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:

1. Calculus I
2. Calculus II
3. Environmental Engineering Lectures I
4. Statics for Civil Engineers
5. Environmental Engineering Lectures II
6. Introduction to Sustainable Engineering
7. Fluid Mechanics
8. Introduction to Engineering Mathematics
9. Advanced Environmental Processes
10. Environmental Engineering and Public Policy
11. Environmental Sampling and Analysis
12. Environmental Engineering Microbiology
13. Advanced Water Treatment Processes
14. Introduction to Project Planning and Design
15. Project Planning and Design
16. Environmental Water Chemistry
17. Environmental Microbiology
18. Advanced Water Treatment Processes
19. Introduction to Project Planning and Design
20. Project Planning and Design
21. Chemical Principles for Engineers
22. Environmental Sampling and Analysis
23. Fluid Mechanics
24. Introduction to Engineering Mathematics
25. Advanced Environmental Processes
26. Environmental Engineering and Public Policy
27. Environmental Microbiology
28. Introduction to Project Planning and Design
29. Project Planning and Design
30. Chemical Principles for Engineers
31. Environmental Sampling and Analysis
32. Fluid Mechanics
33. Introduction to Engineering Mathematics
34. Advanced Environmental Processes
35. Environmental Engineering and Public Policy
36. Environmental Microbiology
37. Introduction to Project Planning and Design
38. Project Planning and Design
39. Chemical Principles for Engineers
40. Environmental Sampling and Analysis
41. Fluid Mechanics
42. Introduction to Engineering Mathematics
43. Advanced Environmental Processes
44. Environmental Engineering and Public Policy
45. Environmental Microbiology
46. Introduction to Project Planning and Design
47. Project Planning and Design
48. Chemical Principles for Engineers
49. Environmental Sampling and Analysis
50. Fluid Mechanics
51. Introduction to Engineering Mathematics
52. Advanced Environmental Processes
53. Environmental Engineering and Public Policy
54. Environmental Microbiology
55. Introduction to Project Planning and Design
56. Project Planning and Design
57. Chemical Principles for Engineers
58. Environmental Sampling and Analysis
59. Fluid Mechanics
60. Introduction to Engineering Mathematics
61. Advanced Environmental Processes
62. Environmental Engineering and Public Policy
63. Environmental Microbiology
64. Introduction to Project Planning and Design
65. Project Planning and Design
66. Chemical Principles for Engineers
67. Environmental Sampling and Analysis
68. Fluid Mechanics
69. Introduction to Engineering Mathematics
70. Advanced Environmental Processes
71. Environmental Engineering and Public Policy
72. Environmental Microbiology
73. Introduction to Project Planning and Design
74. Project Planning and Design
75. Chemical Principles for Engineers
76. Environmental Sampling and Analysis
77. Fluid Mechanics
78. Introduction to Engineering Mathematics
79. Advanced Environmental Processes
80. Environmental Engineering and Public Policy
81. Environmental Microbiology
82. Introduction to Project Planning and Design
83. Project Planning and Design
84. Chemical Principles for Engineers
85. Environmental Sampling and Analysis
86. Fluid Mechanics
87. Introduction to Engineering Mathematics
88. Advanced Environmental Processes
89. Environmental Engineering and Public Policy
90. Environmental Microbiology
91. Introduction to Project Planning and Design
92. Project Planning and Design
93. Chemical Principles for Engineers
94. Environmental Sampling and Analysis
95. Fluid Mechanics
96. Introduction to Engineering Mathematics
97. Advanced Environmental Processes
98. Environmental Engineering and Public Policy
99. Environmental Microbiology
100. Introduction to Project Planning and Design
101. Project Planning and Design
102. Chemical Principles for Engineers
103. Environmental Sampling and Analysis
104. Fluid Mechanics
105. Introduction to Engineering Mathematics
106. Advanced Environmental Processes
107. Environmental Engineering and Public Policy
108. Environmental Microbiology
109. Introduction to Project Planning and Design
110. Project Planning and Design
111. Chemical Principles for Engineers
112. Environmental Sampling and Analysis
113. Fluid Mechanics
114. Introduction to Engineering Mathematics
115. Advanced Environmental Processes
116. Environmental Engineering and Public Policy
117. Environmental Microbiology
118. Introduction to Project Planning and Design
119. Project Planning and Design
120. Chemical Principles for Engineers
121. Environmental Sampling and Analysis
