Civil Engineering, BS

for the degree of Bachelor of Science in Civil Engineering

department website: Department of Civil & Environmental Engineering (https://cee.illinois.edu)  
department faculty: Department of Civil & Environmental Engineering Faculty (https://cee.illinois.edu/directory/faculty)  
overview of college admissions & requirements: The Grainger College of Engineering (https://grainger.illinois.edu/admissions)  
college website: https://grainger.illinois.edu/

Civil engineering is a profession that applies the basic principles of science in conjunction with mathematical and computational tools to solve problems associated with developing and sustaining civilized life on our planet. Civil engineering works are generally one-of-a-kind projects; they are often grand in scale; and they usually require cooperation among professionals of many different disciplines. The completion of a civil engineering project involves the solution of technical problems in which uncertainty of information and myriad non-technical factors often play a significant role. Some of the most common examples of civil engineering works include bridges, buildings, dams, airports, highways, tunnels, and water distribution systems. Civil engineers are concerned with flood control, landslides, air and water pollution, and the design of facilities to withstand earthquakes and other natural hazards, in addition to protecting our environment for a sustainable future.

The civil engineering program comprises seven areas (construction engineering and management, construction materials engineering, environmental engineering, geotechnical engineering, environmental hydrology and hydraulics, structural engineering, and transportation engineering) and three interdisciplinary programs (sustainable and resilient infrastructure systems; energy, water, and environmental sustainability; and societal risk management). Although each area has its own special body of knowledge and engineering tools, they all rely on the same fundamental core principles. Civil engineering projects often draw expertise from many of these areas and programs.

CEE’s Program Education Objectives are to educate CEE students to:

1. Successfully enter the civil and environmental engineering profession as practicing engineers and consultants with prominent companies and organizations in diverse areas that include structural, transportation, geotechnical, materials, environmental, and hydrologic engineering; construction management; or other related or emerging fields.
2. Pursue graduate education and research at major research universities in civil and environmental engineering, and related fields.
3. Pursue professional licensure.
4. Advance to leadership positions in the profession.
5. Engage in continued learning through professional development.
6. Participate in and contribute to professional societies and community services.

Program Review and Approval

To qualify for the degree of Bachelor of Science in Civil Engineering, each student’s academic program plan must be reviewed by a standing committee of the faculty (the Program Review Committee) and approved by the Associate Head of Civil and Environmental Engineering in charge of undergraduate programs. This review and approval process ensures that individual programs satisfy the educational objectives and all of the requirements of the civil engineering program, that those programs do not abuse the substantial degree of flexibility that is present in the curriculum, and that the career interests of each student are cultivated and served.

Overview of Curricular Requirements

The curriculum requires 128 hours for graduation and is organized as follows.

Orientation and Professional Development

These courses introduce the opportunities and resources your college, department, and curriculum can offer as you work to achieve your career goals. They also provide the skills to work effectively and successfully in the engineering profession.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>CEE 195</td>
<td>About Civil Engineering</td>
<td>1</td>
</tr>
<tr>
<td>CEE 495</td>
<td>Professional Practice</td>
<td>0</td>
</tr>
<tr>
<td>ENG 100</td>
<td>Engineering Orientation</td>
<td>0</td>
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<tr>
<td>Total Hours</td>
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Foundational Mathematics and Science

These courses stress the basic mathematical and scientific principles upon which the engineering discipline is based.

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>CHEM 102</td>
<td>General Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 103</td>
<td>General Chemistry Lab I</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 104</td>
<td>General Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 105</td>
<td>General Chemistry Lab II</td>
<td>1</td>
</tr>
<tr>
<td>MATH 221</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 225</td>
<td>Introductory Matrix Theory</td>
<td>2</td>
</tr>
<tr>
<td>MATH 231</td>
<td>Calculus II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 241</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>MATH 285</td>
<td>Intro Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 211</td>
<td>University Physics: Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 212</td>
<td>University Physics: Elec &amp; Mag</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 213</td>
<td>Univ Physics: Thermal Physics</td>
<td>2</td>
</tr>
<tr>
<td>Total Hours</td>
<td></td>
<td>34</td>
</tr>
</tbody>
</table>
Civil Engineering Technical Core

