

## ENVIRONMENTAL ENGINEERING

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. 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.

### The Program

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 the public and environmental health and well-being, which has a significant impact on decision making and planning processes.

The environmental engineering major, housed in the Department of Civil and Environmental Engineering, is beginning 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.

### Mission

The mission of the Department of Civil and Environmental Engineering is to:

1. Provide quality education to prepare nationally competitive undergraduate students for successful careers in civil and environmental engineering
2. Provide advanced skills and knowledge in state-of-the-art research and design in sub-areas of civil and environmental engineering for graduate students
3. Provide service to the university, engineering profession, and the public

### Program Educational Objectives

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.

### A Flexible Curriculum

First year environmental engineering students at NDSU begin their education with fundamental courses in English, chemistry, math, introduction to environmental engineering and design and analysis methods and tools, and engineering science. Second-year courses emphasize environmental engineering fundamentals, microbiological principles, graphic communications, math and 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 fourth year focuses on specialized courses in air pollution, solid and hazardous waste management, water and wastewater treatment and design, and hydrology; a one-year capstone senior design experiences, and six 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 who 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. All classes are taught/assessed by full-time professors, and supplemented by lectures from leaders from the industry.

### Modern, Well-Equipped Facilities

The department has excellent laboratory facilities for undergraduate education and research, including the new undergraduate laboratories for water resources and environmental engineering, laboratories, and several state-of-the-art research laboratories.

### Student Organizations

Students participate in several professional departmental student organizations, which helps them develop leadership and teamwork skills. The NDSU American Water Works Association (AWWA) and the Water Environment Federation (WEF) student chapter has won 2 national design competitions. Students may also participate in a number of student organizations within the College of Engineering, including Engineers Without Borders (EWB), Society of Women Engineers (SWE), National Society of Black Engineers (NSBE), and American Indian Science and Engineering Society (AISES).

### Career Opportunities

NDSU environmental engineering students will be highly sought for internships and co-ops, with most students having completed

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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 in regard to 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 a number of intricate designs or with people in management or sales. Environmental engineering graduates normally go to work at consulting firms, governmental (state and federal) agencies, NGOs, or industry. The academic curriculum also prepares environmental engineering graduates for graduate school, law school, and/or an MBA program.

## Scholarships and Financial Aid

The Department of Civil and Environmental Engineering awards numerous scholarships each year, which range from \$500 - \$10,000. Students should check with the department for more information.

## 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 freshmen prepared to enroll in calculus frequently complete their environmental engineering degree in four years. Students who have studied two years of pre-engineering at another institution can normally complete the environmental engineering degree in two additional years beginning with the 2022-2023 academic year.

## Environmental Engineering Plan of Study

Please note this is a sample plan of study and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Students are encouraged to work with their academic advisor on a regular basis to review degree progress and customize an individual plan of study.

<b>Freshman</b>			
<b>Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>
ENVE 111 Introduction to Environmental Engineering	1	ENVE 211 Analysis & Design Methods for Environmental Engr.	1
CHEM 121 General Chemistry I	3	CHEM 122 General Chemistry II	3
CHEM 121L General Chemistry I Laboratory	1	CHEM 122L General Chemistry II Laboratory	1
ENGL 110 College Composition I	4	COMM 110 Fundamentals of Public Speaking	3
ENGL 120 College Composition II	3	MATH 166 Calculus II	4
MATH 165 Calculus I	4	ME 221 Engineering Mechanics I	3
		Gen Ed Wellness	2
	<b>16</b>		<b>17</b>
<b>Sophomore</b>			
<b>Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>
ENVE 250 Fundamentals of Environmental Engineering	3	ENVE 350 Microbiological Principles for Environmental Engr.	3
CE 212 Civil Engineering Graphic Communications	3	CE 309 Fluid Mechanics	3
CHEM 240 Survey of Organic Chemistry	3	IME 460 Evaluation of Engineering Data	3
GEOL 105 Physical Geology	3	MATH 266 Introduction to Differential Equations	3
MATH 259 (265) Multivariate Calculus	3	ME 223 Mechanics of Materials	3
ME 222 Engineering Mechanics II	3	Gen Ed Humanities & Fine Arts	3
	<b>18</b>		<b>18</b>
<b>Junior</b>			
<b>Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>
ENVE 360 Chemistry for Environmental Engineers	3	ENVE 412 Unit Operations and Processes	2
ENVE 370 Sustainability Engineering	3	ENVE 450 Environmental Chemistry Laboratory	1
CE 310 Fluid Mechanics Laboratory	1	ENVE 460 Environmental Fate and Transport	3
CE 316 Soil Mechanics	3	CE 408 Water Resources and Supply	3
ENGL 321 Writing in the Technical Professions	3	ENGR 311 History of Technology in America	3
PHYS 252 University Physics II	4	ENGR 402 Engineering Ethics and Social Responsibility	1
		Technical Elective	3
	<b>17</b>		<b>16</b>
<b>Senior</b>			
<b>Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>
ENVE 488 Senior Design	2	ENVE 489 Senior Design II	2
CE 410 Water and Wastewater Engineering	3	CE 472 Solid Waste Management	3
CE 477 Applied Hydrology	3	CE 473 Air Pollution	3
IME 440 Engineering Economy	2	ENGR 312 Impact of Technology on Society	3
Gen Ed Social & Behavioral Sciences	3	Technical Elective	3
Technical Elective	3		
	<b>16</b>		<b>14</b>
<b>Total Credits: 132</b>			

View NDSU equivalencies of transfer courses at: [www.ndsu.edu/transfer/equivalencies](http://www.ndsu.edu/transfer/equivalencies)

### For Further Information

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