

Environmental Engineering

Department Information

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

Environmental Engineering is one of the four undergraduate degree programs in the Department of Civil, Construction and Environmental Engineering (CCEE). The vision of the department is to impact people and communities through the 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 fields; 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 by focusing on the interactions between humans and the environment? You could make a difference by choosing a career in environmental engineering. We design sustainable solutions to societal challenges today and into the future.

THE PROGRAM

In general, environmental engineers integrate and apply biological, chemical, and engineering principles to improve and sustain the environment for the protection of its ecosystems, human health, and environmentally-related enhancement of the quality of life. The discipline focuses on water and wastewater treatment system design and public health protection; traditional and emerging contaminant mitigation in water, soil, and air; ecological principles in the design process; green manufacturing; and sustainable design. Environmental engineers will play a crucial role in numerous 21st-century challenges, including sustainably supplying food, water, and energy; designing a future without pollution and waste; creating efficient, healthy, and resilient cities; fostering informed decisions and actions; and, curbing climate change and adapting to its impacts.[1] Environmental engineers are professionals who have broad scientific and technical knowledge, possess strong problem-solving and design skills, and enjoy working with people. Our work is directly related to public and environmental health and well-being, and we have a significant impact on decision-making and planning processes. NDSU's B.S. in Environmental Engineering degree program began accepting students in fall 2020. Its graduates will be sought by companies nationally at competitive salaries, and they will apply their skills in all fields of the profession domestically and abroad. The graduates will most certainly put their education to good use, bettering themselves and the world in which they live.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

The following program educational objectives are consistent with the university, college and department missions. Graduates of our B.S. in Environmental 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)

The B.S. in Environmental Engineering degree program has the following student outcomes:

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 environmental engineering students at NDSU begin their education with fundamental courses in English, chemistry, mathematics, introduction to environmental engineering, design and analysis methods and tools, and engineering science. Second-year courses emphasize environmental engineering fundamentals, microbiological principles, fluid mechanics, graphic communications, mathematics, statistical analyses, and engineering science courses. During the third year, students gain exposure and knowledge in sustainable design, unit operations and processes, fate, and transport of pollutants, soil mechanics, environmental chemistry, ethics, water resources, physics, and three hours of technical electives. The senior year focuses on specialized courses in air pollution, solid and hazardous waste management, water and wastewater treatment and design, hydrology, a one-year capstone senior design experience, and nine hours of technical electives. The technical electives allow the student to take additional courses in those areas of environmental engineering/science in which she or he intends to practice professionally.

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 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 many professional student organizations in the department, which helps them develop leadership and teamwork skills. The major student organizations include the American Railway Engineering and Maintenance-of-Way Association (AREMA), the American Society of Civil Engineers (ASCE), the American Water Works Association (AWWA), Associated General Contractors (AGC), the Institute of Transportation Engineers (ITE), Materials Research Society (MRS), National Association of Homebuilders (NAHB), Sigma Lambda Chi, 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. Students may also participate in several student organizations within the College of Engineering, including the American Indian Science and Engineering Society (AISES), Engineers Without Borders (EWB), Grand Challenge Scholars of NDSU, Habitat for Humanity, National Society of Black Engineers (NSBE), Society of Women Engineers (SWE). The student organizations have won several national and regional awards.

PREPARATION

High school students who wish to prepare for college engineering should attempt to complete the following high school credits: one unit of physics, four units of math, and one unit of chemistry. Nationally, incoming first-year students who come prepared to enroll in calculus frequently complete their environmental engineering degree in 4 years. Students who have studied two years of pre-engineering at another institution can normally complete the environmental 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 environmental engineering students will be highly sought for internships and co-ops, with most students having completed multiple work experiences. Graduates from the program will be widely regarded as hands-on, can-do, project-ready professionals, who will be very successful in finding excellent jobs. Most students will have selected a job before graduation and others within a few weeks of graduation. The work varies with the type of activity and location. Environmental engineers can work in the office, in the field, or a combination of the two. They can work primarily with several intricate designs or with people in management or sales. Environmental engineering graduates normally go to work at consulting firms, governmental (state and federal) agencies, nonprofits/NGOs, or industry. The academic curriculum also prepares environmental engineering graduates for graduate school, law school, and/or an MBA program.

Since this degree program began in the fall semester of 2020, job placement data are not currently available. The median pay for environmental engineers in the US is \$96,530 per year (2022). The U.S. Bureau of Labor Statistics projects a 6-percent growth in employment for environmental engineers from 2022 to 2032 which is above the average growth rate for all occupations (3 percent).

[1] National Academies of Sciences, Engineering, and Medicine. 2019. Environmental Engineering for the 21st Century: Addressing Grand Challenges. Washington, DC: The National Academies Press.

Sample Program Guide

IMPORTANT DISCLAIMER: This guide is not an official curriculum. This guide is a sample four-year degree plan of how students might plan this major with other degree requirements to complete their education in four years. Student plans will vary from this sample due to a variety of factors, such as, but not limited to, start year, education goals, transfer credit, and course availability. To ensure proper degree 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 academic advisors to ensure graduation requirements are being met.

Freshman			
Fall	Credits	Spring	Credits
ENVE 111		1 ENVE 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
		Gen Ed Social & Behavioral Sciences	3
		15	18
Sophomore			
Fall	Credits	Spring	Credits
ENVE 250		3 ENVE 240	3
CE 212		3 CE 309	3
CHEM 240		3 IME 460	3
GEOL 105		3 MATH 128	1
MATH 259		3 MATH 266	3
ME 222		3 ME 223	3
		Gen Ed Wellness (W)	2
		18	18
Junior			
Fall	Credits	Spring	Credits
ENVE 360		3 ENVE 412	2
ENVE 370		3 ENVE 450	1
CE 310		1 ENVE 460	3
CE 316		3 CE 408	3
ENGL 321		3 ENGR 311	3
ENGR 327		3 PHYS 252	4
		16	16
Senior			
Fall	Credits	Spring	Credits
ENVE 488		2 ENVE 489	2
CE 410		3 ENVE 473	3
CE 472		3 Category One Technical Elective	3
CE 477		3 Category Two Technical Elective	3
IME 440		2 Gen Ed Social & Behavioral Sciences/Cultural Diversity	3

Category One Technical Elective	3	
	16	14

Total Credits: 131

Degree Notes:

- No grades less than a "C" are accepted in any of the math courses for this curriculum.
- Some courses have pre-requisites that must be satisfied before a student can enroll.
- Some courses require the approval of the department offering prior to enrolling.