These courses stress fundamental concepts and basic laboratory techniques that comprise the common intellectual understanding of civil engineering.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>CEE 201</td>
<td>Systems Engrg &amp; Economics</td>
<td>3</td>
</tr>
<tr>
<td>CEE 202</td>
<td>Engineering Risk &amp; Uncertainty</td>
<td>3</td>
</tr>
<tr>
<td>CS 101</td>
<td>Intro Computing: Engrg &amp; Sci</td>
<td>3</td>
</tr>
<tr>
<td>SE 101</td>
<td>Engineering Graphics &amp; Design</td>
<td>3</td>
</tr>
<tr>
<td>TAM 211</td>
<td>Statics</td>
<td>3</td>
</tr>
<tr>
<td>TAM 212</td>
<td>Introductory Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>TAM 251</td>
<td>Introductory Solid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>TAM 335</td>
<td>Introductory Fluid Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>Total Hours</td>
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<td>25</td>
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</table>

Science Elective

This elective allows the student to gain additional depth in science. The course should be selected according to the requirements and recommendations for the selected area of study, which is subject to approval by the faculty Program Review Committee.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Science elective, selected in accord with recommendations</td>
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</tr>
<tr>
<td>ATMS 120</td>
<td>Severe and Hazardous Weather</td>
<td>3</td>
</tr>
<tr>
<td>CHBE 321</td>
<td>Thermodynamics</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 222</td>
<td>Quantitative Analysis Lecture</td>
<td>2</td>
</tr>
<tr>
<td>CS 357</td>
<td>Numerical Methods I</td>
<td>3</td>
</tr>
<tr>
<td>ECE 205</td>
<td>Electrical and Electronic Circuits</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 107</td>
<td>Physical Geology</td>
<td>4</td>
</tr>
<tr>
<td>GEOL 118</td>
<td>Natural Disasters</td>
<td>3</td>
</tr>
<tr>
<td>ME 200</td>
<td>Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>STAT 420</td>
<td>Methods of Applied Statistics</td>
<td>3 or 4</td>
</tr>
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</table>

Civil Engineering Technical Electives

This course work is designed to give each student a broad background in the areas of civil engineering through the core courses and to allow each student to develop a focused program through advanced technical electives in chosen primary and secondary fields. There are seven areas of study which include:

- Construction Engineering and Management
- Construction Materials Engineering
- Environmental Engineering
- Environmental Hydrology and Hydraulic Engineering
- Geotechnical Engineering
- Structural Engineering
- Transportation Engineering

In addition to the areas of study, three interdisciplinary programs can be chosen by students. They include:

- Sustainable and Resilient Infrastructure Systems
- Energy-Water-Environment Sustainability
- Societal Risk Management

