor of Plant Sciences
Ph.D., 1971, North Dakota State University

Berry, Eugene S., Associate Professor of Veterinary and Microbiological Sciences
Ph.D., 1983, Northeastern University

Berryhill, David L., Associate Professor of Veterinary and Microbiological Sciences; Interim Department Chair
Ph.D., 1971, Iowa State University

Berzonsky, William A., Assistant Professor of Plant Sciences
Ph.D., 1988, University of Missouri-Columbia

Bhattacharya, Monisha, Assistant Professor of Cereal Science
Ph.D., 1997, University of Hong Kong

Biondini, Mario E., Professor of Animal and Range Sciences
Ph.D., 1983, Colorado State University

Blanchetot, Alain D., Associate Professor of Animal and Range Sciences
Ph.D., 1981, Université de Paris

Boe, Arthur A., Emeritus Professor of Plant Sciences
Ph.D., 1966, Utah State University

Boetel, Mark A., Assistant Professor of Entomology
Ph.D., 1996, South Dakota State University

Bon, Thomas A., Senior Lecturer in Agricultural and Biosystems Engineering
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Bratanich, Ana C., Assistant Professor of Veterinary and Microbiological Sciences
D.V.M., 1979, University of Buenos Aires
Ph.D., 1992, University of Nebraska-Lincoln

Brewer, Gary J., Professor of Entomology; Department Chair
Ph.D., 1984, Kansas State University

Brun, Lynn J., Professor of Soil Science; Department Chair
Ph.D., 1972, Kansas State University

Bugbee, William M., Emeritus Adjunct Professor of Plant Pathology, USDA
Ph.D., 1965, University of Minnesota

Callenbach, John A., Emeritus Professor of Entomology
Ph.D., 1939, University of Wisconsin

Campbell, Larry G., Adjunct Professor of Plant Sciences, USDA
Ph.D., 1974, Kansas State University

Carena, Marcelo J., Assistant Professor of Plant Sciences
Ph.D., 1999, Iowa State University

Carlson, Robert B., Professor of Entomology
Ph.D., 1965, Michigan State University

Carr, Patrick M., Adjunct Professor of Plant Sciences
Ph.D., 1989, Montana State University

Carter, Jack F., Emeritus Professor of Plant Sciences
Ph.D., 1950, University of Wisconsin

Casper, Howard H., Professor of Veterinary and Microbiological Sciences
Ph.D., 1971, North Dakota State University

Caton, Joel S., Associate Professor of Animal and Range Sciences
Ph.D., 1987, New Mexico State University

Cattanach, Allan W., Adjunct Professor of Soil Science
Ph.D., 1979, University of Minnesota

Cattanach, Norman R., Research Assistant in Soil Science
B.S., 1982, University of Wisconsin-River Falls

Chandler, Laurence D., Adjunct Professor of Entomology
Ph.D., 1986, Texas A & M University

Chang, Kow-Ching, Professor of Food and Nutrition
Ph.D., 1980, University of Nebraska

Charlet, Laurence D., Adjunct Professor of Entomology
Ph.D., 1975, University of California, Riverside

Cheng, Zong-Ming, Associate Professor of Plant Sciences
Ph.D., 1991, Cornell University

Christian, Gary R., Adjunct Professor of Veterinary and Microbiological Sciences
D.V.M., 1969, University of Minnesota

Cihacek, Larry J., Associate Professor of Soil Science
Ph.D., 1979, Iowa State University

Cobia, David W., Emeritus Professor of Agricultural Economics
Ph.D., 1967, Purdue University

Colville, Thomas P., Professor of Veterinary and Microbiological Sciences
D.V.M., 1971, University of Minnesota
M.S., 1981, University of Stirling, Scotland

Cross, Harold Z., Emeritus Professor of Plant Sciences
Ph.D., 1971, University of Missouri

Dahl, Bruce L., Research Scientist in Agricultural Economics
M.S., 1989, North Dakota State University

Dahleen, Lynn S., Adjunct Professor of Plant Sciences, USDA
Ph.D., 1989, University of Minnesota

Dahnke, William C., Emeritus Professor of Soil Science
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Danielson, Russell B., Associate Professor of Animal and Range Sciences
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d'Appolonia, Bert L., Emeritus Professor of Cereal Science
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Davison, Kenneth L., Adjunct Professor of Animal and Range Sciences, USDA
Ph.D., 1961, Iowa State University

Deckard, Edward L., Professor of Plant Sciences
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Deibert, Edward J., Professor of Soil Science
Ph.D., 1976, University of Nebraska

DeVuyst, Cheryl, Assistant Professor of Agricultural Economics
Ph.D., 2000, Purdue University

DeVuyst, Eric, Assistant Professor of Agricultural Economics
Ph.D., 1993, Purdue University

Dexter, Alan G., Professor of Plant Sciences
Ph.D., 1969, University of Illinois

Dinusson, William E., Emeritus Professor of Animal and Range Sciences
Ph.D., 1949, Purdue University

Disrud, Lowell A., Assistant Professor of Agricultural and Biosystems Engineering
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Dodd, Jerrold, Professor of Animal and Range Sciences; Department Chair
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Doehlert, Douglas, Adjunct Professor of Cereal Science, USDA
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Dorow, Norbert A., Emeritus Professor of Agricultural Economics
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Duysen, Murray E., Emeritus Professor of Plant Sciences
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Dyer, Neil W., Assistant Professor of Veterinary and Microbiological Sciences
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Edgerly, Charles G.M., Emeritus Professor of Animal and Range Sciences
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Edwards, Michael C., Adjunct Professor of Plant Pathology
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Effertz, Roger, Research Associate in Plant Pathology
M.S., 1999, North Dakota State University

El Nashaar, Hossein, Adjunct Professor of Plant Pathology
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Elias, Elias M., Associate Professor of Plant Sciences
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Enz, John W., Professor of Soil Science
Ph.D., 1976, University of Minnesota

Erickson, Duane O., Emeritus Professor of Animal and Range Sciences
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Erlandson, Gordon W., Emeritus Professor of Agricultural Economics
Ph.D., 1968, University of Minnesota

Fanning, Carl D., Emeritus Professor of Soil Science
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Flaskerud, George, Professor of Agricultural Economics
Ph.D., 1970, Oklahoma State University

Foley, Michael E., Adjunct Professor of Plant Sciences, USDA
Ph.D., 1982, University of Illinois

Foster, A. Earl, Emeritus Professor of Plant Sciences
Ph.D., 1958, South Dakota State University

Foster, Stephen P., Associate Professor of Entomology
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Franckowiak, Jerome D., Professor of Plant Sciences
Ph.D., 1970, University of Wisconsin

Francl, Leonard J., Associate Professor of Plant Pathology
Ph.D., 1985, University of Missouri

Franzen, David W., Assistant Professor of Soil Science
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Freeman, Thomas P., Professor of Plant Pathology
Ph.D., 1968, Arizona State University

Frohberg, Richard C., Professor of Plant Sciences
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Funke, Berdell R., Emeritus Professor of Veterinary and Microbiological Sciences
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Giles, Joseph F., Associate Professor of Soil Science
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Glass, Thomas L., Associate Professor of Veterinary and Microbiological Sciences
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Glogoza, Phillip A., Assistant Professor of Entomology
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Goos, Robert J., Professor of Soil Science
Ph.D., 1980, Colorado State University

Gordon, Dennis T., Professor of Cereal Science; Department Chair
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Grafton, Kenneth F., Professor of Plant Sciences
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Grant, Linda A., Adjunct Professor of Cereal Science, USDA
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Grazul-Bilska, Anna, Assistant Professor of Animal and Range Sciences
Ph.D., 1983, University of Agriculture and Technology, Poland