122. Fluid Mechanics
123. Introduction to Engineering Mathematics
124. Advanced Environmental Processes
125. Environmental Engineering and Public Policy
126. Environmental Microbiology
127. Introduction to Project Planning and Design
128. Project Planning and Design
129. Chemical Principles for Engineers
130. Environmental Sampling and Analysis
131. Fluid Mechanics
132. Introduction to Engineering Mathematics
133. Advanced Environmental Processes
134. Environmental Engineering and Public Policy
135. Environmental Microbiology
136. Introduction to Project Planning and Design
137. Project Planning and Design
138. Chemical Principles for Engineers
139. Environmental Sampling and Analysis
140. Fluid Mechanics
141. Introduction to Engineering Mathematics
142. Advanced Environmental Processes
143. Environmental Engineering and Public Policy
144. Environmental Microbiology
145. Introduction to Project Planning and Design
146. Project Planning and Design
147. Chemical Principles for Engineers
148. Environmental Sampling and Analysis
149. Fluid Mechanics
150. Introduction to Engineering Mathematics
151. Advanced Environmental Processes
152. Environmental Engineering and Public Policy
153. Environmental Microbiology
154. Introduction to Project Planning and Design
155. Project Planning and Design
156. Chemical Principles for Engineers
157. Environmental Sampling and Analysis
158. Fluid Mechanics
159. Introduction to Engineering Mathematics
160. Advanced Environmental Processes
161. Environmental Engineering and Public Policy
162. Environmental Microbiology
163. Introduction to Project Planning and Design
164. Project Planning and Design
165. Chemical Principles for Engineers
166. Environmental Sampling and Analysis
167. Fluid Mechanics
168. Introduction to Engineering Mathematics
169. Advanced Environmental Processes
170. Environmental Engineering and Public Policy
171. Environmental Microbiology
172. Introduction to Project Planning and Design
173. Project Planning and Design
174. Chemical Principles for Engineers
175. Environmental Sampling and Analysis
176. Fluid Mechanics
177. Introduction to Engineering Mathematics
178. Advanced Environmental Processes
179. Environmental Engineering and Public Policy
180. Environmental Microbiology
181. Introduction to Project Planning and Design
182. Project Planning and Design
183. Chemical Principles for Engineers
184. Environmental Sampling and Analysis
185. Fluid Mechanics
186. Introduction to Engineering Mathematics
187. Advanced Environmental Processes
188. Environmental Engineering and Public Policy
189. Environmental Microbiology
190. Introduction to Project Planning and Design
191. Project Planning and Design
192. Chemical Principles for Engineers
193. Environmental Sampling and Analysis
194. Fluid Mechanics
195. Introduction to Engineering Mathematics
196. Advanced Environmental Processes
197. Environmental Engineering and Public Policy
198. Environmental Microbiology
199. Introduction to Project Planning and Design
200. Project Planning and Design
201. Chemical Principles for Engineers
202. Environmental Sampling and Analysis
203. Fluid Mechanics
204. Introduction to Engineering Mathematics
205. Advanced Environmental Processes
206. Environmental Engineering and Public Policy
207. Environmental Microbiology
208. Introduction to Project Planning and Design
209. Project Planning and Design
210. Chemical Principles for Engineers
211. Environmental Sampling and Analysis
212. Fluid Mechanics
213. Introduction to Engineering Mathematics
204. Advanced Environmental Processes
215. Environmental Engineering and Public Policy
216. Environmental Microbiology
217. Introduction to Project Planning and Design
218. Project Planning and Design
219. Chemical Principles for Engineers
220. Environmental Sampling and Analysis
221. Fluid Mechanics
222. Introduction to Engineering Mathematics
223. Advanced Environmental Processes
224. Environmental Engineering and Public Policy
225. Environmental Microbiology
226. Introduction to Project Planning and Design
227. Project Planning and Design
228. Chemical Principles for Engineers
229. Environmental Sampling and Analysis
230. Fluid Mechanics
231. Introduction to Engineering Mathematics
223. Advanced Environmental Processes
224. Environmental Engineering and Public Policy
225. Environmental Microbiology
226. Introduction to Project Planning and Design
227. Project Planning and Design
228. Chemical Principles for Engineers
229. Environmental Sampling and Analysis
230. Fluid Mechanics
231. Introduction to Engineering Mathematics