The fundamental principles of civil engineering design and the behavior of civil engineering systems are emphasized throughout the course work. The specific choices of courses in this category are made through the submission of the Plan of Study, which is subject to approval by the faculty Program Review Committee.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Civil engineering technical courses, selected as follows, to at least include:</td>
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<tr>
<td></td>
<td>Civil Engineering Core Courses</td>
<td>34</td>
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<tr>
<td></td>
<td>The courses that are required and recommended for the primary and secondary fields are listed below. Select at least 5 courses from the following list:</td>
<td></td>
</tr>
<tr>
<td>CEE 300</td>
<td>Behavior of Materials</td>
<td>4</td>
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<tr>
<td>CEE 310</td>
<td>Transportation Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEE 320</td>
<td>Construction Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEE 330</td>
<td>Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEE 340</td>
<td>Energy and Global Environment</td>
<td>3</td>
</tr>
<tr>
<td>CEE 350</td>
<td>Water Resources Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEE 360</td>
<td>Structural Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEE 380</td>
<td>Geotechnical Engineering</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Primary Field Advanced Technical Electives. Select courses from approved lists for appropriate programs of study within the seven areas or three interdisciplinary programs of civil engineering. Design experience is distributed in 200-level, 300-level, and 400-level CEE courses including integrated design courses. See list below:</td>
<td>12-13</td>
</tr>
<tr>
<td></td>
<td>Construction Engineering and Management</td>
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<tr>
<td></td>
<td>Science Electives Required - NONE</td>
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<tr>
<td></td>
<td>Science Electives Recommended - See below:</td>
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<tr>
<td>ATMS 120</td>
<td>Severe and Hazardous Weather</td>
<td>3</td>
</tr>
<tr>
<td>ATMS 303</td>
<td>Synoptic-Dynamic Wea Analysis</td>
<td>4</td>
</tr>
<tr>
<td>ECE 205</td>
<td>Electrical and Electronic Circuits</td>
<td>3</td>
</tr>
<tr>
<td>FIN 221</td>
<td>Corporate Finance</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 107</td>
<td>Physical Geology</td>
<td>4</td>
</tr>
<tr>
<td>GEOL 118</td>
<td>Natural Disasters</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 333</td>
<td>Earth Materials and the Env</td>
<td>4</td>
</tr>
<tr>
<td>GEOL 380</td>
<td>Environmental Geology</td>
<td>4</td>
</tr>
<tr>
<td>ME 200</td>
<td>Thermodynamics</td>
<td>3</td>
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<tr>
<td>NPRE 201</td>
<td>Energy Systems</td>
<td>2 or 3</td>
</tr>
<tr>
<td>SE 400</td>
<td>Engineering Law</td>
<td>3 or 4</td>
</tr>
<tr>
<td>STAT 420</td>
<td>Methods of Applied Statistics</td>
<td>3 or 4</td>
</tr>
<tr>
<td>UP 205</td>
<td>Ecology &amp; Environmental Sustainability</td>
<td>3</td>
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<tr>
<td></td>
<td>Civil Engineering Core Courses:</td>
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<tr>
<td>CEE 300</td>
<td>Behavior of Materials</td>
<td>4</td>
</tr>
<tr>
<td>CEE 320</td>
<td>Construction Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEE 360</td>
<td>Structural Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEE 380</td>
<td>Geotechnical Engineering</td>
<td>3</td>
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<tr>
<td></td>
<td>Civil Engineering Core Courses Recommended- None</td>
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<tr>
<td></td>
<td>Advanced Technical Courses - Required:</td>
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<tr>
<td>CEE 420</td>
<td>Construction Productivity</td>
<td>3 or 4</td>
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<tr>
<td>CEE 421</td>
<td>Construction Planning (Required Integrated Design Course)</td>
<td>3 or 4</td>
</tr>
<tr>
<td>CEE 422</td>
<td>Construction Cost Analysis</td>
<td>3 or 4</td>
</tr>
<tr>
<td>CEE 461</td>
<td>Reinforced Concrete I</td>
<td>3</td>
</tr>
</tbody>
</table>

Information listed in this catalog is current as of 10/2019
Civil Engineering Core Courses Recommended:
CEE 330

Civil Engineering Core Courses Required:
STAT 420
MSE 401
ME 200
MCB 300
GEOL 107
CS 357
CHEM 232
CHEM 222

Science Electives Recommended:

Science Electives Required - None

Environmental Engineering
CEE 300
CEE 310

Civil Engineering Core Courses Recommended:
CEE 360
CEE 380

Advanced Technical Courses Required:
CEE 401 Concrete Materials (Required Integrated Design Course)
CEE 405 Asphalt Materials I

Advanced Technical Courses Recommended:
CEE 406 Pavement Design I
CEE 460 Steel Structures I
CEE 461 Reinforced Concrete I
CEE 469 Wood Structures
CEE 483 Soil Mechanics and Behavior
MSE 406 Thermal-Mech Behavior of Matls
MSE 440 Mechanical Behavior of Metals
MSE 445 Corrosion of Metals