Grygiel, Carolyn E., Associate Professor of Animal and Range Sciences
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Gudmestad, Neil C., Associate Professor of Plant Pathology
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Gulya, Thomas J., Adjunct Professor of Plant Pathology, USDA
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Haggart, Janice J., Lecturer in Veterinary and Microbiological Sciences
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Halley, Scott, Research Assistant in Plant Pathology
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Hammond, James J., Professor of Plant Sciences
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Hareland, Gary A., Adjunct Professor of Cereal Science
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Harris, Marion O., Associate Professor of Entomology
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Harrold, Robert L., Professor of Animal and Range Sciences
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Haugen, Roger G., Extension Specialist in Animal and Range Sciences
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Haugse, Clayton N., Emeritus Professor of Animal and Range Sciences
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Heintz, Robert H., Emeritus Associate Professor of Plant Sciences
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Helgeson, Delmer L., Emeritus Professor of Agricultural Economics
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Hellevang, Kenneth, Professor of Agricultural and Biosystems Engineering
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Helms, Theodore C., Associate Professor of Plant Sciences
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Herman, Dale E., Professor of Plant Sciences
Ph.D., 1966, Purdue University

Herren, R. Stanley, Professor of Economics
Ph.D., 1975, Duke University

Higgins, Kenneth, Adjunct Professor of Animal and Range Sciences
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Hirning, Harvey J., Emeritus Professor of Agricultural and Biosystems Engineering
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Hofman, Vernon L., Associate Professor of Agricultural and Biosystems Engineering
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Holland, Neal S., Emeritus Professor of Plant Sciences
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Hopkins, David G., Assistant Professor of Soil Science
Ph.D., 1997, North Dakota State University

Horsley, Richard D., Associate Professor of Plant Sciences
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Horvath, David P., Adjunct Professor of Plant Sciences, USDA
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Hosford, Robert, Emeritus Professor of Plant Pathology
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Howatt, Kirk A., Assistant Professor of Plant Sciences
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Hughes, Harlan, Professor of Agricultural Economics
Ph.D., 1971, University of Missouri

Jackson, Marcus B., Extension Forester
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Jan, Chao-Chien, Adjunct Professor of Plant Sciences, USDA
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Jansen, Edward L., Research Associate in Agricultural Economics
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Jauhar, P.P., Adjunct Professor of Plant Sciences, USDA
Ph.D., 1963, Indian Agricultural Institute, New Dehli, India

Jensen, Patricia A., Vice President, Dean and Director for Agricultural Affairs, College of Agriculture
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Johnson, Brian E., Research Associate in Soil Science
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Johnson, Burton L., Assistant Professor of Plant Sciences
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Johnson, D. Demcey, Associate Professor of Agricultural Economics
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Johnson, Dexter W., Emeritus Professor of Agricultural and Biosystems Engineering
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Johnson, Jerome E., Emeritus Professor of Agricultural Economics
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Johnson, John N., Emeritus Professor of Animal and Range Sciences
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Johnson, LaDon J., Emeritus Professor of Animal and Range Sciences
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Johnson, Robert L., Emeritus Professor of Animal and Range Sciences
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Johnson, Roger G., Emeritus Professor of Agricultural Economics
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Johnson, Verlin K., Emeritus Professor of Animal and Range Sciences
Ph.D., 1951, University of Illinois

Kegode, George O., Assistant Professor of Plant Sciences
Ph.D., 1995, Iowa State University

Khan, Khalil, Professor of Cereal Science
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Khan, Mohamed, Assistant Professor of Soil Science
Ph.D., 1998, Clemson University

Kianian, Shahryar, Assistant Professor of Plant Sciences
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Kiesling, Richard L., Emeritus Professor of Plant Pathology
Ph.D., 1952, University of Wisconsin

Kirby, Donald R., Professor of Animal and Range Sciences
Ph.D., 1980, Texas A&M University

Klotz, Karen L., Adjunct Professor of Plant Sciences, USDA
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Knodel, Janet J., Adjunct Professor of Entomology
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Koo, Won W., Professor of Agricultural Economics
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Kraenzel, David G., Extension Specialist in Agricultural Economics
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Krupinsky, Joseph M., Adjunct Professor of Plant Pathology, USDA
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Kucera, Henry L., Emeritus Professor of Agricultural and Biosystems Engineering
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Lambert, David K., Professor, Agricultural Economics; Department Chair
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Lamey, H. Arthur, Professor of Plant Pathology
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Lana, Edward P., Emeritus Professor of Plant Sciences
Ph.D., 1948, University of Minnesota

Lardy, Gregory P., Assistant Professor of Animal and Range Sciences
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Lee, Chiwon W., Associate Professor of Plant Sciences
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Leistritz, F. Larry, Professor of Agricultural Economics
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Leitch, Rebecca L., Lecturer in Agricultural Economics
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Lindley, James A., Associate Professor of Agricultural and Biosystems Engineering
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Logue, Catherine M., Assistant Professor of Veterinary and Microbiological Sciences
Ph.D., 1996, University of Ulster at Jordanstown, United Kingdom

Lorenz, Russell L., Adjunct Professor of Animal and Range Sciences
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Lorenzen, James H., Associate Professor of Plant Sciences
Ph.D., 1988, Cornell University

Lulai, Edward C., Adjunct Professor of Plant Sciences, USDA
Ph.D., 1978, North Dakota State University

Lundstrom, Darnell R., Professor of Agricultural and Biosystems Engineering
Ph.D., 1988, North Dakota State University

Lym, Rodney G., Professor of Plant Sciences
Ph.D., 1979, University of Wyoming

Maan, Shivcharan S., Professor of Plant Sciences
Ph.D., 1961, Kansas State University

Mack, Lawrence E., Lecturer in Agricultural Economics
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MacRae, Ian V., Adjunct Professor of Entomology
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Maher, George G., Extension Specialist in Agricultural and Biosystems Engineering
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Manthey, Frank A., Assistant Professor of Cereal Science
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Mao, Weining, Research Associate in Agricultural Economics
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Marchello, Martin J., Professor of Animal and Range Sciences
Ph.D., 1968, Virginia Polytechnic Institute and State University

McBride, Dean K., Emeritus Professor of Entomology
M.S., 1965, North Dakota State University

McClean, Phillip E., Professor of Plant Sciences
Ph.D., 1982, Colorado State University

McDonald, Clarence E., Emeritus Professor of Cereal Science
Ph.D., 1957, Purdue University

McDonald, Hugh J., Emeritus Professor of Agricultural Economics
Ph.D., 1969, Ohio State University-Columbus

McDonald, Ian C., Adjunct Professor of Entomology, USDA
Ph.D., 1968, Virginia Polytechnic Institute and State University

McMullen, Marcia P., Associate Professor of Plant Pathology
Ph.D., 1983, North Dakota State University

McMullen, Michael S., Associate Professor of Plant Sciences
Ph.D., 1976, University of Minnesota

McWilliams, Denise A., Extension Crop Production Specialist
Ph.D., 1988, Iowa State University

Merrill, Stephen D., Adjunct Professor of Soil Science
Ph.D., 1976, University of California-Riverside

Messersmith, Calvin G., Professor of Plant Sciences
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Meyer, Dwain W., Professor of Plant Sciences
Ph.D., 1970, Iowa State University

Miller, James D., Adjunct Professor of Plant Pathology, USDA
Ph.D., 1975, North Dakota State University

Miller, Jerry F., Adjunct Professor of Plant Sciences, USDA
Ph.D., 1976, North Dakota State University

