

# CIVIL ENGINEERING (B.S.)

The mission of the Civil and Environmental Engineering Department is to provide high-quality, state-of-the-art educational and research programs. The Department strives for excellence in its academic programs, its research endeavors, and its university, community and professional service activities. The program is designed to prepare graduates for success in their immediate, as well as long-term, professional careers as practitioners, for obtaining a professional license, and for pursuing advanced studies and lifelong learning.

## Admission Requirements

Admission is contingent upon satisfaction of the general undergraduate admission requirements of the University (<http://bulletins.wayne.edu/undergraduate/general-information/admission/>) and the bachelor of science programs in the College of Engineering (<http://bulletins.wayne.edu/undergraduate/college-engineering/bs/>).

## Program Requirements

Candidates for the Bachelor of Science degree must complete 123-124 credits of coursework, including the General Education (<http://bulletins.wayne.edu/undergraduate/general-information/general-education/>) requirements. All course work must be completed in accordance with the academic procedures of the University (<http://bulletins.wayne.edu/undergraduate/general-information/>) and the College of Engineering (<http://bulletins.wayne.edu/undergraduate/college-engineering/academic-regulations/>) governing undergraduate scholarship and degrees. Non-engineering entries, cited below by subject rather than individual course number, indicate courses to be selected in fulfillment of the University General Education Requirements. The degree requirements shown in the curriculum below are in effect as of the publication date of this bulletin. Students should consult their advisors for verification of current requirements.

First Year		
First Semester		Credits
MAT 2010	Calculus I	4
CHM 1125	General Chemistry I for Engineers	3
CHM 1130	General Chemistry I Laboratory	1
BE 1200	Basic Engineering I: Design in Engineering	3
ENG 1020	Introductory College Writing	3
Wayne Experience (WE) - Suspended as of Fall 2023		
<b>Credits</b>		<b>14</b>
Second Semester		
MAT 2020	Calculus II	4
BE 1500	Introduction to Programming and Computation for Engineers	3
PHY 2170	University Physics I for Scientists and Engineers	4
Civic Literacy (CIV) course		3
Social Inquiry (SI) course		3
<b>Credits</b>		<b>17</b>
Second Year		
First Semester		
MAT 2030	Calculus III	4
BE 2100	Basic Engineering III: Probability and Statistics in Engineering	3
PHY 2180	University Physics II for Scientists and Engineers	4
CE 2410	Statics (ME 2410)	3
<b>Credits</b>		<b>14</b>
Second Semester		
MAT 2150	Differential Equations and Matrix Algebra	4
CE 2420	Elementary Mechanics of Materials	3
CE 3450	Civil Engineering Materials	4

CE 4020	Introduction to Construction Engineering and Management	3
Physical Science Elective <sup>1</sup>		3-4
<b>Credits</b>		<b>17-18</b>
Third Year		
First Semester		
CE 3250	Applied Fluid Mechanics	4
CE 4400	Structural Analysis	4
CE 4510	Introduction to Geotechnical Engineering	4
ENG 3050	Technical Communication I: Reports	3
<b>Credits</b>		<b>15</b>
Second Semester		
CE 4210	Introduction to Environmental Engineering	3
CE 4230	Environmental Engineering Laboratory	1
CE 4410	Steel Design	3
CE 4600	Transportation Engineering	3
Diversity, Equity, and Inclusion (DEI) course		3
Cultural Inquiry (CI) course		3
<b>Credits</b>		<b>16</b>
Fourth Year		
First Semester		
CE 4240	Environmental Engineering Design	3
CE 4420	Reinforced Concrete Design	3
CE 4610	Highway Design	3
or CE 4640 or Transportation Systems Design and Operation		
CE Technical Elective		3
CE Design Elective		3
<b>Credits</b>		<b>15</b>
Second Semester		
CE 4995	Senior Design Project	3
CE Technical Elective		3
CE Design Elective		3
ENG 3060	Technical Communication II: Presentations	3
Global Learning (GL) course		3
<b>Credits</b>		<b>15</b>
<b>Total Credits</b>		<b>123-124</b>

<sup>1</sup> Students may select from BIO 1050, BIO 1500, BIO 1510, ESG 1500, or ESG 1010 to meet the Physical Science elective requirement.