Environmental Engineering
Science Electives Required - None
Science Electives Recommended:
CHEM 222 Quantitative Analysis Lecture
CHEM 232 Elementary Organic Chemistry I
CS 357 Numerical Methods I
GEOL 107 Physical Geology
MCB 300 Microbiology
ME 200 Thermodynamics
MSE 401 Thermodynamics of Materials
STAT 420 Methods of Applied Statistics

Civil Engineering Core Courses Required:
CEE 330 Environmental Engineering

Civil Engineering Core Courses Recommended:
CEE 401 Concrete Materials
CEE 424 Sustainable Const Methods
CEE 460 Steel Structures I
CEE 469 Wood Structures
CEE 480 Foundation Engineering

Construction Materials Engineering
Science Electives Required - None
Science Electives Recommended:
GEO 107 Physical Geology
GEO 333 Earth Materials and the Env
ME 200 Thermodynamics
ME 430 Failure of Engr Materials
MSE 401 Thermodynamics of Materials
MSE 402 Kinetic Processes in Materials
MSE 420 Ceramic Materials & Properties
MSE 450 Polymer Science & Engineering
TAM 427 Mechanics of Polymers
TAM 428 Mechanics of Composites

Civil Engineering Core Courses Required:
CEE 300 Behavior of Materials
CEE 310 Transportation Engineering

Civil Engineering Core Courses Recommended:
CEE 360 Structural Engineering
CEE 380 Geotechnical Engineering

Advanced Technical Courses Required:
CEE 401 Concrete Materials (Required Integrated Design Course)
CEE 405 Asphalt Materials I

Advanced Technical Courses Recommended:
CEE 406 Pavement Design I
CEE 460 Steel Structures I
CEE 461 Reinforced Concrete I
CEE 469 Wood Structures
CEE 483 Soil Mechanics and Behavior
MSE 406 Thermal-Mech Behavior of Matls
MSE 440 Mechanical Behavior of Metals
MSE 445 Corrosion of Metals

Geotechnical Engineering
Science Electives Required - None
Science Electives Recommended:
GEO 333 Earth Materials and the Env
GEO 380 Environmental Geology
GEO 401 Geomorphology
GEO 411 Structural Geol and Tectonics
GEO 440 Sedimentology and Stratigraphy
GEO 470 Introduction to Hydrogeology

Civil Engineering Core Courses Required:
CEE 360 Structural Engineering
CEE 380 Geotechnical Engineering

Civil Engineering Core Courses Recommended:
CEE 300 Behavior of Materials
CEE 310 Transportation Engineering
CEE 320 Construction Engineering
CEE 330 Environmental Engineering
CEE 350 Water Resources Engineering

Advanced Technical Courses Required:
CEE 483 Soil Mechanics and Behavior
CEE 484 Applied Soil Mechanics (Required Integrated Design Course)

Advanced Technical Courses Recommended:
CEE 457 Groundwater
CEE 460 Steel Structures I
CEE 461 Reinforced Concrete I
CEE 463 Reinforced Concrete II

Structural Engineering
Science Electives Required - None
Science Electives Recommended:
CS 357 Numerical Methods I
ECE 205 Electrical and Electronic Circuits

Environmental Engineering Lab (Required Integrated Design Course)
### Civil Engineering, BS

**Civil Engineering Core Courses:**
- CEE 300 Behavior of Materials 4
- CEE 360 Structural Engineering 3
- CEE 380 Geotechnical Engineering 3

**Civil Engineering Core Courses Recommended:**
- CEE 320 Construction Engineering 3

**Advanced Technical Courses Required:**
- CEE 460 Steel Structures I 3
- CEE 461 Reinforced Concrete I 3
- CEE 465 Design of Structural Systems (Required Integrated Design Course) 3
- CEE 470 Structural Analysis 4

**Advanced Technical Courses Recommended - None**

**Transportation Engineering**

**Science Electives Required - None**

**Science Electives Recommended:**
- CS 357 Numerical Methods I 3
- ECE 205 Electrical and Electronic Circuits 3
- GEOL 107 Physical Geology 4
- ME 200 Thermodynamics 3
- ME 340 Dynamics of Mechanical Systems 3.5
- MSE 401 Thermodynamics of Materials 3
- SE 320 Control Systems 4
- STAT 420 Methods of Applied Statistics 3 or 4