Moilanen, Charles W., Emeritus Professor of Agricultural and Biosystems Engineering
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Ph.D., 1964, University of Minnesota

Puyear, Robert L., Emeritus Professor of Zoology
Ph.D., 1964, Oregon State University

Qalbani, Askar, Adjunct Professor of Zoology
M.D., 1970, Liaquat Medical College, Pakistan

Rao, M. Bhaskara, Professor of Statistics
Ph.D., 1973, Indian Statistical Institute, India

Rasmussen, Seth C., Assistant Professor of Chemistry
Ph.D., 1994, Clemson University, South Carolina

Reiser, Mary H., Adjunct Professor of Zoology
Ph.D., 1988, Northern Arizona University

Richardson, J.L., Adjunct Professor of Geosciences
Ph.D., 1974, Iowa State University

Rodgers, Kenton R., Associate Professor of Chemistry
Ph.D., 1988, University of Iowa

Rokke, Paul D., Associate Professor of Psychology
Ph.D., 1985, University of Houston

Rottman, Craig, Associate Professor of Physics
Ph.D., 1983, University of Illinois, Urbana-Champaign

Rudesill, James T., Emeritus Professor of Chemistry
Ph.D., 1957, Purdue University

Sahin, Ayse, Assistant Professor of Mathematics
Ph.D., 1994, University of Maryland

Saini-Eidukat, Bernhardt, Assistant Professor of Geosciences
Ph.D., 1991, University of Minnesota

Sawicki, Charles A., Associate Professor of Physics
Ph.D., 1975, Cornell University

Schwert, Donald P., Professor of Geosciences
Ph.D., 1978, University of Waterloo, Canada

Scoby, Donald R., Emeritus Professor of Botany
Ph.D., 1968, North Dakota State University

Sheikh, Abul K., Lecturer in Computer Science
M.S., 1991, North Dakota State University

Sheridan, Mark A., James A. Meier Professor of Zoology
Ph.D., 1985, University of California, Berkeley

Shreve, Warren E., Associate Professor of Mathematics
Ph.D., 1967, University of Nebraska

Sibi, Mukund P., Professor of Chemistry
Ph.D., 1980, City University of New York

Sinha, Mahendra K., Emeritus Professor of Physics
Ph.D., 1961, Pennsylvania State University

Skogen, Madeleine K., Emeritus Professor of Mathematics
M.S., 1960, North Dakota State University

Slanger, William D., Adjunct Professor of Statistics; Interim Dean, College of University Studies and Graduate School
Ph.D., 1975, Cornell University

Slator, Brian M., Associate Professor of Computer Science
Ph.D., 1988, New Mexico State University

Smyth, Joshua M., Assistant Professor of Psychology
Ph.D., 1998, State University of New York-Stonybrook

Sojka, Nadine M., Adjunct Professor of Clinical Laboratory Science
M.S., 1996, California College of Health Sciences

Soucek, Mark D., Assistant Professor of Polymers and Coatings
Ph.D., 1990, University of Texas, Austin

Sparks, Robert B., Associate Professor of Biochemistry
Ph.D., 1972, University of South Dakota

Srivastava, D.K., Associate Professor of Biochemistry
Ph.D., 1980, Banaras Hindu University, India

Staton, R. Dennis, Adjunct Professor of Psychology and Electrical Engineering
Ph.D., 1969, Harvard University
M.D., 1973, University of Miami School of Medicine

Stewart, Mary J., Assistant Professor of Zoology
Ph.D., 1992, Kansas State University

Stockwell, Craig A., Assistant Professor of Zoology
Ph.D., 1995, University of Nevada, Reno

Stolzenberg, Gary E., Lecturer in Chemistry
Ph.D., 1968, Kansas State University

Stoy, Patrick, Adjunct Professor of Respiratory Care
M.D., 1974, University of Minnesota

Sugihara, James M., Emeritus Professor of Chemistry
Ph.D., 1947, University of Utah

Suttle, Jeffrey C., Adjunct Professor of Botany
Ph.D., 1979, Michigan State University

Swenson, Orven F., Associate Professor of Physics
Ph.D., 1982, Air Force Institute of Technology

Tallman, Dennis E., Professor of Chemistry
Ph.D., 1968, Ohio State University

Terpstra, Jeffrey T., Assistant Professor of Statistics
Ph.D., 1997, Western Michigan University

Tinguely, Mark F., Lecturer in Computer Science
M.S., 1987, North Dakota State University

Tucker, Robert, Adjunct Professor of Chemistry
Ph.D., 1967, Iowa State University

Ubhaya, Vasant A., Professor of Computer Science
Ph.D., 1971, University of California, Berkeley

Ungar, Abraham A., Professor of Mathematics
Ph.D., 1973, Tel Aviv University, Israel

Van Amburg, Gerald L., Adjunct Professor of Botany
Ph.D., 1969, Texas A&M University

Vick, Brady A., Adjunct Professor of Biochemistry
Ph.D., 1975, North Dakota State University

Vinograd, Robert E., Emeritus Professor of Mathematics
Ph.D., 1952, Moscow State University
D.Sc., 1960, Moscow State University, Russia

White, Alan R., Associate Professor of Botany; Department Chair
Ph.D., 1981, University of North Carolina

Wicks, Zeno W., Jr., Emeritus Professor of Polymers and Coatings
Ph.D., 1944, University of Illinois

Wilson, Margaret L., Assistant Professor of Psychology
Ph.D., 1994, University of California-Berkeley

Withnell, Gary D., Adjunct Assistant Professor of Physics
Ph.D., 1980, North Dakota State University

Wittrock, David A., Associate Professor of Psychology
Ph.D., 1990, State University of New York, Albany

Wonderlich, Stephen A., Adjunct Professor of Psychology
Ph.D., 1985, University of Missouri

Wood, Dolores A., Adjunct Professor of Zoology
M.S., 1986, University of North Dakota

Xu, Yuesheng, Associate Professor of Mathematics
Ph.D., 1989, Old Dominion University

Zimmerman, Don C., Adjunct Professor of Biochemistry
Ph.D., 1964, North Dakota State University

General Education Requirements

These requirements apply to all students who enter NDSU in pursuit of a baccalaureate degree.

NDSU has alphabetic indicators to identify its general education categories as shown on the following list of category requirements. The alphabetical indicators are used primarily on departmental curriculum guides to facilitate program planning.

Students transferring to NDSU from a North Dakota University System institution who have completed the 36-credit general education requirements of that institution will have completed the lower-division general education requirements at NDSU.

NDSU courses commonly accepted in transfer as general education courses at other ND University System institutions are designated in parentheses after the course title on the following list of approved courses. For example, the designation (ND: Hum) indicates general approval of that course for ND University System transfer in the humanities category. For cross-listed courses, an underlined prefix indicates the GERTA approved listing. (The general education category requirements across ND University System institutions are similar, but not identical.)

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.

NOTES:

- Only courses approved by the University Senate Standing Committee on General Education and by the University Senate may be used to fulfill category requirements.
- Before making course selections, students should check with their advisers for possible additional college requirements.
- Updated lists of approved courses are printed as a centerfold in the registration schedule for each term.

Category Requirements

Credits

First-Year Experience Course
(Alphabetic Indicator = F) 1
A first-year experience course is required of all entering freshmen and new students who transfer fewer than 24 semester credits to NDSU.