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.

CEE 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>
<th>Credits</th>
</tr>
</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>
</tr>
<tr>
<td>CHE 709</td>
<td>Fundamentals of Air Pollution and Its Control</td>
<td>4</td>
</tr>
</tbody>
</table>

CEE Lab Electives: One course required

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<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>
</tr>
</tbody>
</table>

Geospatial Electives: One course required

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<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>
</table>

Hydraulics Electives: One course required

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEE 755</td>
<td>Design of Pressurized Water Transmission Systems</td>
<td>4</td>
</tr>
<tr>
<td>CEE 758</td>
<td>Stormwater Management Designs</td>
<td>3</td>
</tr>
<tr>
<td>CEE 759</td>
<td>Stream Restoration</td>
<td>4</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>
</tbody>
</table>

Hydrology Electives: One course required

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<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>
</tr>
</tbody>
</table>

Public Health Electives: One course required

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMP 403</td>
<td>Introduction to Public Health</td>
<td>4</td>
</tr>
<tr>
<td>HMP 444A</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>
</tr>
</tbody>
</table>

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>
<th>Title</th>
<th>Credits</th>
</tr>
</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>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second Year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEE 402</td>
<td>2D Computer Aided Design</td>
<td>3</td>
</tr>
<tr>
<td>CEE 500</td>
<td>Statics for Civil Engineers</td>
<td>3</td>
</tr>
<tr>
<td>CEE 520</td>
<td>Environmental Pollution and Protection: A Global Context</td>
<td>4</td>
</tr>
<tr>
<td>MATH 527</td>
<td>Differential Equations with Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>Discovery Elective</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Credits</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fall</td>
<td>19</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEE 650</td>
<td>Fluid Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>CEE 705</td>
<td>Introduction to Sustainable Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEE 720</td>
<td>Solid and Hazardous Waste Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ESCI 654</td>
<td>Fate and Transport in the Environment</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Credits</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spring</td>
<td>18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Third Year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEE 620</td>
<td>Fundamental Aspects of Environmental Engineering</td>
<td>4</td>
</tr>
<tr>
<td>CEE 724</td>
<td>Environmental Engineering Microbiology</td>
<td>4</td>
</tr>
<tr>
<td>Hydrology Elective</td>
<td></td>
<td>3-4</td>
</tr>
<tr>
<td>Discovery Elective</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Credits</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Third Year</td>
<td>19</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fourth Year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CEE 721</td>
<td>Environmental Sampling and Analysis</td>
<td>4</td>
</tr>
<tr>
<td>CEE 723</td>
<td>Environmental Water Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CEE 797</td>
<td>Introduction to Project Planning and Design</td>
<td>2</td>
</tr>
<tr>
<td>CEE Design Electives (2)</td>
<td></td>
<td>6-8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Credits</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fourth Year</td>
<td>16-18</td>
</tr>
</tbody>
</table>
Hydraulics Elective  

<table>
<thead>
<tr>
<th>Credits</th>
<th>15-18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Credits</td>
<td>132-138</td>
</tr>
</tbody>
</table>

1 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.

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 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.