**Civil Engineering Core Courses Required:**
- CEE 300 Behavior of Materials 4
- CEE 310 Transportation Engineering 3

**Civil Engineering Core Courses Recommended:**
- CEE 320 Construction Engineering 3
- CEE 330 Environmental Engineering 3
- CEE 350 Water Resources Engineering 3
- CEE 360 Structural Engineering 3
- CEE 380 Geotechnical Engineering 3

**Advanced Technical Courses: You must select one course from each of the three Areas below and one course from the recommended list.**

#### Area 1 - Facilities
- CEE 405 Asphalt Materials I 3 or 4
- CEE 406 Pavement Design I 3 or 4
- CEE 407 Airport Design 3 or 4

#### Area 2 - Systems:
- CEE 407 Airport Design 3 or 4
- CEE 415 Geometric Design of Roads (Required Integrated Design Course) 4
- CEE 416 Traffic Capacity Analysis 3 or 4
- CEE 418 Public Transportation Systems 3 or 4

#### Area 3 - Railroad:
- CEE 408 Railroad Transportation Engrg 3 or 4
- CEE 409 Railroad Track Engineering 3 or 4
- CEE 410 Railway Signaling & Control 3 or 4

**CEE 411 RR Project Design & Constr 3 or 4**
- CEE 412 High-Speed Rail Engineering 3 or 4

**Recommended:**
- CEE 401 Concrete Materials 4
- CEE 405 Asphalt Materials I 3 or 4
- CEE 406 Pavement Design I 3 or 4
- CEE 407 Airport Design 3 or 4
- CEE 408 Railroad Transportation Engnr 3 or 4
- CEE 409 Railroad Track Engineering 3 or 4
- CEE 410 Railway Signaling & Control 3 or 4
- CEE 411 RR Project Design & Constr 3 or 4
- CEE 412 High-Speed Rail Engineering 3 or 4
- CEE 415 Geometric Design of Roads 4
- CEE 416 Traffic Capacity Analysis 3 or 4
- CEE 417 Urban Transportation Planning 4
- CEE 418 Public Transportation Systems 3 or 4
- CEE 498 Special Topics (Section HRP) 1 to 4
- CEE 498 Special Topics (Section HRM) 1 to 4

**Water Resources Engineering and Science**

**Science Electives Required - None**

**Science Electives Recommended:**
- CS 357 Numerical Methods I 3
- GEOL 107 Physical Geology 4
- ME 200 Thermodynamics 3
- CEE 350 Water Resources Engineering 3

**Civil Engineering Core Courses Required:**
- CEE 330 Environmental Engineering 3
- CEE 388 Geotechnical Engineering 3

**Advanced Technical Courses Required (Choose one):**
- CEE 452 Hydraulic Analysis and Design 3
- CEE 453 Urban Hydrology and Hydraulics (Required Integrated Design Course) 4

**Advanced Technical Courses Recommended:**
- CEE 432 Stream Ecology 3 or 4
- CEE 433 Water Technology and Policy 3 or 4
- CEE 434 Environmental Systems I 3
- CEE 437 Water Quality Engineering 3
- CEE 450 Surface Hydrology 3
- CEE 451 Environmental Fluid Mechanics 3
- CEE 452 Hydraulic Analysis and Design 3
- CEE 453 Urban Hydrology and Hydraulics 4
- CEE 457 Groundwater 3
- CEE 458 Water Resources Field Methods 4
- CEE 498 Special Topics (Section EH) 1 to 4

**Energy-Water-Environment Sustainability**

**Science Electives Required:**
- ME 200 Thermodynamics 3 or 4
  - or CHBE 321 Thermodynamics
### Science Electives Recommended - None

### Civil Engineering Core Courses Required:
- **CEE 340** Energy and Global Environment 3

### Civil Engineering Core Courses Recommended:
- **CEE 330** Environmental Engineering 3
- **CEE 350** Water Resources Engineering 3

