

Civil Engineering

Department Information

- **Department Web Site:**
www.ndsu.edu/ccee/ (<http://www.ndsu.edu/ccee/>)
- **Credential Offered:**
 B.S.C.E.
- **Official Program Curriculum:**
catalog.ndsu.edu/undergraduate/program-curriculum/civil-engineering/ (<http://catalog.ndsu.edu/undergraduate/program-curriculum/civil-engineering/>)

Civil engineers are professionals who have broad technical knowledge, possess strong problem-solving skills, and enjoy working with people. The civil engineers work is directly related to public well-being and safety and has a significant impact on decision-making and planning processes. Civil engineers design solutions for the infrastructure of society and the environment in which we live.

Projects may include designing structures such as buildings, bridges, and sports stadiums; transportation infrastructure such as highways, railroads, pipelines, waterways, ports, and airports; water infrastructure like pipes, dams, and drainage; safe drinking water supply and waste systems; and averting damage from earthquakes, landslides and floods. The profession embraces new technologies such as nanotechnology, smart materials, sensors, robotics, etc. that are introduced into civil engineering projects to improve reliability, cost-effectiveness, and quality of life.

NDSU civil engineering graduates apply their skills in all fields of the profession domestically and abroad. With a strong and balanced technical and general education curriculum, they are highly sought by companies from all over the country at competitive salaries. The Bachelor of Science in Civil Engineering program is accredited by the Engineering Accreditation Commission of ABET, <https://www.abet.org>, under the commission's General Criteria and Program Criteria for Civil and Similarly Named Engineering Programs. In addition, a new 4+1 accelerated Master's degree in civil engineering started in Fall 2021, which provides a path for excellent undergraduate students to complete a BS degree in the department and a Master's degree in Civil Engineering in 5 years.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

The following program educational objectives are consistent with the university, college and department missions. Graduates of our BS program in Civil Engineering program are expected within a few years of graduation to:

1. Engage successfully in the practice of engineering to solve current and emerging problems.
2. Conduct design in a manner that is ethical, includes diverse perspectives, and realizes the broader societal and sustainability implications of the design and decision-making process.
3. Ascend to leadership roles within the workplace via initiative and responsible stewardship
4. Advance their profession and communities through collaborative work, professional licensure, advanced degrees, lifelong learning, and engaged service.

STUDENT OUTCOMES (SO)

When graduated, students in the Civil Engineering program will have:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

CURRICULUM

First-year civil engineering students at NDSU begin their education with fundamental courses in English, chemistry, mathematics, and an introduction to the engineering sciences. Second-year courses become more specific with an emphasis on surveying, mathematics, physics, and engineering science courses. The third-year students preview the specialization areas of civil engineering. These are (1) environmental engineering, (2) geotechnical, (3) structural, (4) transportation, and (5) water resources. The senior year continues to require certain courses but also provides 12 hours of technical electives and a senior design project. The technical electives allow the student to take additional courses in those areas of civil

engineering in which she/he/they intend to practice professionally. Currently, there are 51 core civil engineering and technical elective courses from which the student may choose.

Accelerated PROGRAM

The accelerated program provides opportunities for current students in the Civil Engineering program to complete a Master's degree in Civil Engineering (MSCE) in 5 years (one additional year beyond the BS degree). The accelerated Master's program requires at least a total of 30 semester credits. Up to 9 credits (three courses) from the Civil Engineering BS program can be double counted to the MSCE program. However, these courses must be taken at the 600- or 700-level. In that sense, the interested students could accelerate the Master's study by reducing three courses, so they could complete the remaining 21 credits plus the completion of the Master's thesis and graduate in one year, while the total and design credit requirements for the technical elective courses stay the same for the Civil Engineering BS degree.

FACULTY

The department has well-qualified and dedicated faculty members. They are nationally and internationally recognized experts, with the knowledge and experience to prepare graduates for successful careers. All faculty members in the department have a doctoral degree. Many are licensed as a Professional Engineer (PE) or Certified Professional Contractor (CPC). In addition, the department has many adjunct faculty members who worked or are currently working in the industry.

FACILITIES

The department has excellent laboratory facilities for undergraduate education across all civil, environmental, and construction areas, including the teaching laboratories for civil engineering materials, construction management and engineering, environmental engineering, geotechnical engineering, structural engineering, transportation engineering, and water resources engineering. Students also have access to computer clusters and many state-of-the-art research laboratories.

STUDENT ORGANIZATIONS

Students participate in various professional student organizations in the department, which helps them develop leadership skills and the ability to work in teams. The major student organizations include: American Indian Science and Engineering Society (AISES), American Railway Engineering and Maintenance-of-Way Association (AREMA), American Society of Civil Engineers (ASCE), American Water Works Association (AWWA), Associated General Contractors of America (AGC), Engineers Without Borders (EWB), Grand Challenge Scholars of NDSU, Habitat for Humanity, Institute of Transportation Engineers (ITE), Materials Research Society (MRS), National Association of Home Builders (NAHB), National Society of Black Engineers (NSBE), Sigma Lambda Chi (ΣΛΧ), Society of Women Engineers (SWE), and Water Environment Federation (WEF), as well as Steel Bridge, Concrete Canoe, Associated Schools of Construction, Residential Construction Management, GeoWall, and Quiz Bowl competition teams. The student organizations have won several national and regional awards.

PREPARATION

High school students who wish to prepare for some phase of engineering at the college level should attempt to complete the following high school credits: one unit of physics, four units of mathematics, and one unit of chemistry. Incoming freshmen prepared to enroll in calculus frequently complete their civil engineering degree in four years. Transfer students who have studied two years of pre-engineering at another institution typically complete the civil engineering degree in two additional years.

SCHOLARSHIPS AND FINANCIAL AID

The department awards numerous scholarships each year, which mostly range from \$500 to \$10,000. Students should check with the department for more information. Other forms of financial aid are available through the Office of Financial Aid and Scholarships.

CAREER OPPORTUNITIES

NDSU civil engineers are widely regarded as hands-on, can-do, project-ready graduates, who are very successful in finding excellent jobs. Our students are highly sought for internships and co-ops, with most students having completed multiple work experiences. Most have selected a job before graduation and others within a few weeks of graduation. The work varies with the type of activity and location. Civil engineers can work in the office and/or in the field. They can work primarily on intricate designs or with people in management or sales.

Job placement of recent NDSU civil engineering graduates indicates a variety of work experience. About 40 percent of the graduates have gone to work for consulting engineering firms and another 40 percent with city, state government, and federal governments. The remainder are employed by industry, contractors, and the military or have gone to graduate school at NDSU or other universities. Most graduates are involved in more than one type of civil engineering activity. Job placement of graduates seeking employment is 98-100 percent in recent semesters. The starting annual salaries for recent civil engineering graduates were between \$65,000 and \$85,000. The U.S. Bureau of Labor Statistics projects a 5-percent growth in employment for civil engineers from 2022 to 2032 which is above the average growth rate for all occupations (3 percent).

Graduate programs leading to Master of Science (MS) and Doctor of Philosophy (Ph.D.) degrees are available in specialized fields. For more complete details, see the [Graduate Bulletin \(http://catalog.ndsu.edu/graduate/\)](http://catalog.ndsu.edu/graduate/) online.