CIVIL AND ENVIRONMENTAL ENGINEERING MAJOR

The Bachelors of Science in Civil Engineering requires a total of 122 credit hours with emphasis in basic science (mathematics, chemistry, and physics), engineering science (mechanics of materials, statics, and dynamics), and basic civil and environmental engineering core courses (computations, materials, fluid mechanics, probability & statistics, and Geographic Information Systems). By the Junior year, each student chooses one of three tracks: Geotechnical and Structural Engineering, Environmental and Water Resources, or Transportation/Project Management. Each track specifies junior- and senior-level requirements. All three tracks include technical electives that may be selected from a combination of the six Civil Engineering specialties and other approved courses (the six specialty areas are: Environmental, Geotechnical, Project Management, Structural, Transportation, and Water Resources). The curriculum provides a sensible blend of required courses and electives, permitting students to pursue their interests without the risk of overspecialization.

The Bachelor of Science degree in Civil Engineering is accredited by the Engineering Accreditation Commission of ABET, www.abet.org (http://www.abet.org).

Admission to the Major

See the entrance requirements for the A. James Clark School of Engineering (https://academiccatalog.umd.edu/undergraduate/colleges-schools/engineering) in the Colleges and Schools section of this site.

MISSION

The mission of the Department is threefold:

1. Provide a high quality, challenging education that encompasses breadth and depth; and prepare graduates to be proficient in both analysis and synthesis facets of civil engineering design;
2. Maintain a strong research program that is recognized for excellence in major areas of civil and environmental engineering;
3. Provide service to the University, the civil engineering profession, and the community at large.

The Department provides an educational program of basic and specialized engineering knowledge necessary for its graduates to be proficient in recognized specialties of civil engineering. This preparation provides graduates with the tools needed for successful practice in the period following graduation. In addition to general and technical education, the educational program stresses professional and ethical responsibilities, an awareness of societal issues, and the need for lifelong learning.

The Department contributes to the advancement of knowledge through research on important engineering problems. The research results are communicated through recognized channels of knowledge dissemination.

The Department serves the needs of the community by emphasizing global and societal issues. The Department addresses these issues through University and professional channels and contributes to their solutions.

Program Educational Objectives

The department of the Department of Civil Engineering has established the following Program Educational Objectives:

• To understand, apply and develop fundamental knowledge in science, technology, engineering and mathematics.
• To attain advanced qualification in both specialization and breadth.
• To understand and apply business sensitive criteria in meeting professional responsibilities.
• To incorporate societal sensitive criteria into professional decisions.
• To develop forward-thinking attitudes that enhance communication and exemplary practice.

Program Learning Outcomes

Student Outcomes

In addition to ensuring technical competency of all graduates in the broad discipline areas of civil engineering, the Department must encourage the development of skills and abilities that will enhance the marketability of its graduates and provide them with the best possible opportunity for success in the work place. As a result, the faculty has agreed to develop the following abilities and skills within each graduate and has approved the following Student Outcomes:

1. An ability to apply knowledge of mathematics, science and engineering (ABET)
2. An ability to design and conduct experiments, as well as to analyze and interpret data (ABET)
3. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability (ABET)
4. An ability to function on multidisciplinary teams (ABET)
5. An ability to identify, formulate, and solve engineering problem (ABET)
6. An understanding of professional and ethical responsibility (ABET)
7. An ability to communicate effectively (ABET)
8. The global education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context (ABET)
9. A recognition of the need for, and an ability to engage in lifelong learning (ABET)
10. A knowledge of contemporary issues (ABET)
11. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practices (ABET)
12. Breadth in civil engineering areas, technical specialization, project management, public policy, business and public administration, leadership, attitudes. (ASCE)

Requirements

The Department offers a program of study leading to an ABET-accredited Bachelor of Science in Civil Engineering (BSCE) degree. Each student specializes in one of three tracks: Infrastructure Engineering (Structural and Geotechnical), Environmental and Water Resources Engineering, or Transportation Systems and Project Management. A total of 122 credit hours are required for a BSCE degree with emphasis in basic science (mathematics, chemistry, and physics), engineering science (mechanics of materials, statics, and dynamics), basic civil and environmental engineering courses; required courses in the selected track; technical
The curriculum provides a sensible blend of required courses and electives, permitting students to pursue their interests without the risk of overspecialization.