### Advanced Technical Courses Required:
- **CEE 493** Sustainable Design Eng Tech (Must also select 3 courses from recommended list below) 4

### Advanced Technical Courses Recommended:
- **ABE 436** Renewable Energy Systems 3 or 4
- **ARCH 441** Heat and Moisture in Buildings 3
- **CEE 424** Sustainable Const Methods 4
- **CEE 433** Water Technology and Policy 3 or 4
- **CEE 434** Environmental Systems I 3
- **CEE 437** Water Quality Engineering 3
- **CEE 446** Air Quality Engineering 4
- **CEE 449** Environmental Engineering Lab 3
- **CEE 450** Surface Hydrology 3
- **CEE 452** Hydraulic Analysis and Design 3
- **CEE 453** Urban Hydrology and Hydraulics 4
- **CEE 457** Groundwater 3
- **CEE 498** Special Topics (Section EH) 1 to 4
- **ENG 471** Seminar Energy & Sustain Engrg 1
- **ME 400** Energy Conversion Systems 3 or 4
- **NPRE 402** Nuclear Power Engineering 3 or 4
- **NPRE 475** Wind Power Systems 3 or 4

### Societal Risk Management

Science Electives Required - None

### Science Electives Recommended:
- **FIN 230** Introduction to Insurance 3
- **GEOL 118** Natural Disasters 3
- **LAW 301** Introduction to Law 2 or 3
- **NRES 287** Environment and Society 3
- **STAT 420** Methods of Applied Statistics 3 or 4

### Civil Engineering Core Courses Required:
- **CEE 340** Energy and Global Environment 3

### Civil Engineering Core Courses Recommended:
- **CEE 300** Behavior of Materials 4
- **CEE 310** Transportation Engineering 3
- **CEE 320** Construction Engineering 3
- **CEE 330** Environmental Engineering 3
- **CEE 350** Water Resources Engineering 3
- **CEE 360** Structural Engineering 3
- **CEE 380** Geotechnical Engineering 3

### Advanced Technical Courses Required:
- **CEE 491** Decision and Risk Analysis (and select 3 from the recommended list below) 3 or 4

### Advanced Technical Courses Recommended:
- **CEE 406** Pavement Design I 3 or 4
- **CEE 416** Traffic Capacity Analysis 3 or 4
- **CEE 417** Urban Transportation Planning 4

### CEE 437 Water Quality Engineering 3
- **CEE 440** Fate Cleanup Environ Pollutant 4
- **CEE 449** Environmental Engineering Lab 3
- **CEE 460** Steel Structures I 3
- **CEE 461** Reinforced Concrete I 3
- **CEE 465** Design of Structural Systems 3
- **CEE 472** Structural Dynamics I 3 or 4
- **CEE 498** Special Topics (Section WE) 1 to 4
- **IE 410** Advanced Topics in Stochastic Processes & Applications 3 or 4
- **NPRE 442** Radioactive Waste Management 3
- **SE 450** Decision Analysis I 3 or 4
- **STAT 425** Applied Regression and Design 3 or 4
- **STAT 429** Time Series Analysis 3 or 4
- **STAT 430** Topics in Applied Statistics 3 or 4
- **UP 438** Disasters and Urban Planning 4

### Sustainable and Resilient Infrastructure Systems

Science Electives Required - None

### Science Electives Recommended:
- **ATMS 120** Severe and Hazardous Weather 3
- **CS 357** Numerical Methods I 3
- **ENSI 300** Environmental Sustainability 3
- **ESE 140** Climate and Global Change 3
- **ESE 320** Water Planet, Water Crisis 3
- **ESE 482** Challenges of Sustainability 3
- **FIN 221** Corporate Finance 3
- **GEOG 103** Earth’s Physical Systems 4
- **NPRE 201** Energy Systems 2 or 3
- **NRES 439** Env and Sustainable Dev 3
- **SE 320** Control Systems 4
- **STAT 420** Methods of Applied Statistics 3 or 4
- **UP 406** Urban Ecology 4