CATEGORY 1: Communication

(Alphabetic Indicator = C) 9
Comm 110, Fund of Public Speaking or equivalent . . . . . .(3)
Engl 110, College Composition I . . . . . .(3)
Engl 120, College Composition II or equivalent . . . . . .(3)

CATEGORY 2: Quantitative Reasoning

(Alphabetic Indicator = R) 3
CSci, Programming, e.g., BASIC, COBOL, FORTRAN
Math 104, Finite Math or 146 or higher
Stat 330, Introductory Statistics or higher

CATEGORY 3: Science and Technology

(Alphabetic Indicator = S) 10
- Courses in the areas of the natural sciences, the physical sciences, and technology are included in this category.
- A minimum of 4 general education credits must be in natural or physical sciences.
- A one-credit laboratory course must be taken as a co-requisite with one of the general education science and technology courses.

CATEGORY 4: Humanities and Fine Arts

(Alphabetic Indicator = A) 6
- No more than 3 of the 6 credits may be in fine arts performance.
- Any performance courses must be in addition to those required for the student's major.

CATEGORY 5: Social and Behavioral Sciences

(Alphabetic Indicator = B) 6

CATEGORY 6: Wellness

(Alphabetic Indicator = W) 2
Required is a 2-credit course focused on wellness that integrates at least two of the four following areas of lifelong wellness: emotional well-being, nutrition, physical activity, and psychological development.

REQUIREMENTS WITH NO ADDITIONAL CREDITS:

CATEGORY 7: Cultural Diversity

(Alphabetic Indicator = D)
This requirement may be met by 3 credits taken as part of the 6 credits required in the humanities and fine arts or as part of the 6 credits required in the social and behavioral sciences in a course approved for cultural diversity.

CATEGORY 8: Global Perspectives

(Alphabetic Indicator = G)
This requirement may be met by 3 credits taken in any department as part of the 36 credits required for general education or as part of a student's major in a course approved for global perspectives.

CATEGORY 9: Computer Usage Integrated in All Majors

CATEGORY 10: Communication Activities in Upper-Division Major Courses

CATEGORY 11: Comprehension of Personal and Professional Ethics Integrated in Majors

CATEGORY 12: Capstone Experience in All Majors

TOTAL 36-37

Courses Approved for General Education Requirements by Category as of February 2000

First-Year Experience Course **Credits**

ABEN/AGRI/HD&E/ME/UNIV 189: Skills for Academic Success 1

1. Communication Category

COMM 110: Fundamentals of Public Speaking (ND:Comm) 3
ENGL 110: College Composition I (ND:Engl) 3
ENGL 111: Honors Composition I 3
ENGL 120: College Composition II (ND:Engl) 3
ENGL 121: Honors Composition II 3

2. Quantitative Reasoning Category

CSCI 122: Beginning BASIC/Visual BASIC (ND:CompSc) 3
CSCI 125: Beginning COBOL (ND:CompSc) 3
CSCI 126: Beginning FORTRAN (ND:CompSc) 3
CSCI 162: Intense FORTRAN (ND:CompSc) 2
MATH 104: Finite Mathematics 3
MATH 146: Applied Calculus I (ND:Math) 4
MATH 165: Calculus I (ND:Math) 4
STAT 330: Introductory Statistics (ND:Math) 3

3. Science and Technology Category

Natural Science:

• ARSC 225: Natural Resources and Agro-ecosystems 3
• BIOL 124: Environmental Science (ND:Sci) 3
BIOL/ZOO126: Human Biology (ND:Sci) 3
BIOL 150/150L: General Biology, Lab (ND:LabSc) 3/1
BIOL 202/202L: Introductory Microbiology, Lab (ND:LabSc) 2/1
ENT 210: Insects, Humans, and the Environment 3
• PLSC 110: World Food Crops 3
PLSC 111: Genetics and You 2
PLSC 210/211: Horticulture Science, Lab 3/1
PLSC/BIOL/BOT/ZOO 315/315L: Genetics, Lab 3/1
ZOO 120/120L: Human Anatomy and Physiology, Lab (ND:LabSc) 4/1
ZOO 170/170L: General Zoology, Lab 3/1

Physical Science:

CHEM 117/117L: Chemical Concepts and Applications, Lab (ND:LabSc) . . .3/1
CHEM 121/121L: General Chemistry I, Lab (ND:LabSc) 3/1
CHEM 122/122L: General Chemistry II, Lab (ND:LabSc) 3/1
• GEOL 105/105L: Physical Geology, Lab (ND:LabSc) 3/1
• GEOL 106/106L: The Earth Through Time, Lab (ND:LabSc) 3/1
GEOL 304: Eastern North Dakota Field Course 1
PHYS 110/110L: Introductory Astronomy, Lab (ND:Sci) 3/1
PHYS 120/120L: Fundamentals of Physics, Lab (ND:Sci) 3/1
PHYS 211/211L: College Physics I, Lab (ND:LabSc) 3/1
PHYS 212/212L: College Physics II/Lab 3/1
SOIL 210: Introduction to Soil Science 4

Technology:

CSCI 146: Business Use of Computers OR
CSCI 147: Microcomputer Packages (ND:CompSc) 3
ECE 275: Digital Systems I 3
SOIL 217: Introduction to Meteorology and Climatology 3
STAT 331: Regression Analysis (ND:Sci) 2

4. Humanities and Fine Arts Category

Humanities and Fine Arts:

ARCH/LA 171: Environmental Design I 3
ARCH/LA 172: Environmental Design II 3
• ARCH 321: History of Architecture I 3
ARCH 322: History of Architecture II 3
ART 110: Introduction to the Visual Arts (ND:Hum) 3
ART 210: Art History I 3
ART 211: Art History II 3
ATID 310: Evolution of Fashion 3
ATID 315: History of Interiors I 3
ATID 316: History of Interiors II 3
■ ATID 410: Dress in World Cultures 3
CLAS 101: First-Year Latin I 4
CLAS 151: First-Year Greek I 4
ENGL 220: Introduction to Literature (ND:Hum) 3
ENGL 225: Introduction to Film 3
ENGL 251: British Literature I 3
ENGL 252: British Literature II 3
ENGL 261: American Literature I 3
ENGL 262: American Literature II 3
■ ENGL 330: British/American Women Writers 3
■ ENGL 335: Multicultural Writers 3
■ ENGL 340: 19th-Century American Novel 3
■ ENGL 341: 20th-Century American Novel 3
ENGL 342: 19th-Century American Short Story 3
ENGL 343: 20th-Century American Short Story 3
■ ENGL 345: Themes in American Culture 3
ENGR 311: Impact of Technology on Society I 3
• FREN 101: First-Year French I (ND:Hum) 4
• FREN 102: First-Year French II 4
• FREN 201: Second-Year French I 3
• GERM 101: First-Year German I (ND:Hum) 4
• GERM 102: First-Year German II 4
• GERM 201: Second-Year German I 3
HIST 101: Western Civilization I (ND:Hist) 3
HIST 102: Western Civilization II 3
HIST 103: U.S. to 1877 (ND:Hist) 3
HIST 104: U.S. Since 1877 3
■ HIST 261: American Indian History 3
■ HIST 431: The North American Plains 3
LA 322: History of Landscape Architecture 4
LANG 498H: Imaginary Homelands 3
MUSC 103: Introduction to Music History 3
MUSC 104: Introduction to Music Literature to 1825 (ND:Hum) 3
MUSC 105: Intro to Music Literature: 1825 to Present (ND:Hum) 3
■ MUSC 108: Roots of American Popular Music (ND:Hum) 3
■ MUSC 201: World Music 3
POLS 240: Political Ideologies 3
RELS 100: Introduction to Religion (ND:Hum) 3
• SPAN 101: First-Year Spanish I (ND:Hum) 4
• SPAN 102: First-Year Spanish II 4
• SPAN 201: Second-Year Spanish I 3
THEA 110: Introduction to Theatre Arts 3
THEA 115: World Film 3
■ THEA 280: World Theatre 3
THEA 281: Dramatic Literature and Style 3
■ UNIV 350: Perspectives in Women's Studies 3

