ENGINEERING PROGRAMS

Many new college students are undecided on the particular branch of engineering in which they wish to enroll and want to explore different areas. The purpose of the engineering studies program is to give new students the opportunity to become better acquainted with the engineering profession and its various disciplines, and to prepare them academically for entry into a specific engineering curriculum.

After deciding on a major, students may transfer to whatever discipline in engineering they choose. The transfer should be made within the first year of course-work at North Dakota State University. In order to transfer to a specific major, a minimum grade point average (GPA) of 2.0 is required, except for computer engineering and electrical engineering, which require a 2.3 GPA. Construction engineering requires a 2.5 GPA and mechanical engineering requires a 2.8 GPA. The engineering programs available at NDSU are listed below. Specific fact sheets describing these engineering majors are available from the Office of Admission.

Engineers are employed in every major industry in every state, in small and large cities, and in rural areas. Engineers work in manufacturing, infrastructure engineering for buildings and public facilities, and in scientific research and development services. Many engineers work in the construction, transportation, telecommunications and utilities industries. Federal, state and local governments are major employers of engineers. For example, federal engineering employers include the U.S. Departments of Defense, Transportation, Agriculture, Interior, and Energy as well as the National Aeronautics and Space Administration. Most engineers in state and local government agencies work in highway and public works departments. Many engineers are self-employed as consultants.

Agricultural and Biosystems Engineering - The agricultural and biosystems engineering program prepares men and women for careers requiring application of physical, biological and engineering sciences to problems that involve living systems. Agricultural and biosystems engineers solve problems related to the production, handling and processing of biological materials for food, feed, fiber and fuel; the preservation of natural resources, and environmental quality; and the design and production of machine systems. Agricultural and biosystems engineering integrates engineering topics, engineering design and biological sciences in a single program with two concentrations: agricultural engineering and biosystems engineering. A major in agricultural and biosystems engineering can serve a broad range of career interests.

Civil Engineering - Civil engineers plan and design the infrastructure that supports modern living. This includes planning and design for airports, canals, harbors, roads, bridges, railroads, water and wastewater treatment facilities, water supply and solid waste disposal facilities. Civil engineers are often involved with architectural projects by providing structural system and foundation designs for buildings. In addition to consulting engineering firms, civil engineers are commonly employed with cities, state departments of transportation and federal agencies such as the Corps of Engineers.

Computer Engineering - The rapid advances in computer technology are largely a result of the research, development and design efforts of computer hardware engineers. Computer engineers apply engineering principles and methods to the design and development of the digital systems hardware and software, including the interface between them and the other physical devices that comprise a system. Computer engineers work for manufacturing, telecommunications and advanced technology companies.

Areas of specialization for computer engineering:

Biomedical Engineering -- Biomedical engineering is firmly based in engineering and in the life sciences. It integrates medicine and engineering in the effort against illness and disease by providing appropriate products, tools and techniques for research, diagnosis and treatment by healthcare professionals.

Computer Architecture/Digital VLSI -- VLSI designers and computer architects design computer system hardware, including how the CPU communicates with various types of memory, and high-performance multi-processor systems. VLSI design focuses on the lower levels of abstraction: transistor-level and physical-level design; whereas computer architecture focuses on the higher levels of abstraction: architecture and gate-level design.

Cyber Physical Systems -- Cyber physical systems deals with the interaction of computing elements monitoring/controlling physical entities, often in a large network.

Embedded Systems -- Embedded systems deals with the design of a dedicated computer system to perform a specific task, often requiring real-time constraints. An example is a smartphone.

Computer Systems -- Computer systems deals with the close interaction between a system's hardware and software.

Construction Engineering - Construction engineering deals with the planning, design and management of construction projects, such as buildings, highways, bridges, airports, railroads, dams and reservoirs. Construction engineers are involved in the design of permanent and temporary structures, cost estimating, project scheduling and control, materials procurement and selection of equipment. Construction engineers must be well versed in engineering design and management principles, business practices, financing and economics, and human behavior.

Electrical Engineering - Electrical engineers design, develop, test and supervise the manufacture of electrical and electronics equipment. Some of the equipment includes electric motors, machinery controls, automobiles, aircraft, radar and navigation systems, and power-generating and transmission devices used by electric utilities. Electrical engineers specialize in areas such as biomedical, power systems engineering, electrical equipment manufacturing, communications, signal processing, control systems or aviation electronics. Electrical engineers work in a wide variety of manufacturing and engineering companies.

