

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 Engineering is one of the four undergraduate degree programs in the Department of Civil, Construction and Environmental Engineering. The vision of the department is to impact people and communities through creation of globally relevant knowledge, innovators and future opportunity builders. We dare to change the world: we educate students to become global leaders in our field; we solve existing and emerging challenges of the world through innovation and research excellence; we integrate the complexities of design, management, and practice to solve societal problems and create opportunities; and we serve all people and communities in North Dakota and beyond.

Would you like to make this world a better place to live, and improve the quality of life for all of us? You could do just that by choosing a career in civil engineering. We design sustainable solutions to societal challenges today and into the future.

THE PROGRAM

Civil engineers are professionals who have broad technical knowledge, possess strong problem-solving skills and enjoy working with people. Our work is directly related to the public wellbeing and safety, and has a significant impact on decision making and planning processes. We design solutions for the infrastructure of society and the environment in which we live. Civil engineering 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> (<https://www.abet.org/>), under the General Criteria and the Civil and Similarly Named Engineering Programs Program Criteria. 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, math and an introduction to the engineering sciences. Second year courses become more specific with an emphasis in surveying, math, 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 for 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 intends to practice professionally. Currently, there are 51 core civil engineering and technical elective courses from which the student may choose.

4+1 PROGRAM

The BSCE + MSCE (4+1) program provides the opportunities for current students in the Civil Engineering program to complete a Master's degree of 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 in 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.

A separate application to the 4+1 program is required. Applicants can apply for their admissions in the junior year (having accumulated more than 75 credits) with an average cumulative GPA above 3.5. The review procedure for applications will follow the existing policy of Master's degree graduate student admissions.

Application procedure:

- Interested and eligible students must submit a Combined/Accelerated Program Degree Program Declaration (<https://www.ndsu.edu/fileadmin/facultysenate/ucc/accelerated-programs.pdf>) form to the department office.
- Next, the student's academic advisor will evaluate the substitution of the graduate level courses into the undergraduate program, followed by the final review and approval from the Department Chair. A maximum of 9 graduate student credits* may be applied to the undergraduate degree.
- After receiving the necessary approvals noted above, the student will submit this form to the Graduate College and formally apply for admission to the graduate program.
- All admissions to the Graduate College will be conditional. The minimum condition is completion of the Bachelor's degree prior to full standing in the Master's program, and maintaining a 3.0 cumulative GPA in their graduate classes.
- No undergraduate course may be counted toward a Master's degree.
- Students entering the Master's degree program with a Bachelor's degree in hand may not use courses earned as part of the Bachelor program for the Master's degree requirements, even if those courses were graduate level courses.
- Students must meet all of the requirements that would ordinarily be expected of those enrolled in the MSCE program.

* Graduate tuition will be assessed for graduate credits approved for double-counting toward requirements for both undergraduate and graduate programs of study. Double-counted graduate credits count toward totals for financial aid, but are not covered under the tuition cap. Mandatory student fees, however, are capped at 12 credits, regardless of program.

** Note: A substitution form is required for the 600/700-level courses to officially apply to the BS degree. This is submitted after they have enrolled in the class(es).

Students in the Civil Engineering program also have an option to obtain a Master's degree through the 4+1 accelerated BSCE + MCM program, which requires at least a total of 30 course credits plus a professional exam. Up to 9 credits (three courses) from the Civil Engineering BS program can be double counted to the Master of Construction Management (MCM) program. These courses must be taken in the 600 or 700 level and students can complete the accelerated program in five years. The total number of credits and design credits (from technical elective courses) required for the Civil Engineering BS degree remain the same.

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 of them 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 ($\Sigma\Lambda\chi$), 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 a number of 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 in regard to type of activity and location. Civil engineers can work in the office and/or in the field. They can work primarily with a number of 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 and federal government. 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. Some students accept jobs in which they are not involved in a specific civil engineering activity, but use their engineering background in other activities. Job placement of graduates seeking employment is 98-100 percent in recent semesters. The starting annual salaries accepted by recent civil engineering graduates were between \$53,000 and \$75,000 (average salary around \$60,000-65,000).

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

Sample Program Guide

IMPORTANT DISCLAIMER: A Sample Program Guide provides an unofficial guide of program requirements and should be used by prospective students who are considering attending NDSU in the future. It is NOT an official curriculum and should NOT be used by current NDSU students for official degree planning purposes. Note that the official curriculum used by current NDSU students can vary from the Sample Program Guide due to a variety of factors such as, but not limited to, start year, education goals, transfer credit, and course availability.

To ensure proper program completion, enrolled students should utilize Degree Map (<https://www.ndsu.edu/registrar/degreemap/>) and Schedule Planner (<https://www.ndsu.edu/onestop/degree-map-and-planning/>) in Campus Connection and consult regularly with their academic advisor to ensure requirements are being met.

Freshman			
Fall	Credits	Spring	Credits
CE 111		1 CE 112	1
CHEM 121		3 CHEM 122	3
CHEM 121L		1 CHEM 122L	1
ENGL 110		3 COMM 110	3
ENGL 120		3 MATH 166	4
MATH 165		4 ME 221	3

		ENGR 311	3
		15	18
Sophomore			
Fall	Credits	Spring	Credits
CE 204		3 IME 460	3
CE 212		3 MATH 266	3
GEOL 105		3 ME 223	3
MATH 128		1 PHYS 252	4
MATH 259		3 Gen Ed Wellness	2
ME 222		3	
		16	15
Junior			
Fall	Credits	Spring	Credits
CE 309		3 CE 303	2
CE 316		3 CE 303L	1
ENGL 321		3 CE 343	4
ME 350		3 CE 370	3
ENGR 327		3 CE 371	1
		CE 408	3
		CE 418	4
		15	18
Senior			
Fall	Credits	Spring	Credits
CE 310		1 CE 483	3
CE 404		3 CE 489	3
CE 444		3 IME 440	2
Gen Ed Social & Behavioral Sciences		3 Technical Elective	3
Gen Ed Social & Behavioral Sciences and Global Perspectives		3 Technical Elective	3
Technical Elective		2 Technical Elective	2
Technical Elective		2	
		17	16

Total Credits: 130

DEGREE NOTES:

- No grades less than a "C" are accepted in any of the math courses.
- Students must complete courses in a minimum of three technical areas with a minimum of 6 credits in design for a minimum total of 12 technical electives.