Fine Arts Performance:

ART 124: Three-Dimensional Design 3
ART 130: Drawing I 3
MUSC 112: Varsity Band (ND:FA) 1
MUSC 115: University Chorus (ND:FA) 1
MUSC 303: Concert Band (ND:FA) 1
MUSC 306: Concert Choir (ND:FA) 1
THEA 161: Acting I (ND:FA) 3

5. Social and Behavioral Sciences Category

• AGEC/ECON 201: Principles of Microeconomics (ND:SS) 3
• AGEC/ECON 202: Principles of Macroeconomics (ND:SS) 3
■ AGEC 220: World Agricultural Development 3
■ ANTH 111: Introduction to Anthropology (ND:SS) 3
ATID 486: Dress and Human Behavior 3
CDFS 135: Family Science 3
CDFS 186: Consumer and Society 3
• CDFS 468: Women in Economic Systems 3
COMM 212: Interpersonal Communication 3
■ COMM 216: Intercultural Communication (ND:SS) 3
• ENGR 312: Impact of Technology on Society II 3
• GEOG 151: Human Geography 3
• GEOG 161: World Regional Geography 3
H&CE 341: Leadership and Presentation Techniques 3
POLS 110: Introduction to Political Science (ND:SS) 3
POLS 115: American Government (ND:SS) 3
• POLS 120: Terrorism 3
POLS 215: Problems/Policies in American Government 3
• POLS 220: International Politics (ND:SS) 3
• POLS 442: Global Policy Issues 3
PSYC 111: Introduction to Psychology (ND:SS) 3
PSYC 210: Human Sexuality 3
PSYC 211: Introduction to Behavior Modification 3
PSYC 212: Psych Aspects of Drug Use and Abuse 3
PSYC 214: Social Interaction 3
PSYC 221: Psychology in Business and Industry 3
PSYC 250: Developmental Psychology 3
PSYC 270: Abnormal Psychology 3
SOC 110: Introduction to Sociology (ND:SS) 3
SOC 214: Social Interaction 3
■ SOC 412: Sociology of Sex Roles 3
UNIV 403: Weighing the Evidence 3

6. Wellness Category

CDFS 242: Marriage and the Family 3
F&N 111: Wellness 3
F&N 250: Nutrition Science 3
F&N 319: Consumer Issues in Food and Nutrition 3
HD&E 220: Individual and Family Wellness 2
HPER 100: Concepts of Fitness and Activities 2
HPER 217: Personal and Community Health 3
NUTR 240: Principles of Nutrition 3

■ Indicates that the course is also approved for **Category 7: Cultural Diversity (D)**
• Indicates that the course is also approved for **Category 8: Global Perspectives (G)**

NOTE: Math 103, College Algebra, is accepted by other NDUS institutions as ND:Math.

Common Course Numbers

Old Course Prefix, Number, Title	New Course Prefix, Number, Title
ACCT 210, Accounting for Non-Business Majors	ACCT 102, Fundamentals of Accounting
ACCT 211, Principles of Accounting I	ACCT 200, Elements of Accounting I
ACCT 212, Principles of Accounting I	ACCT 201, Elements of Accounting II
AGEC 110, Principles of Microeconomics	AGEC 201, Principles of Microeconomics
AGEC 242, Farm & Agribusiness Mgt	AGEC 242, Intro to Ag Mgt
AGEC 244, Ag Marketing, Livestock Emphasis	AGEC 244, Ag Marketing
AGEC 246, Agricultural Finance	AGEC 246, Intro to Agricultural Finance
AGEC 375, Applied Agricultural Law	AGEC 375, Applied Agricultural Law
ASM 115, Fundamentals of Ag Systems Mgt	ASM 115, Fundamentals of Ag Systems Mgt
ASM 125, Fabrication & Construction Techn	ASM 125, Fabrication & Construction Techn
ASM 354, Electricity & Electronic Applic	ASM 354, Electricity & Electronic Applic
ASM 373, Tractors & Power Units	ASM 373, Tractors & Power Units
ASM 374, Power Units Lab	ASM 374, Power Units Lab
ASM 378, Machinery Principles & Mgt	ASM 378, Machinery Principles & Mgt
ARSC 114, Intro to Animal Sciences	ARSC 114, Intro to Animal Sciences
ARSC 123, Feeds & Feeding	ARSC 123, Feeds & Feeding
ARSC 220, Production of Meat Animals	ARSC 220, Livestock Production
ARSC 222, Meat Animal Evaluation	ARSC 222, Meat Animal Evaluation
ARSC 225, Nat Resources & Agroecosystems	ARSC 225, Nat Resource & Agro-ecosystems
ARSC 260, Horse Production	ARSC 260, Horse Production
ARSC 325, Intro to Range Mgt	ARSC 336, Intro to Range Mgt
ARSC 331, Livestock Selection	ARSC 331, Livestock Selection
ANTH 111, Intro to Anthropology	ANTH 111, Intro to Anthropology
ART 110, Intro to the Appreciation of Art	ART 110, Intro to the Visual Arts
ART 151, Intro to Studio Art I	ART 122, Two-Dimensional Design
ART 152, Intro to Studio Art II	ART 124, Three-Dimensional Design
ART 161, Drawing I	ART 130, Drawing I
ART 261, Drawing II	ART 230, Drawing II
ART 262, Painting I	ART 220, Painting I
ART 263, Printmaking I	ART 270, Printmaking I
ART 264, Photography I	ART 280, Photography I
ART 265, Ceramics I	ART 250, Ceramics I
ART 266, Sculpture I	ART 265, Sculpture I
ART 351, Hist of Art - Prehistoric Through Gothic	ART 210, Art History I
ART 352, Hist of Art - Renaissance Through Modern	ART 211, Art History II
BIOC 260, Elements of Biochemistry	CHEM 260, Elements of Biochemistry
BIOL 113, Environmental Science	BIOL 124, Environmental Science
BIOL 115, Human Biology	BIOL 126, Human Biology
BIOL 150, General Biology	BIOL 150, General Biology
BIOL 151, General Biology Lab	BIOL 150L, General Biology Lab
BIOL 311, Genetics	BIOL 315, Genetics
BIOL 312, Genetics Lab	BIOL 315L, Genetics Lab
CHEM 110, Chem Concepts & Applications	CHEM 117, Chem Concepts & Applications
CHEM 111, Chem Concepts & Appl Lab	CHEM 117L, Chem Concepts & Appl Lab
CHEM 120, General Chemistry I	CHEM 121, General Chemistry I
CHEM 121, General Chemistry II	CHEM 122, General Chemistry II
CHEM 130, General Chemistry Lab I	CHEM 121L, General Chemistry I Lab
CHEM 131, General Chemistry Lab II	CHEM 122L, General Chemistry II Lab
CHEM 140, Org Chem Concepts & Appl	CHEM 140, Org Chem Concepts & Appl
CHEM 241, Survey of Organic Chemistry	CHEM 240, Survey of Organic Chemistry
CHEM 341, Organic Chemistry I	CHEM 341, Organic Chemistry I
CHEM 342, Organic Chemistry II	CHEM 342, Organic Chemistry II
CHEM 351, Organic Chemistry Lab I	CHEM 341L, Organic Chemistry I Lab
CHEM 352, Organic Chemistry Lab II	CHEM 342L, Organic Chemistry II Lab
CLLG 120, Sci Terminology: Greek, Latin	CLAS 180, Sci Terminology: Greek & Latin
CLLG 161, Introductory Latin I	CLAS 101, First-Year Latin I
CLLG 162, Introductory Latin II	CLAS 102, First-Year Latin II
CLLG 251, Introductory Greek I	CLAS 151, First-Year Greek I
CLLG 252, Introductory Greek II	CLAS 152, First-Year Greek II
CLLG 261, Intermediate Latin Readings I	CLAS 201, Second-Year Latin I
CLLG 262, Intermediate Latin Readings II	CLAS 202, Second-Year Latin II
CLLG 271, Biblical Hebrew I	CLAS 289, Biblical Hebrew I
CLLG 272, Biblical Hebrew II	CLAS 290, Biblical Hebrew II