**Technical Electives:** Civil Engineering students are required to complete at least six credits in technical electives. Applicable courses include ET 2140, CE 3070, CE 4640, IE 4850, GPH 3600 any CE course at the 5000 or 6000 level, or other courses approved by the undergraduate program coordinator.

Students may earn technical elective credit through approved co-op or internship experience by completing the following: The combination of BE 1050 (1 credit) and BE 3510 (2 credits) OR BE 3510 (3 credits) may be counted as technical elective credit. BE 1050 must be completed first in the sequence. A maximum of three credits of BE 3510 can be taken as technical elective credits. No more than 1 credit per semester of BE 3510.

**Design Electives:** Students are required to complete two courses from:

Code	Title	Credits
CE 4610	Highway Design	3
CE 5230	Water Supply and Wastewater Engineering	3
CE 5240	Air Pollution Engineering	3
CE 5390	Design of Prestressed Concrete Structures	3
CE 5410	Energy, Emissions, Environment (E3) Design	3
CE 5510	Geotechnical Engineering I	4
CE 5520	Geotechnical Engineering II	3
CE 5610	Advanced Highway Design	3

CE 6130	Open Channel Hydraulics	3
CE 6150	Hydrologic Analysis and Design	3
CE 6170	River Assessment and Restoration I	3
CE 6190	Groundwater	3
CE 6270	Sustainability Assessment and Management	3
CE 6340	Bridge Design and Evaluation	3
CE 6370	Advanced Reinforced Concrete Design	3
CE 6410	Advanced Steel Design	3
CE 6580	Geoenvironmental Engineering I	4
CE 6660	Pavement Asset Management	3
BE 5900	National Design Competition Projects (Students must complete a total of 3 credits of BE 5900 in order to count the course towards the Design Elective requirement.)	1-4

Other courses with approval of the undergraduate program coordinator.

Courses used to satisfy core requirements may not also be used to satisfy technical or design elective requirements.

## Program Educational Outcomes

Within 3 to 5 years of graduation, BSCE graduates will: 1) Apply their knowledge and skills as effective, productive civil or environmental engineers designing innovative engineered systems for private corporations, consulting firms, constructors, or government agencies; 2) Work and communicate effectively with others on multidisciplinary teams to develop practical, technically sound, sustainable, cost-effective solutions to complex and diverse civil and/or environmental engineering problems; 3) Build upon the knowledge gained during undergraduate study for personal and professional development, including preparation for licensure and obtaining advanced degrees; 4) Engage in the profession in an ethical, equitable, and responsible manner that will protect human health and welfare and the environment; 5) Acquire leadership skills that will empower their ascension to leadership roles as practitioners; and 6) Be active members of professional and technical societies, engage in community service, and/or advocate for policies that advance the profession and society.

## Student Outcomes

Graduates of the Civil and Environmental Engineering Department will demonstrate the following skills and attributes when they receive their B.S. degrees:

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.

The civil engineering curriculum has been designed to provide a broad education in the basic sciences, mathematics, and engineering sciences, civil engineering analysis and design, and their application to civil engineering practice. The courses in civil engineering may be considered as an array of groups, each representing an area of concern to contemporary society and industry. Technical electives may be selected from one of these major areas according to the student's particular interest or may be chosen from several areas in order to broaden one's knowledge. A student who contemplates continuing study at the graduate level should seek the advice of his/her faculty counselor in the selection of elective courses. Realizing the social implications of the practice of civil engineering, the program provides for the development of a background in economics, the social sciences, humanities, communication skills, ethics, and related non-technical areas.

## Civil Engineering (CE) Honors requirements:

CE department requirements (22 credits total):

- Need a minimum GPA of 3.5 and 3.3 Honors GPA
- 9 credits minimum must be in Engineering Honors courses including the following:
  - BE 5998 Engineering Honors Thesis (3 cr.)
  - CE 4995 Senior Design Project (WI) (3 cr.)
  - Engineering Honors course (3 cr.)
  - At least one HON 42XX Honors seminar (3 cr.). \*Select Honors seminars may fulfill University Group requirements

*The additional 10 credits required for graduation with Honors may be taken in any department, including additional Engineering courses.*

Suggestions include: approved AGRADE courses, CHM 1225/1230, ECO 2010 or ECO 2020, ENG 1020, MAT 2010, MAT 2020.