

ENVIRONMENTAL ENGINEERING MAJOR (B.S.)

<https://ceps.unh.edu/civil-environmental-engineering/program/bs/environmental-engineering-major>

Description

Environmental engineers graduating with a B.S. EnvE degree will plan, design, and construct public and private facilities to minimize the impact of human activity on the environment through sustainable approaches that protect human health. For example, environmental engineers design and build drinking water treatment systems, municipal and industrial wastewater treatment plants, solid waste management facilities, air pollution control systems, contaminated ground water remediation systems, and hazardous waste remediation facilities. These facilities must meet regulatory requirements, be cost effective to build and maintain, be safe to operate, and have minimal environmental impact.

In CEE 420 Environmental Engineering Gateway, students are introduced to the full spectrum of environmental engineering projects that they will subsequently explore in design teams during their degree program. In CEE 505 Introduction to Sustainable Engineering, students learn tools to analyze life cycles and are exposed to global actions for sustainability.

In CEE 520 Environmental Pollution and Protection: A Global Context, students tour field sites and through junior and senior year classes and student organizations (ASCE, EWRI, EWB), they interact with engineers who talk about engineering consulting, environmental policy, and design practices applied to local and global projects. As part of these projects, students:

1. analyze treatment alternatives;
2. recommend a system that meets regulatory operational needs, and is sustainable; and
3. prepare an implementation schedule and project budget.

Students choose elective courses from areas of Sustainability, Water Resources, Environmental Engineering Design, and other relevant topics. Design projects are performed in a minimum of two design electives. In the capstone design experience courses students work on a multi-disciplinary environmental engineering project and apply skills learned in other courses while working with real-world problems and clients.

The Environmental Engineering program (B Sci in Environmental Engineering) is accredited by the Engineering Accreditation Commission of ABET, <https://www.abet.org>, under the General Criteria and the Program Criteria for Environmental Engineering and Similarly Named Engineering Programs.

Requirements

Degree Requirements

Minimum Credit Requirement: 130 credits

Minimum Residency Requirement: 32 credits must be taken at UNH

Minimum GPA: 2.0 required for conferral*

Core Curriculum Required: Discovery & Writing Program Requirements

Foreign Language Requirement: No

All Major, Option and Elective Requirements as indicated.

*Major GPA requirements as indicated.

Major Requirements

To qualify for graduation, an EnvE major must: have satisfied all specified course requirements, have satisfied the University's Academic Requirements, have a minimum cumulative grade-point average of 2.00, and have a minimum grade-point average of 2.00 in engineering courses.

At the end of the sophomore year, students are required to have a minimum overall grade-point average of 2.00 and a minimum grade-point average of 2.00 in CEE 420, MATH 425, CHEM 405, PHYS 407, MATH 426, CEE 500, CEE 520 to be permitted to enroll in junior-level courses.

EnvE students do not have to take a course in the Discovery Biological Science category since they satisfy this category with CEE 724

For a full listing of the requirements over four years of study please refer to the degree plan tab.

| Code | Title | Credits |
|-----------------------------------|--|---------|
| Required Courses | | |
| CEE 402 | 2D Computer Aided Design | 3 |
| CEE 420 | Environmental Engineering Gateway | 3 |
| CEE 500 | Statics for Civil Engineers | 3 |
| CEE 502 | Project Engineering | 3 |
| CEE 505 | Introduction to Sustainable Engineering | 3 |
| CEE 520 | Environmental Pollution and Protection: A Global Context | 4 |
| CEE 620 | One Water Engineering | 4 |
| CEE 650 | Fluid Mechanics | 4 |
| CEE 720 | Waste Management and Site Remediation | 3 |
| CEE 721 | Environmental Sampling and Analysis | 4 |
| CEE 723 | Environmental Engineering Chemistry | 4 |
| CEE 724 | Environmental Engineering Microbiology | 4 |
| CEE 731 | Advanced Water Treatment Processes | 4 |
| CHEM 405 | Chemical Principles for Engineers | 4 |
| or CHEM 403 & CHEM 404 | General Chemistry I and General Chemistry II | |
| ESCI 654 | Fate and Transport in the Environment | 4 |
| MATH 425 | Calculus I | 4 |
| MATH 426 | Calculus II | 4 |
| MATH 527 | Differential Equations with Linear Algebra | 4 |
| MATH 644 | Statistics for Engineers and Scientists | 4 |
| or MATH 539 | Introduction to Statistical Analysis | |
| PHYS 407 | General Physics I | 4 |
| Capstone Design Experience | | |
| CEE 797 | Introduction to Project Planning and Design | 2 |
| CEE 798 | Project Planning and Design | 2 |