Old Course Prefix, Number, Title	New Course Prefix, Number, Title
CLLG 351, New Testament Greek	CLAS 251, Second-Year Greek I
CLLG 352, Classical Greek Prose	CLAS 252, Second-Year Greek II
CLSC 111, Intro to Clinical Lab Science	CLS 111, Intro to Clinical Lab Science
COMP 150, Programming in BASIC	CSCI 122, Beginning BASIC/Visual BASIC
COMP 160, FORTRAN Programming	CSCI 126, Beginning FORTRAN
COMP 61, COBOL Programming	CSCI 125, Beginning COBOL
COMP 173, Computer Science I	CSCI 160, Computer Science I
COMP 174, Computer Science II	CSCI 161, Computer Science II
COMP 210, Self-Paced Java	CSCI 155, Immigration
ECON 110, Principles of Microeconomics	ECON 201, Principles of Microeconomics
ECON 111, Principles of Macroeconomics	ECON 202, Principles of Macroeconomics
EE 211, Circuit Analysis I	EE 206, Circuit Analysis I
ENGL 110, Writing & Reading I	ENGL 110, College Composition I
ENGL 110H, Literature & Ideas I	ENGL 111, Honors Composition I
ENGL 111, Writing & Reading II	ENGL 120, College Composition II
ENGL 111H, Literature & Ideas II	ENGL 121, Honors Composition II
ENGL 112, Writing for Non-Native Speakers I	ENGL 112, ESL College Composition I
ENGL 114, Writing for Non-Native Speakers II	ENGL 122, ESL College Composition II
ENGL 130, Intro to Literature	ENGL 220, Intro to Literature
ENGL 220, Business & Tech Writing	ENGL 215, Writing for Work
ENGL 230, Survey of British Literature I	ENGL 251, British Literature I
ENGL 231, Survey of British Literature II	ENGL 252, British Literature II
ENGL 226, Poetry of Rock	ENGL 226, Poetry of Rock
ENGL 233, Discovering Poetry	ENGL 222, Intro to Poetry
ENGL 235, Discovering Film	ENGL 225, Intro to Film
ENGL 240, Survey of American Literature I	ENGL 261, American Literature I
ENGL 241, Survey of American Literature II	ENGL 262, American Literature II
	ENGL 271, Literary Analysis I
ENGL 334, World Literature	ENGL 240, World Literature Masterpieces
F&N 110, Intro to Nutrition	NUTR 240, Principles of Nutrition
FREN 111, Elementary French I	FREN 101, First-Year French I
FREN 112, Elementary French II	FREN 102, First-Year French II
FREN 211, Intermediate French I	FREN 201, Second-Year French I
FREN 212, Intermediate French II	FREN 202, Second-Year French II
GEOG 110, World Geography	GEOG 161, World Regional Geography
GEOG 115, Human Geography	GEOG 151, Human Geography
GEOG 314, Geography of North America	GEOG 262, Geography of North America
GEOL 120, Physical Geology	GEOL 105, Physical Geology
GEOL 121, Physical Geology Lab	GEOL 105L, Physical Geology Lab
GEOL 130, History of Life on Earth	GEOL 106, The Earth Through Time
GEOL 131, Historical Geology Lab	GEOL 106L, The Earth Through Time Lab
GERM 111, Elementary German I	GERM 101, First-Year German I
GERM 112, Elementary German II	GERM 102, First-Year German II
GERM 211, Intermediate German I	GERM 201, Second-Year German I
GERM 212, Intermediate German II	GERM 202, Second-Year German II
HPER 110, Lifetime Fitness & Activities	HPER 100, Concepts of Fitness & Wellness
HPER 139, Intro to Recreation	HPER 200, Intro to Parks & Recreation
HPER 140, First Aid—Responding to Emergencies	HPER 210, First Aid & CPR
HPER 145, Personal & Community Health	HPER 217, Personal & Community Health
HIST 110, United States History I	HIST 103, U.S. to 1877
HIST 111, United States History II	HIST 104, U.S. Since 1877
HIST 140, Survey of Western Civilization I	HIST 101, Western Civilization I
HIST 141, Survey of Western Civilization II	HIST 102, Western Civilization II
HIST 201, Intro to Public History	HIST 251, Intro to Public History
HIST 202, Intro to Museum Work	HIST 252, Intro to Museum Work
HIST 203, Archival Photography	HIST 253, Archival Photography
HIST 220, History of North Dakota	HIST 220, North Dakota History
HIST 230, Women in America	HIST 260, Women in America
HIST 231, American Indian History	HIST 261, American Indian History
HIST 235, Families in America	HIST 265, Families in America
HIST 237, U.S. Environmental History	HIST 267, U.S. Environmental History
HIST 238, Rural America	HIST 268, Rural America
HIST 257, The Cold War	HIST 257, The Cold War
HIST 259, Women in Eur Hist 1400-1800	HIST 259, Women in Eur Hist 1400-1800