**Freshman Year**

**First Semester**

- **Credits**
  - MATH140: 4
  - CHEM135: 3
  - ENES100: 3
  - ENGL101: 3
  - ENCE100: 1

**Second Semester**

- **Credits**
  - MATH141: 4
  - ENES102: 3
  - PHYS161: 3
  - ENCE201: 3

**General Education Program Requirements**

- **Credits:** 6

**Sophomore Year**

**First Semester**

- **Credits**
  - MATH241: 4
  - ENES220: 3
  - ENCES215: 3
  - PHYS261: 1
  - PHYS250: 3

**Second Semester**

- **Credits**
  - MATH246: 3
  - ENCE200: 3
  - ENCE305: 3
  - ENCE360: 3

**Science requirement**

- **Credits:** 3

**Junior Year**

**First Semester**

Select one of the following tracks:

- **Infrastructure Engineering**
- **Transportation Systems & Engineering Management**
- **Environmental and Water Resources Engineering**

**Senior Year**

**First Semester**

**Credits**

**Second Semester**

**Credits**

**Transportation Systems & Engineering Management Track**

**Junior Year**

**First Semester**

- **Credits**
  - ENCE300: 3
  - ENCE302: 3
  - ENCE360: 3
  - ENCE370: 3
  - ENCE Electives: 3

**Second Semester**

**Credits**

**General Education Program Requirements**

- **Credits:** 3

**Senior Year**

**First Semester**

- **Credits**
  - ENCE423: 3
  - ENCE470: 3

**Second Semester**

- **Credits**
  - ENCE402: 3
  - ENCE466: 3

**General Education Program Requirements**

- **Credits:** 3

**Environmental and Water Resources Engineering Track**

**Junior Year**

**First Semester**

- **Credits**
  - BIOE120: 3
  - ENCE302: 3
  - ENCE310: 3
  - ENCE360: 3

**Second Semester**

- **Credits**
  - ENCE393: 3
  - ENCE321: 3
  - ENCE340: 3
  - ENCE Electives: 3

**ENCE Electives**

- **Credits**
  - 3

**General Education Program Requirements**

- **Credits:** 3

**Senior Year**

**First Semester**

- **Credits**
  - ENCE411: 3

**Second Semester**

- **Credits**
  - ENCE422: 3

**General Education Program Requirements**

- **Credits:** 3

**Total Credits:** 122
ENCE Electives

- 3XX, 4XX or 6XX. At least two must be ENCE courses
- No more than one ENCE489
- No more than 3 total ENCE with the same first two numbers

Breadth Electives

Geotechnical/Structure Track
Include two electives from List A or List B:

<table>
<thead>
<tr>
<th>List A Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENCE370</td>
<td>Introduction to Transportation Engineering and Planning</td>
<td>3</td>
</tr>
<tr>
<td>ENCE402</td>
<td>Simulation and Design of Experiments for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>ENCE422</td>
<td>Project Cost Accounting and Economics</td>
<td>3</td>
</tr>
<tr>
<td>ENCE423</td>
<td>Project Planning, Estimating &amp; Scheduling</td>
<td>3</td>
</tr>
<tr>
<td>ENCE470</td>
<td>Highway Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ENCE472</td>
<td>Transportation Engineering</td>
<td>3</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>List B Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENCE310</td>
<td>Introduction to Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ENCE370</td>
<td>Introduction to Transportation Engineering and Planning</td>
<td>3</td>
</tr>
<tr>
<td>ENCE402</td>
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Transportation/Project Management Track
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</thead>
<tbody>
<tr>
<td>ENCE340</td>
<td>Fundamentals of Geotechnical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ENCE353</td>
<td>Introduction to Structural Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ENCE441</td>
<td>Foundation Design</td>
<td>3</td>
</tr>
</tbody>
</table>

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<tr>
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<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ENCE444</td>
<td>Experimental Methods in Geotechnical Structural Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ENCE454</td>
<td>Design of Concrete Structures</td>
<td>3</td>
</tr>
</tbody>
</table>

Environmental/Water Resources Track
Include two electives from List A or List B:

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<th>Credits</th>
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<tbody>
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<td>ENCE340</td>
<td>Fundamentals of Geotechnical Engineering</td>
<td>3</td>
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<tr>
<td>ENCE353</td>
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<th>Credits</th>
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<tbody>
<tr>
<td>ENCE320</td>
<td>Introduction to Project Management</td>
<td>3</td>
</tr>
<tr>
<td>ENCE370</td>
<td>Introduction to Transportation Engineering and Planning</td>
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<tr>
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Four Year Plan
Click here (https://eng.umd.edu/four-year-plans) for roadmaps for four-year plans in the A. James Clark School of Engineering.

Additional information on developing a four-year academic plan can be found on the following pages:

- 4yearplans.umd.edu
- the Student Academic Success-Degree Completion Policy (https://academiccatalog.umd.edu/undergraduate/registration-academic-requirements-regulations/academic-advising) section of this catalog