Electives

- *Design and Environmental/Civil Engineering Electives:* four 700-level courses are required, two courses must be Design Electives, with a minimum of 12 total credits.
- *Additional Electives:* Select one CEE Lab Elective, one Geospatial Elective, one Sustainability Elective, one Public Health Elective and two Water Resources Electives are required.
- Each elective course can only be used to fulfill one category.
- Course lists are subject to change, check with advisor.

| Code | Title | Credits |
|--|--|---------|
| Design Electives or Environmental/Civil Engineering Electives | | |
| CEE 719 | Green Building Design | 3 |
| CEE 729 | Sources, Control, and Stewardship of Air Pollution | 4 |
| CEE 730 | Public Health Engineering for Rural and Developing Communities | 3 |

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|---------|--|---|
| CEE 732 | Solid Waste Facility and Remediation System Design | 4 |
| CEE 733 | Public Infrastructure Asset Management | 4 |
| CEE 755 | Design of Pressurized Water Transmission Systems | 4 |
| CEE 758 | Stormwater Management Designs | 3 |
| CEE 759 | Stream Restoration | 4 |

| Code | Title | Credits |
|--|--|---------|
| Environmental/Civil Engineering Electives | | |
| CEE 706 | Environmental Life Cycle Assessment | 3 |
| CEE #722 | Introduction to Marine Pollution and Control | 4 |
| CEE 751 | Open Channel Flow | 3 |
| CEE 754 | Engineering Hydrology | 3 |
| CEE 768 | Geo-Environmental Engineering | 3 |

| Code | Title | Credits |
|---------------------------------------|-------------------------------------|---------|
| CEE Lab Electives | | |
| Select one course from the following: | | |
| CEE 665 | Soil Mechanics | 4 |
| CEE 721 | Environmental Sampling and Analysis | 4 |

| Code | Title | Credits |
|---------------------------------------|--|---------|
| Geospatial Electives | | |
| Select one course from the following: | | |
| CEE 403 | GIS for Civil and Environmental Engineering | 3 |
| FORT 581 | Applied Geospatial Techniques | 4 |
| NR 658 | Introduction to Geographic Information Systems | 4 |
| NR 757 | Remote Sensing of the Environment | 4 |

| Code | Title | Credits |
|---------------------------------------|---|---------|
| Sustainability Electives | | |
| Select one course from the following: | | |
| CEE 706 | Environmental Life Cycle Assessment | 3 |
| CEE 719 | Green Building Design | 3 |
| CEE 733 | Public Infrastructure Asset Management | 4 |
| CHBE 705 | Fossil Fuels and Renewable Energy Sources | 4 |
| ME 706 | Renewable Energy: Physical and Engineering Principles | 3 |

| Code | Title | Credits |
|--|--|---------|
| Water Resources Electives | | |
| Select two courses from the following: | | |
| CEE 751 | Open Channel Flow | 3 |
| CEE 754 | Engineering Hydrology | 3 |
| CEE 755 | Design of Pressurized Water Transmission Systems | 4 |
| CEE 758 | Stormwater Management Designs | 3 |
| CEE 753 | Snow Hydrology | 3 |
| CEE 759 | Stream Restoration | 4 |
| ESCI 705 | Principles of Hydrology | 4 |
| ESCI 710 | Groundwater Hydrology | 4 |
| OE 757 | Coastal Engineering and Processes | 3 |

| Code | Title | Credits |
|---------------------------------------|--|---------|
| Public Health Electives | | |
| Select one course from the following: | | |
| HMP 403 | Introduction to Public Health | 4 |
| HMP 501 | Epidemiology and Community Medicine | 4 |
| HMP 715 | Environmental Health | 4 |
| CEE 730 | Public Health Engineering for Rural and Developing Communities | 3 |

Degree Plan

Sample Degree Plan

First Year

| Fall | | Credits |
|----------|-----------------------------------|---------|
| CEE 420 | Environmental Engineering Gateway | 3 |
| ENGL 401 | First-Year Writing | 4 |
| CHEM 405 | Chemical Principles for Engineers | 4 |

| | | |
|---------------------------------|--|-----------|
| MATH 418 | Analysis and Applications of Functions | 4 |
| *See note below. | | |
| Discovery Elective ² | | 4 |
| Credits | | 19 |