Old Course Prefix, Number, Title	New Course Prefix, Number, Title
H&CE 341, Leadership & Presentation Tech	H&CE 341, Leadership & Presentation Tech
H&CE 381, Early Experience	H&CE 381, Early Experience
MCOM 112, Understanding Media	COMM 112, Understanding Media & Social Change
MCOM 210, Intro to Media Writing	COMM 200, Intro to Media Writing
MCOM 241, Intro to Photography	COMM 240, Intro to News Photography
MCOM 242, Photojournalism	COMM 242, Advanced News Photography
MATH 102, Intermediate Algebra	MATH 102, Intermediate Algebra
MATH 103, College Algebra	MATH 103, College Algebra
MATH 124, Finite Mathematics	MATH 104, Finite Mathematics
MATH 142, Trigonometry	MATH 105, Trigonometry
MATH 146, Calculus for Social & Life Sciences I	MATH 146, Applied Calculus I
MATH 147, Calculus for Social & Life Sciences II	MATH 147, Applied Calculus II
MATH 160, Univ Calculus I	MATH 165, Calculus I
MATH 161, Univ Calculus II	MATH 166, Calculus II
MATH 260, Univ Calculus III (with Vector Analysis)	MATH 265, Calculus III
MATH 261, Intro to Differential Equations	MATH 266, Intro to Differential Equations
MATH 327, Applied Linear Algebra	MATH 327, Applied Linear Algebra
MICR 110, Introductory Microbiology	BIOL 202, Introductory Microbiology
MICR 111, Introductory Microbiology Lab	BIOL 202L, Introductory Microbiology Lab
MICR 350, General Microbiology	MICR 350, General Microbiology
MICR 351, General Microbiology Lab	MICR 350L, General Microbiology Lab
MICR 460, Pathogenic Microbiology	MICR 460, Pathogenic Microbiology
MICR 461, Pathogenic Microbiology Lab	MICR 460L, Pathogenic Microbiology Lab
MUS 125, Fundamentals of Music	MUSC 101, Fundamentals of Music
MUS 126, Intro to Music Lit	MUSC 104, Intro to Music Lit to 1825
MUS 127, Intro to Music Lit: 1825-Present	MUSC 105, Intro to Music Lit: 1825-Present
MUS 128, Roots of Am Popular Music	MUSC 108, Roots of Am Popular Music
MUS 129, Intro to World Music	MUSC 201, World Music
MUS 140, Intro to Music Style & Literature	MUSC 103, Intro to Music History
NURS 361, Health Assessment	NURS 360, Health Assessment
PHIL 211, Intro to Philosophy	PHIL 101, Intro to Philosophy
PHYS 110, Astronomy	PHYS 110, Introductory Astronomy
PHYS 111, Astronomy Lab	PHYS 110L, Introductory Astronomy Lab
PHYS 118, Fundamentals of Physics	PHYS 120, Fundamentals of Physics PHYS 120L, Fundamentals of Physics Lab
PHYS 121, General Physics I	PHYS 211, College Physics I
PHYS 122, General Physics Lab I	PHYS 211L, College Physics I Lab
PHYS 123, General Physics II	PHYS 212, College Physics II
PHYS 124, General Physics Lab II	PHYS 212L, College Physics II Lab
PHYS 251, University Physics I	PHYS 251, University Physics I
PHYS 252, University Physics Lab I	PHYS 251L, University Physics I Lab
PHYS 253, University Physics II	PHYS 252, University Physics II
PHYS 254, University Physics Lab II	PHYS 252L, University Physics II Lab
PPTH 456, Tree Diseases	PPTH 456, Forest & Shade Tree Pathology
PLSC 110, World Food Crops	PLSC 110, World Food Crops
PLSC 210, Horticulture Science	PLSC 210, Horticulture Science
PLSC 215, Principles of Floral Design	PLSC 177, Floral Design I
PLSC 219, Prairie & Comm Forestry	PLSC 219, Intro to Prairie & Comm Forestry
PLSC 220, Principles of Crop Production	PLSC 225, Principles of Crop Production
PLSC 320, Principles of Forage Crop Production	PLSC 320, Principles of Forage Production
PLSC 323, Principles of Weed Science	PLSC 323, Principles of Weed Science
PLSC 365, Herbaceous Landscape Plants	PLSC 365, Herbaceous Landscape Plants
PLSC 368, Plant Propagation	PLSC 368, Plant Propagation
POLS 110, Intro to Political Science	POLS 110, Intro to Political Science
POLS 120, American Government	POLS 115, American Government
POLS 140, International Relations	POLS 220, International Politics
POLS 141, Terrorism	POLS 120, Terrorism
POLS 210, Political Ideologies	POLS 240, Political Ideologies
POLS 230, Judicial Process	POLS 230, Judicial Process
POLS 245, Current Politics	POLS 210, Current Politics
POLS 260, Prob & Policies in Am Gov & Politics	POLS 215, Problems & Policies in Am Gov
PSYC 110, Introductory Psychology	PSYC 111, Intro to Psychology
PSYC 213, Developmental Psychology	PSYC 250, Developmental Psychology
PSYC 231, Abnormal Psychology	PSYC 270, Abnormal Psychology

Old Course Prefix, Number, Title	New Course Prefix, Number, Title
REL 150, Intro to Religion	RELS 100, Intro to Religion
REL 220, The Old Testament	RELS 220, Old Testament
REL 230, The New Testament	RELS 230, New Testament
REL 243, Religion & Self	RELS 243, Religion & Self
REL 250, American Religious History	RELS 270, American Religious History
SOC 112, Intro to Sociology	SOC 110, Intro to Sociology
SOC 160, Intro to Criminal Justice	CJ 201, Intro to Criminal Justice
SOC 201, Social Problems	SOC 115, Social Problems
SOIL 210, Intro to Soil Science	SOIL 210, Intro to Soil Science
SOIL 321, Soil Management & Conservation	SOIL 321, Soil Mgt & Conservation
SOIL 322, Soil Fertility & Fertilizers	SOIL 322, Soil Fertility & Fertilizers
SPAN 111, Elementary Spanish I	SPAN 101, First-Year Spanish I
SPAN 112, Elementary Spanish II	SPAN 102, First-Year Spanish II
SPAN 211, Intermediate Spanish I	SPAN 201, Second-Year Spanish I
SPAN 212, Intermediate Spanish II	SPAN 202, Second-Year Spanish II
SPCM 110, Fund of Public Speaking	COMM 110, Fund of Public Speaking
SPCM 116, Interpersonal Communication	COMM 212, Interpersonal Communication
SPCM 150, Forensic Practice	COMM 150, Forensic Practice
SPCM 214, Persuasive Speaking	COMM 214, Persuasive Speaking
SPCM 216, Intro to Intercultural Communication	COMM 216, Intercultural Communication
SPCM 222, Voice and Articulation	COMM 222, Voice and Diction
SPCM 271, Listening & Nonverbal Comm	COMM 271, Listening & Nonverbal Comm
SPCM 281, Oral Interpretation	COMM 211, Oral Interpretation
SPCM 314, Argumentation & Debate	COMM 314, Argumentation & Debate
THTR 110, Intro to Theatre Arts	THEA 110, Intro to Theatre Arts
THTR 150, Theatre Practice	THEA 201, Theatre Practicum
THTR 161, Acting I	THEA 161, Acting I
THTR 260, Acting II	THEA 261, Acting II
THTR 270, Intro to the Technical Theatre I	THEA 270, Stagecraft
x98, Seminar	x91, Seminar
x94 Study Abroad	x92, Study Abroad
x97, Individual Study	x94, Individual Study
x95, Field Experience	x96, Field Experience
x95, Cooperative Education	x97, Cooperative Education
x96, Special Topics	x99, Special Topics

Note: Common Course Number (CCN) matrix index Web site: www.ndscs.nodak.edu/nduscat/

