ENVIRONMENTAL ENGINEERING MAJOR (B.S.)

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

Description

The Environmental Engineering program is accredited by the:

Engineering Accreditation Commission of ABET
111 Market Place
Suite 1050
Baltimore, MD 21202-4012,
(410) 347-7700
http://www.abet.org

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 and to protect human health. For example, environmental engineers design and build drinking water treatment systems, municipal and industrial wastewater treatment plants, solid waste management facilities, 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. EnvE students can also focus on sustainable engineering with a required course (CEE 705 Introduction to Sustainable Engineering) in junior year and two or three senior year electives, including design electives.

In CEE 420 Environmental Engineering Lectures I, 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 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 and design practices applied to local 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.

Design projects are performed in CEE 731 Advanced Water Treatment Processes and a minimum of two design electives. CEE 797 Introduction to Project Planning and Design/ and CEE 798 Project Planning and Design/ serve as a capstone design experience where students work on a multi-disciplinary environmental engineering project and apply skills learned in other courses while working with real-world problems/ clients. EnvE students do not have to take a course in the Discovery Biological Science category since they satisfy this category with CEE 724 Environmental Engineering Microbiology.

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 the following to be permitted to enroll in junior-level courses:

To qualify for graduation, an EnvE major must: have satisfied the previously 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.

Requirements

These are the required major courses. For a full listing of the requirements within the four years of study please refer to the degree plan tab.

CE Electives (lists are subject to change, check with advisor)

1. For Design and Non-Design, four courses are required, two of which must be Design, and total credits at least 12.
2. One course is required from each of the other sections.
3. Hydraulics, hydrology and public health electives cannot be used to cover more than one category.

Design Electives:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEE 719</td>
<td>Green Building Design</td>
<td>3</td>
</tr>
<tr>
<td>CEE 730</td>
<td>Public Health Engineering for Rural and Developing Communities</td>
<td>3</td>
</tr>
<tr>
<td>CEE 732</td>
<td>Solid and Hazardous Waste Design</td>
<td>4</td>
</tr>
<tr>
<td>CEE 733</td>
<td>Public Infrastructure Asset Management</td>
<td>4</td>
</tr>
<tr>
<td>CEE 734</td>
<td>Bioenvironmental Engineering Design</td>
<td>4</td>
</tr>
<tr>
<td>CEE 755</td>
<td>Design of Pressurized Water Transmission Systems</td>
<td>4</td>
</tr>
</tbody>
</table>
Environmental Engineering Major (B.S.)

CEE 758  Stormwater Management Designs  3
CEE 759  Stream Restoration  4

Non-Design Electives:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>CEE 706</td>
<td>Environmental Life Cycle Assessment</td>
<td>3</td>
</tr>
<tr>
<td>CEE 722</td>
<td>Introduction to Marine Pollution and Control</td>
<td>4</td>
</tr>
<tr>
<td>CEE 750</td>
<td>Ecolhydrology</td>
<td>3</td>
</tr>
<tr>
<td>CEE 751</td>
<td>Open Channel Flow</td>
<td>3</td>
</tr>
<tr>
<td>CEE 754</td>
<td>Engineering Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>CEE 757</td>
<td>Coastal Engineering and Processes</td>
<td>3</td>
</tr>
<tr>
<td>CEE 768</td>
<td>Geo-Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>SAFS 632</td>
<td>Urban Agriculture</td>
<td>4</td>
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<tr>
<td>CHE 709</td>
<td>Fundamentals of Air Pollution and Its Control</td>
<td>4</td>
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CEE Lab Electives: One course required

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<tbody>
<tr>
<td>CEE 665</td>
<td>Soil Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>CEE 721</td>
<td>Environmental Sampling and Analysis</td>
<td>4</td>
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Geospatial Electives: One course required

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<tbody>
<tr>
<td>CEE 403</td>
<td>GIS for Civil and Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>FORT 581</td>
<td>Applied Geospatial Techniques</td>
<td>4</td>
</tr>
<tr>
<td>NR 658</td>
<td>Introduction to Geographic Information Systems</td>
<td>4</td>
</tr>
<tr>
<td>NR 757</td>
<td>Remote Sensing of the Environment</td>
<td>4</td>
</tr>
</tbody>
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Hydraulics Electives: One course required

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Hydrology Electives: One course required

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<tr>
<td>CEE 750</td>
<td>Ecolhydrology</td>
<td>3</td>
</tr>
<tr>
<td>CEE 754</td>
<td>Engineering Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>ESCI 705</td>
<td>Principles of Hydrology</td>
<td>4</td>
</tr>
<tr>
<td>ESCI 710</td>
<td>Groundwater Hydrology</td>
<td>4</td>
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Public Health Electives: One course required

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<tbody>
<tr>
<td>HMP 403</td>
<td>Introduction to Public Health</td>
<td>4</td>
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<tr>
<td>HMP 844A</td>
<td>Global Public Health Issues</td>
<td>4</td>
</tr>
<tr>
<td>HMP 501</td>
<td>Epidemiology and Community Medicine</td>
<td>4</td>
</tr>
<tr>
<td>HMP 715</td>
<td>Environmental Health</td>
<td>4</td>
</tr>
<tr>
<td>CEE 730</td>
<td>Public Health Engineering for Rural and Developing Communities</td>
<td>3</td>
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Degree Plan

The following schedule is a sample of a planned program for environmental engineering students completing the major.