Spring

| | | |
|---------------------------------|--------------------------|-----------|
| CEE 402 | 2D Computer Aided Design | 3 |
| MATH 425 | Calculus I | 4 |
| PHYS 407 | General Physics I | 4 |
| Discovery Elective ² | | 4 |
| Credits | | 15 |

Second Year

Fall

| | | |
|------------------------------|--|-----------|
| CEE 403 | GIS for Civil and Environmental Engineering | 3 |
| or other Geospatial Elective | | |
| CEE 500 | Statics for Civil Engineers | 3 |
| CEE 520 | Environmental Pollution and Protection: A Global Context | 4 |
| MATH 426 | Calculus II | 4 |
| Discovery Elective | | 4 |
| Credits | | 18 |

Spring

| | | |
|------------------------|--|-----------|
| CEE 502 | Project Engineering | 3 |
| CEE 505 | Introduction to Sustainable Engineering | 3 |
| MATH 527 | Differential Equations with Linear Algebra | 4 |
| Discovery Elective | | 4 |
| Public Health Elective | | 4 |
| Credits | | 18 |

Third Year

Fall

| | | |
|--------------------------|---------------------------------------|--------------|
| CEE 650 | Fluid Mechanics | 4 |
| CEE 720 | Waste Management and Site Remediation | 3 |
| Sustainability Elective | | 3-4 |
| Math Statistics Elective | | 4 |
| Discovery | | 4 |
| Credits | | 18-19 |

Spring

| | | |
|--------------------------|--|--------------|
| CEE 620 | One Water Engineering | 4 |
| CEE 724 | Environmental Engineering Microbiology | 4 |
| ESCI 654 | Fate and Transport in the Environment | 4 |
| Water Resources Elective | | 3-4 |
| Credits | | 15-16 |

Fourth Year

Fall

| | | |
|-------------------------|---|--------------|
| CEE 721 | Environmental Sampling and Analysis | 4 |
| CEE 723 | Environmental Engineering Chemistry | 4 |
| CEE 797 | Introduction to Project Planning and Design | 2 |
| CEE Design Elective (1) | | 3-4 |
| CEE Elective (1) | | 3-4 |
| Credits | | 16-18 |

Spring

| | | |
|---------|------------------------------------|---|
| CEE 731 | Advanced Water Treatment Processes | 4 |
| CEE 798 | Project Planning and Design | 2 |

| | |
|--------------------------|----------------|
| CEE Elective (1) | 3-4 |
| CEE Design Elective (1) | 3-4 |
| Water Resources Elective | 3-4 |
| Credits | 15-18 |
| Total Credits | 134-141 |

- an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

The EnvE program requires a minimum of 130 total credits for graduation.

***MATH 418 does not count toward this minimum number of credits.**

¹ Students who passed the ALEKS placement examination as determined by the Mathematics Department may enroll in MATH 425 Calculus I. Subsequent MATH courses (MATH 426 Calculus II, MATH 527 Differential Equations with Linear Algebra Differential Equations with Linear Algebra, MATH 644 Statistics for Engineers and Scientists) will be taken one semester earlier than shown here.

² See Discovery Program requirements. The Discovery requirements for Writing, Quantitative Reasoning, and Physical Science are fulfilled by ENGL 401 First-Year Writing, MATH 425 Calculus I, and PHYS 407 General Physics I, respectively. CEE 520 Environmental Pollution and Protection: A Global Context fulfills the Environmental, Technology, and Society requirement. CEE 797 Introduction to Project Planning and Design and CEE 798 Project Planning and Design fulfill the Senior Capstone requirement. Environmental Engineering Microbiology fulfills the Biological Science requirement. Courses in the EnvE curriculum designated Discovery Electives can be selected from the University's approved Discovery Program courses in Fine and Performing Arts, Humanities, Historical Perspectives, World Cultures, and Social Science. One of these electives must have an Inquiry attribute.

³ Approved lists of sustainability, water resources, design and Environmental/Civil electives are available from the EnvE undergraduate coordinator, Paula Mouser.

Student Learning Outcomes

By the time of graduation students have attained:

- an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- 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.
- an ability to communicate effectively with a range of audiences.
- 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.
- 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.
- an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.