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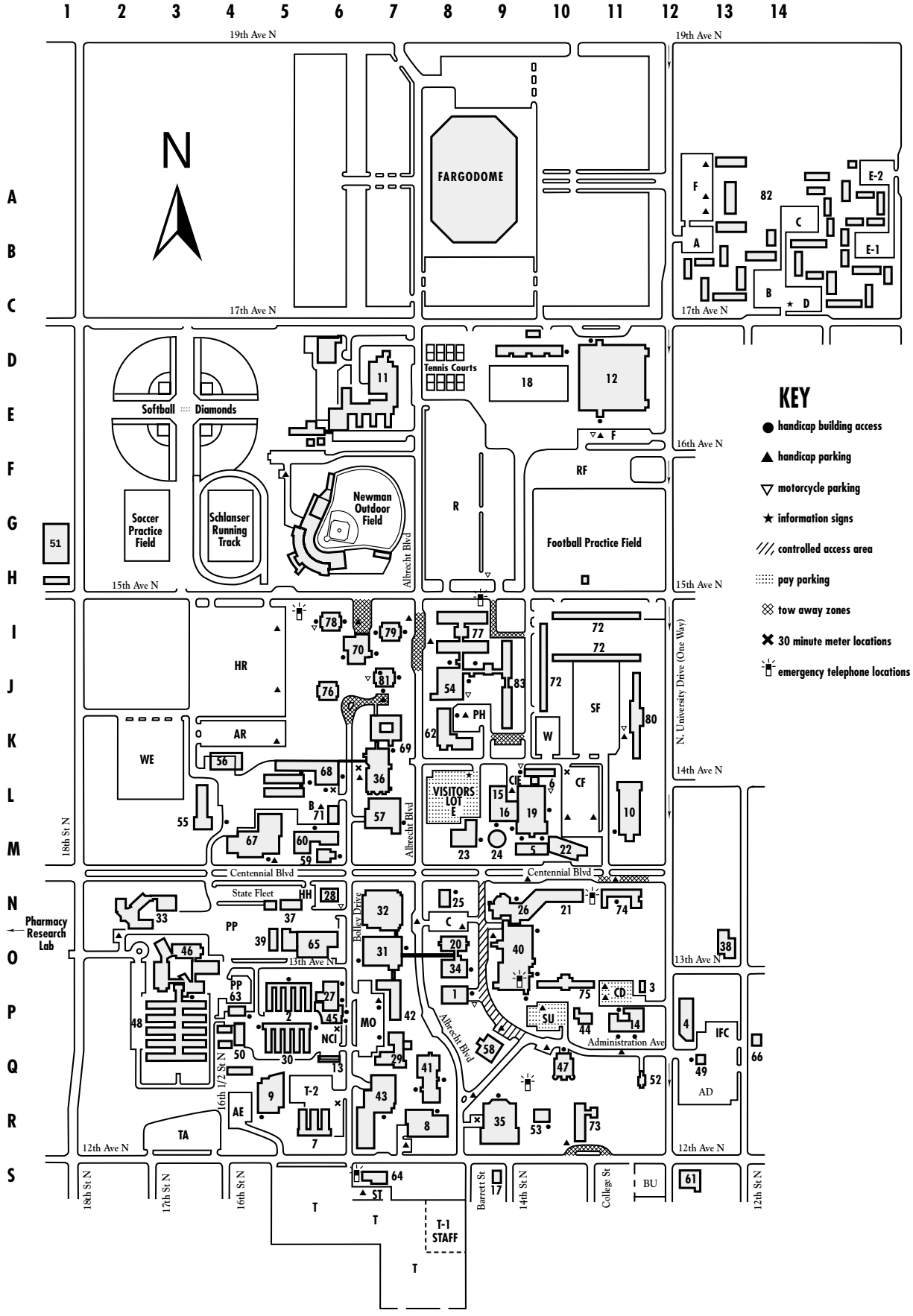
North Dakota State University



Directory

P8 1 Agricultural and Biosystems Engineering
P5 2 Agronomy Greenhouse Plant Diagnostic Lab
P11 3 Alba Bales House (Family Studies Institute)
P12 4 Alumni, Development Center
M10 5 Architecture and Landscape Architecture
K10 6 Architecture Quonset
R6 7 Art
R7 8 Askanase Hall (Little Country Theatre)
Q5 9 Auxiliary Enterprises (Dining Services and Residence Life)
L11 10 Bentson/Bunker Fieldhouse (HPER, Athletics, ROTC)
D7 11 Biosciences Research Laboratory
D11 12 Bison Sports Arena (HPER, Athletics, Sports Information, Campus Recreation/Intramural)
Q6 13 Campus Laundry
P11 14 Ceres Hall—(Admission, Financial Aid, Counseling and Disability Services, Career Center, Registrar, Student Academic Affairs, Cooperative Education, International Programs, Project Success)
L9 15 Civil and Industrial Engineering
L9 16 Construction Management
S9 17 Credit Union (Northland Educators)
D9 18 Dacotah Field
L10 19 Dolve Hall (Mechanical Engineering)
O8 20 Dunbar Laboratories (Biochemistry, Polymers and Coatings)
N10 21 E. Morrow Lebedeff Hall (Human Development and Education)
M10 22 Ehly Hall (Architecture and Landscape Architecture)
M8 23 Electrical and Computer Engineering
M9 24 Engineering Center
N8 25 Engineering and Technology
N9 26 Katherine Kilbourne Burgum Family Life, 4-H Center (Education)
P6 27 Harris Hall (Cereal Science)
N6 28 Hastings Hall (Herbarium, IBID)
Q7 29 Heating Plant
P5 30 Horticulture and Plant Pathology Greenhouse
O7 31 Hultz Hall (Animal and Range Sciences, Entomology)
N7 32 Industrial Agriculture and Communications Center (Information Technology Services, Computer Network, Computer Science, and Industrial Agriculture)
N2 33 Johansen Hall (State Seed Dept., Seed Research)
O8 34 Ladd Hall (Chemistry)
R9 35 Library
K7 36 Loftsgard Hall (Plant Sciences)
N5 37 Longwell Building
P5 2 Lord and Burnham Greenhouses
O13 38 Lutheran Student Center
O5 39 Maintenance Buildings
O9 40 Memorial Union (Varsity Mart)
P10 SU Metered Parking Lot
Q8 41 Minard Hall (Arts, Humanities and Social Sciences)
P7 42 Morrill Hall (Agriculture, Ag. Econ., University Studies)
R7 43 Music Education Building (Festival Concert Hall)
P10 44 Nelson Health Center
P6 45 Northern Crops Institute
O3 46 Northern Crops Science Lab (sunflowers, sugar beets)
S9 17 Northland Educators Federal Credit Union
Q10 47 Old Main (Administration, Business Office, Student Affairs, University Relations)
P5 2 Plant Sciences Greenhouse
P2 48 Plant Sciences Greenhouse
Q13 49 Post Office
P4 50 Potato Research-Pesticide Storage
G1 51 Poultry Research Center
Q11 52 President's House
R10 53 Putnam Hall (Business)
R7 43 Reineke Fine Arts Center (Music)
J8 54 Residence Dining Center
L4 55 Robinson Hall (Veterinary Research)
K4 56 Service Center, Pilot Plant
L7 57 Shepperd Arena
Q9 58 South Engineering (Physics)
M6 59 Stevens Auditorium
M6 60 Stevens Hall (Natural Sciences)
S12 61 St. Paul's Chapel (Newman Center)
K8 62 Sudro Hall (Pharmacy, Nursing)
P4 63 Sugar Beet Research
S7 64 Thordarson Hall (Independent Study, State Film Library)
O6 65 Thorson Maintenance Center (Physical Plant)
Q14 66 United Campus Ministry, YMCA of NDSU
M5 67 Van Es (Vet Science, Microbiology)
L6 68 Waldron Laboratory (Agriculture, Soil Testing Lab, Statistics)
K7 69 Walster Hall (Agriculture)
I6 70 West Dining Center
L6 71 Wiidakas Lab (Plant Sciences, Corn Seed House)

Housing Units

I10 72 Bison Courts
R10 73 Burgum Hall
N11 74 Churchill Hall
P10 75 Dinan Hall
J6 76 Pavek Hall
I8 77 Reed-Johnson Halls
I6 78 Seim Hall
I7 79 Sevrinson Hall
K11 80 Stockbridge Hall
J7 81 Thompson Hall
A14 82 University Village
J9 83 Weible Halls (North and South)

Selected Offices

P11 14 Admission (Ceres Hall)
Q10 47 Business Office (Old Main)
P11 14 Career Center (Ceres Hall)
P11 14 Counseling and Disability Services (Ceres Hall)
Q5 9 Dining Services (Auxiliary Enterprises)
P11 14 Financial Aid (Ceres Hall)
Q5 9 Residence Hall (Auxiliary Enterprises)
Q10 47 Human Resources (Old Main)
P11 14 Registrar, Student Academic Affairs (Ceres Hall)
Q10 47 Student Affairs (Old Main)
06 65 NDSU Police (Thorson Maintenance Center)
09 40 Varsity Mart (Memorial Union)