<table>
<thead>
<tr>
<th>Course</th>
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</thead>
<tbody>
<tr>
<td>First Year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEE 420</td>
<td>Environmental Engineering Lectures I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 401</td>
<td>First-Year Writing</td>
<td>4</td>
</tr>
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</table>

Spring

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</tr>
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<tbody>
<tr>
<td>MATH 425</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 405</td>
<td>Chemical Principles for Engineers</td>
<td>4</td>
</tr>
<tr>
<td>Discovery Electives</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

Credits 19

Second Year

| Fall   |                                            |         |
| CEE 402 | 2D Computer Aided Design                  | 3       |
| CEE 500 | Statics for Civil Engineers               | 3       |
| CEE 520 | Environmental Pollution and Protection: A Global Context | 4  |
| MATH 527 | Differential Equations with Linear Algebra | 4   |
| Discovery Elective | 2               | 4       |

Credits 16

| Spring  |                                            |         |
| MATH 644 | Statistics for Engineers and Scientists  | 4       |
| CEE 502 | Project Engineering                       | 3       |
| Discovery Elective | 2              | 4       |
| Public Health Elective | 4          | 4       |
| Discovery or Geospatial Course | 4         | 4       |

Credits 18

Third Year

| Fall   |                                            |         |
| CEE 650 | Fluid Mechanics                            | 4       |
| CEE 705 | Introduction to Sustainable Engineering    | 3       |
| CEE 720 | Solid and Hazardous Waste Engineering      | 3       |
| ESCI 654 | Fate and Transport in the Environment     | 4       |

Credits 14

Spring

| CEE 620 | Fundamental Aspects of Environmental Engineering | 4 |
| CEE 724 | Environmental Engineering Microbiology          | 4 |
| Hydrology Elective | 4             | 3-4   |
| Discovery Elective | 2               | 4       |

Credits 15-16

Fourth Year

| Fall   |                                            |         |
| CEE 721 | Environmental Sampling and Analysis        | 4       |
| CEE 723 | Environmental Water Chemistry              | 4       |
| CEE 797 | Introduction to Project Planning and Design | 2       |
| CEE Design Electives (2) | 6-8             | 6-8    |

Credits 16-18

Spring

| CEE 731 | Advanced Water Treatment Processes        | 4       |
| CEE 798 | Project Planning and Design                | 2       |
| CEE Electives (2) | 6-8             | 6-8    |
Students who are required to take MATH 418 Analysis and Applications of Functions because they did not pass the placement examination as determined by the Mathematics Department prior to the fall semester, will enroll in MATH 425 Calculus I during the spring semester. Subsequent MATH courses (MATH 426 Calculus II, MATH 527 Differential Equations with Linear Algebra, MATH 644 Statistics for Engineers and Scientists) will be taken one semester later than shown here.

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.

Approved lists of technical, hydrology, hydraulics, and design and non-design electives are available from the EnvE administrator, Paula Mouser. Students must take a minimum of four 700-level CEE electives totaling at least 12 credits. A minimum of two CEE elective courses must be from the design category.

The EnvE program requires a minimum of 132 total credits for graduation.

**Student Learning Outcomes**

- To have obtained a working knowledge in the environmental engineering areas of water and wastewater treatment, environmental health and safety, solid and hazardous waste engineering, sustainability, and water resources.
- To be able to locate, assess, and compile data, and to conduct experiments to gather data, and analyze and interpret data using engineering judgement to draw conclusions.
- To have an ability to acquire and apply new knowledge, techniques, skills, and software necessary for engineering practice.
- To be able to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, use project management skills to establish goals, plan tasks, and meet objectives.
- To be able to effectively communicate and support ideas in documents and presentations to a range of audiences.
- To be able to apply principles of mathematics, science, and engineering to identify, formulate, and solve complex engineering problems.
- To have been prepared for the Fundamentals of Engineering examination and understand the importance of professional licensure.
- To have 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, social, economic, public policy, and environmental issues.
- To recognize the roles and responsibilities of public institutions, private organization, and businesses in project development, management, and regulatory compliance.
- To be able 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.