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.

Program Educational Objectives

The graduates of the Civil and Environmental Engineering Program, in their early careers, will be expected to:

1. apply their knowledge and skills as effective, productive civil engineers within private corporations, engineering consulting firms, as well as local, state and federal government agencies in the design of contemporary civil engineering systems and processes
2. work and communicate effectively with others on multidisciplinary teams to develop practical, technically sound, cost-effective solutions to complex and diverse civil engineering problems
3. build upon the fundamental knowledge gained in the undergraduate program of study, allowing analysis and design in alternative and innovative conditions
4. engage in the profession in an ethical and responsible manner
5. exhibit leadership skills
6. become and remain active members within professional and technical societies

Student Outcomes

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

a) apply knowledge of mathematics, science and engineering to solve civil engineering problems
b) design and conduct experiments; collect and interpret data
c) design a civil engineering system, component or process to meet specific needs
d) collaborate and communicate on multi-disciplinary teams
e) identify, formulate and solve civil engineering problems
f) demonstrate understanding of ethical and professional responsibility of a civil engineer
g) communicate effectively in oral and written form
h) demonstrate understanding of global and societal issues as they pertain to civil engineering
i) explain the importance of life-long learning and continuing education
j) demonstrate knowledge of contemporary issues
k) demonstrate proficiency in using modern engineering tools in the practice of civil engineering
l) explain the aspects of professional practice issues relevant to the civil engineering profession (include principles of sustainability in design; explain basic concepts in project management, business, public policy, and leadership; analyze issues in professional ethics; and explain the importance of professional licensure)

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.

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/).

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

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MAT 2010</td>
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<tr>
<td>CHM 1125</td>
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<td>CHM 1130</td>
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<tr>
<td>BE 1200</td>
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<td>ENG 1020</td>
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<tr>
<td>Wayne Experience (WE)</td>
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<table>
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<tr>
<th>Second Semester</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MAT 2020</td>
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<tr>
<td>PHY 2175</td>
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</table>

Civil Engineering (B.S.) 1
BE 1500  Introduction to Programming and Computer for Engineers  3

Civic Literacy (CIV) course  3
Social Inquiry (SI) course  3

Credits  17

Second Year
First Semester
MAT 2030  Calculus III  4
PHY 2185  University Physics for Engineers II  4
BE 2100  Basic Engineering III: Probability and Statistics in Engineering  3
CE 2410  Statics (ME 2410)  3

Credits  14

Second Semester
MAT 2150  Differential Equations and Matrix Algebra  4
CE 2420  Elementary Mechanics of Materials  3
CE 3450  Civil Engineering Materials  4
ENG 3050  Technical Communication I: Reports  3

Physical Science Elective  3-4

Credits  17-18

Third Year
First Semester
CE 3250  Applied Fluid Mechanics  4
CE 4400  Structural Analysis  4
CE 4510  Introduction to Geotechnical Engineering  4
CE 4850  Engineering Economy  3

Credits  15

Second Semester
CE 4210  Introduction to Environment Engineering  3
CE 4410  Steel Design  3
CE 4600  Transportation Engineering  3
PHI 1120  Professional Ethics  3

Diversity, Equity, and Inclusion (DEI) course  2

Credits  15

Fourth Year
First Semester
CE 4240  Environment Engineering Design  3
CE 4420  Reinforced Concrete Design  3
CE 4610  Highway Design or CE 4640  3

CE Technical Elective  3
CE Design Elective  3

Credits  15

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

Credits  15

Total  123-124

1 Students may select from BIO 1050, BIO 1510 or ESG 1010 meet the Physical Science elective requirement.

Core structural engineering courses (CE 4400, CE 4410 and CE 4420) must be taken at Wayne State University. Transfer credit for these courses will not be accepted towards the B.S. in Civil Engineering degree.

Technical Electives: Civil Engineering students are required to complete at least six credits in technical electives. Applicable courses include CE 3010, CE 3070, any CE course at the 5000 or 6000 level, or other courses approved by the undergraduate program coordinator.

The combination of BE 1050 (1 credit) and BE 3510 (2 credits) may be counted as technical elective credit. BE 1050 must be completed first in the sequence. A maximum of two 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:

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CE 4610</td>
<td>Highway Design</td>
<td>3</td>
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<tr>
<td>CE 4640</td>
<td>Transportation Systems Design and Operation</td>
<td>3</td>
</tr>
<tr>
<td>CE 5230</td>
<td>Water Supply and Wastewater Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CE 5390</td>
<td>Design of Prestressed Concrete Structures</td>
<td>3</td>
</tr>
<tr>
<td>CE 5410</td>
<td>Energy, Emissions, Environment (E3) Design</td>
<td>3</td>
</tr>
<tr>
<td>CE 5510</td>
<td>Geotechnical Engineering I</td>
<td>4</td>
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<tr>
<td>CE 5520</td>
<td>Geotechnical Engineering II</td>
<td>3</td>
</tr>
<tr>
<td>CE 5610</td>
<td>Advanced Highway Design</td>
<td>3</td>
</tr>
<tr>
<td>CE 6130</td>
<td>Open Channel Hydraulics</td>
<td>3</td>
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<tr>
<td>CE 6150</td>
<td>Hydrologic Analysis and Design</td>
<td>3</td>
</tr>
<tr>
<td>CE 6190</td>
<td>Groundwater</td>
<td>3</td>
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<tr>
<td>CE 6270</td>
<td>Sustainability Assessment and Management</td>
<td>3</td>
</tr>
<tr>
<td>CE 6340</td>
<td>Bridge Design and Evaluation</td>
<td>3</td>
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Civil Engineering (B.S.)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CE 6370</td>
<td>Advanced Reinforced Concrete Design</td>
<td>3</td>
</tr>
<tr>
<td>CE 6410</td>
<td>Advanced Steel Design</td>
<td>3</td>
</tr>
<tr>
<td>CE 6580</td>
<td>Geoenvironmental Engineering I</td>
<td>4</td>
</tr>
<tr>
<td>CE 6660</td>
<td>Pavement Asset Management</td>
<td>3</td>
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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.