

# CIVIL ENGINEERING MAJOR

**Program Director:** Natasha Andrade, Ph.D.

The Bachelor of Science in Civil Engineering degree program at the University of Maryland is accredited by the Engineering Accreditation Commission of ABET, <https://www.abet.org>, under the General Criteria and the Civil Engineering Program Criteria.

The Bachelor of Science in Civil Engineering requires a total of 122 credit hours with an emphasis on 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/Structural, Environmental/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.

## 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 catalog.

## Mission

The mission of the Department of Civil and Environmental Engineering 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 life-long 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 Civil and Environmental 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 lifelong learning, diversity, equity, inclusion, communication, and exemplary practice.

## Student Learning Outcomes

In addition to ensuring the 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 workplace. 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 identify, formulate, and solve complex engineering problems by applying principles of engineering, science and mathematics
2. 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
3. An ability to communicate effectively with a range of audiences
4. 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
5. 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
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

## 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: Geotechnical/Structural, Environmental/Water Resources, or Transportation/Project Management. A total of 122 credit hours are required for a BSCE degree with an 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 electives; and a senior capstone design course. 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	Second Semester	Credits
MATH140		4 MATH141	4
CHEM135		3 ENES102	3
ENES100		3 PHYS161	3
ENGL101		3 General Education Program Requirements	3
ENCE100		1 General Education Program Requirements	3
		<b>14</b>	<b>16</b>

Sophomore Year			
First Semester	Credits	Second Semester	Credits
MATH241		4 MATH246	3
ENES220		3 ENCE201	3
ENCE200		3 ENCE215	3
PHYS261		1 ENCE305	3
PHYS260		3 ENES200 or ENEE 200	3
Science requirement		3	
		<b>17</b>	<b>15</b>

Junior Year			
First Semester	Credits	Second Semester	Credits
Select one of the following tracks:		15 Continue selected track	15
Geotechnical and Structural Engineering			
Transportation/Project Management			
Environmental and Water Resources Engineering			
		<b>15</b>	<b>15</b>

Senior Year			
First Semester	Credits	Second Semester	Credits
Continue selected track		15 Continue selected track	15
		<b>15</b>	<b>15</b>

Total Credits 122

## Tracks

### Geotechnical & Structural Track

Junior Year			
First Semester	Credits	Second Semester	Credits
ENCE300		3 ENES221	3
ENCE302		3 Professional Writing	3
ENCE353		3 ENCE340	3
ENCE360		3 ENCE Breadth Electives	3
ENCE Breadth Electives		3 General Education Program Requirements	3
		<b>15</b>	<b>15</b>

Senior Year			
First Semester	Credits	Second Semester	Credits
ENCE320		3 ENCE444	3
ENCE454		3 ENCE467	2
ENCE441		3 ENCE Electives	3
ENCE465		1 Tech Electives	3
General Education Program Requirements		6 General Education Program Requirements	3
		<b>16</b>	<b>14</b>

Total Credits 60

### Transportation/Project Management Track

Junior Year			
First Semester	Credits	Second Semester	Credits
ENCE300		3 ENCE320	3
ENCE302		3 ENCE472	3
ENCE360		3 Professional Writing	3
ENCE370		3 ENCE Breadth Electives	3
ENCE Breadth Electives		3 General Education Program Requirements	3
		<b>15</b>	<b>15</b>

Senior Year			
First Semester	Credits	Second Semester	Credits
ENCE423		3 ENCE402	3
ENCE470		3 ENCE422	3
Tech Electives		3 ENCE Electives	3
General Education Program Requirements		6 ENCE467	2
ENCE465		1 General Education Program Requirements	3
		<b>16</b>	<b>14</b>

Total Credits 60

### Environmental/Water Resources Track

Junior Year			
First Semester	Credits	Second Semester	Credits
ENCE302		3 ENCE300	3
ENCE310		3 ENCE431	3
ENCE360		3 Professional Writing	3
ENCE Breadth Electives		3 ENCE Breadth Electives	3
ENCE205		3 General Education Program Requirements	3
		<b>15</b>	<b>15</b>

Senior Year			
First Semester	Credits	Second Semester	Credits
ENCE411		3 ENCE422	3
ENCE432		3 ENCE412	3
General Education Program Requirements		6 ENCE Electives	3
ENCE465		1 General Education Program Requirements	3
Tech Electives		3 ENCE467	2
		<b>16</b>	<b>14</b>
<b>Total Credits 60</b>			

Minimum Degree Requirements: 122 credits and the fulfillment of all departmental, school, and university requirements with a cumulative grade point average of at least 2.0. Additional semester credits will be involved to the extent that courses carrying more than three credits are selected.

## 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

## TECH Electives

Students can choose from a variety of courses that are approved as technical electives. Moreover, if a student chooses a course that is not pre-approved, the student can request an evaluation by the Committee of Undergraduate Education for approval.

## Breadth Electives

### Geotechnical & Structural Track

Include two electives from List A or List B:

#### List A

Course	Title	Credits
ENCE370	Introduction to Transportation Engineering and Planning	3
ENCE402	Simulation and Design of Experiments for Engineers	3
ENCE422	Project Cost Accounting and Economics	3
ENCE423	Project Planning, Estimating & Scheduling	3
ENCE470	Highway Engineering	3
ENCE472	Transportation Engineering	3

#### List B

Course	Title	Credits
ENCE310	Introduction to Environmental Engineering	3
ENCE411	Environmental Engineering Science	3
ENCE412	Environmental Engineering Unit Operations	3
ENCE431	Hydrologic Engineering	3
ENCE432	Ground Water Hydrology	3

### Transportation/Project Management Track

Include two electives from List A or List B:

#### List A

Course	Title	Credits
ENCE340	Fundamentals of Geotechnical Engineering	3
ENCE353	Introduction to Structural Analysis	3
ENCE441	Foundation Design	3
ENCE444	Experimental Methods in Geotechnical Structural Engineering	3
ENCE454	Design of Concrete Structures	3

#### List B

Course	Title	Credits
ENCE310	Introduction to Environmental Engineering	3
ENCE411	Environmental Engineering Science	3
ENCE412	Environmental Engineering Unit Operations	3
ENCE431	Hydrologic Engineering	3
ENCE432	Ground Water Hydrology	3

### Environmental/Water Resources Track

Include two electives from List A or List B:

#### List A

Course	Title	Credits
ENCE340	Fundamentals of Geotechnical Engineering	3
ENCE353	Introduction to Structural Analysis	3
ENCE441	Foundation Design	3
ENCE444	Experimental Methods in Geotechnical Structural Engineering	3
ENCE454	Design of Concrete Structures	3

#### List B

Course	Title	Credits
ENCE320	Introduction to Project Management	3
ENCE370	Introduction to Transportation Engineering and Planning	3
ENCE402	Simulation and Design of Experiments for Engineers	3
ENCE423	Project Planning, Estimating & Scheduling	3
ENCE470	Highway Engineering	3
ENCE472	Transportation Engineering	3

## GRADUATION PLANS

Click here (<https://eng.umd.edu/advising/four-year-plans/>) for roadmaps for graduation plans in the A. James Clark School of Engineering.

Additional information on developing a graduation plan can be found on the following pages:

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