Industrial Engineering and Management - Industrial engineers are involved in the design and implementation of better, more productive systems in both a manufacturing and a service environment. Industrial engineers design, install, fabricate and integrate systems that include people, materials, information, equipment and energy necessary to accomplish the desired function. Industrial engineers often are responsible for productivity

improvements, supply chain optimizations, project management feasibility studies for new technologies and applications, lean and just-in-time implementation, health care management and logistics, and systems integration and engineering. Whether it's streamlining an operating room, managing a worldwide supply chain, manufacturing and designing automobiles, or solving logistics problems, industrial engineers are involved in the process. The main areas of employment are in manufacturing, service and consulting.

Manufacturing Engineering - Manufacturing engineers design, direct and coordinate the processes and systems for making virtually every kind of product—from beginning to end. Manufacturing engineers apply scientific principles to the production of goods to make products better and at a lower cost. They are key team members in the production of a wide range of products: automobiles, airplanes, tractors, electronics, surgical instruments, toys, building products, foodstuffs, and sports and recreational equipment. In all cases, manufacturing engineers design the processes and systems to make products with the required functionality, to high quality standards, in ways that are environmentally friendly, and available when and where customers prefer at the best possible price.

Mechanical Engineering - Mechanical engineers research, develop and design machinery, and test tools, engines, machines and systems that function safely and reliably. From huge turbines and internal combustion engines to miniature robots, mechanical engineers are involved in their design and manufacture. Mechanical engineers also design technology for heating, ventilating and refrigeration systems, as well as material handling systems, elevators and escalators needed in modern buildings. Mechanical engineers also design the tools that other fields of engineering need to perform their work. Mechanical engineers often work for consulting firms, manufacturing firms and various government agencies.

Advising

The industrial and manufacturing engineering department provides advisement to students interested in the general field of engineering, but who have not yet declared a specific discipline. Students who want to begin in engineering studies are placed in pre-industrial engineering and management (IEM). This designation of pre-IEM does not mean students are admitted to industrial engineering and management as a major field of study. Rather, it is intended for initial placement into the College of Engineering.

Engineering students are encouraged to enroll in the Introduction to Engineering course (ENGR 111) to learn about the different engineering programs offered at NDSU. Students must meet with their advisors and instructors regularly to discuss career interests and ask questions pertaining to field of study options. Engineering students are encouraged to attend the meetings of student-run engineering clubs and organizations where they will interact with their classmates, alumni and professionals from various engineering disciplines. Many of these clubs and organizations participate in yearly competitions with students from other engineering programs from across the country.

Every September, the NDSU Career Center hosts the Engineering & Tech Expo. This event draws engineering companies from around the country to NDSU with the purpose of recruiting students for internships and full-time positions. By attending the event, engineering students engage with potential future employers and are provided the opportunity to gain further information on career possibilities in the engineering field.

Sample Curriculum

First Year	Credits F	Credits S
CHEM 121, 121L - General Chemistry I and Lab	3, 1	-
CHEM 122, 122L - General Chemistry II and Lab	-	3, 1
ENGL 110, 120 - College Composition I, II	3	3
*ENGR 111 - Introduction to Engineering	1	-
**MATH 165, 166 - Calculus I, II	4	4
ME 221 - Engineering Mechanics I	-	3
UNIV 189 - Skills for Academic Success	1	-
Humanities and Fine Arts or Social and Behavioral Sciences Elective	-	3
Wellness Elective	2	-
Total	**15**	**17**

*Each department has an introduction course that is typically taken during the freshman year.

**Students who are not prepared for MATH 165 - Calculus I or MATH 166 - Calculus II may need to take MATH 103 - College Algebra and/or MATH 105 - Trigonometry, depending on their ACT math subscore, math placement exam results or transfer course work.

This sample curriculum is not intended to serve as a curriculum guide for current students, but rather an example of course offerings for prospective students. For the curriculum requirements in effect at the time of entrance into a program, consult with an academic advisor or with the Office of Registration and Records.

For Further Information

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