### Civil Engineering Core Courses Required:
- **CEE 340** Energy and Global Environment 3

### Civil Engineering Core Courses Recommended:
- **CEE 300** Behavior of Materials 4
- **CEE 310** Transportation Engineering 3
- **CEE 320** Construction Engineering 3
- **CEE 330** Environmental Engineering 3
- **CEE 350** Water Resources Engineering 3
- **CEE 380** Geotechnical Engineering 3

### Advanced Technical Courses Required:
- **CEE 491** Decision and Risk Analysis (And select 3 courses from the recommended list below) 3 or 4

### Advanced Technical Courses Recommended:
- **ABE 436** Renewable Energy Systems 3 or 4
- **CEE 401** Concrete Materials 4
- **CEE 406** Pavement Design I 3 or 4
- **CEE 408** Railroad Transportation Engrg 3 or 4
- **CEE 409** Railroad Track Engineering 3 or 4
- **CEE 416** Traffic Capacity Analysis 3 or 4
- **CEE 417** Urban Transportation Planning 4

*Information listed in this catalog is current as of 10/2019*
### Civil Engineering, BS

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CEE 418</td>
<td>Public Transportation Systems</td>
<td>3 or 4</td>
</tr>
<tr>
<td>CEE 421</td>
<td>Construction Planning</td>
<td>3 or 4</td>
</tr>
<tr>
<td>CEE 424</td>
<td>Sustainable Const Methods</td>
<td>4</td>
</tr>
<tr>
<td>CEE 434</td>
<td>Environmental Systems I</td>
<td>3</td>
</tr>
<tr>
<td>CEE 453</td>
<td>Urban Hydrology and Hydraulics</td>
<td>4</td>
</tr>
<tr>
<td>CEE 458</td>
<td>Water Resources Field Methods</td>
<td>4</td>
</tr>
<tr>
<td>CEE 465</td>
<td>Design of Structural Systems</td>
<td>3</td>
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<tr>
<td>CEE 493</td>
<td>Sustainable Design Eng Tech</td>
<td>4</td>
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<tr>
<td>CEE 498</td>
<td>Special Topics (Section PS)</td>
<td>1 to 4</td>
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<tr>
<td>MSE 489</td>
<td>Mati Select for Sustainability</td>
<td>3 or 4</td>
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<tr>
<td>UP 466</td>
<td>Energy, Ping &amp; Bld Environment</td>
<td>4</td>
</tr>
<tr>
<td>UP 480</td>
<td>Sustainable Design Principles</td>
<td>2</td>
</tr>
</tbody>
</table>

#### General Civil Engineering

### Science Electives Required - Choose one course from recommended list below:

### Science Electives Recommended:
- GEO 107 Physical Geology: 4
- CHEM 222 Quantitative Analysis Lecture: 2
- CHEM 232 Elementary Organic Chemistry I: 3 or 4
- ME 200 Thermodynamics: 3
- STAT 400 Statistics and Probability I: 4

### Civil Engineering Core Courses Required - Must take 7 courses from list below:
- CEE 300 Behavior of Materials: 4
- CEE 310 Transportation Engineering: 3
- CEE 320 Construction Engineering: 3
- CEE 330 Environmental Engineering: 3
- CEE 340 Energy and Global Environment: 3
- CEE 350 Water Resources Engineering: 3
- CEE 360 Structural Engineering: 3
- CEE 380 Geotechnical Engineering: 3

### Construction: Advanced Technical Courses Required - Option I: Pick no more than one course from each area below such that the sum of the core and advanced courses is at least 34 credit hours.
- CEE 420 Construction Productivity: 3 or 4
- CEE 421 Construction Planning: 3 or 4
- CEE 422 Construction Cost Analysis: 3 or 4

### Environmental: Advanced Technical Courses Required - Choose 2 courses from the recommended list below:
- CEE 437 Water Quality Engineering: 3
- CEE 440 Fate Cleanup Environ Pollutant: 4
- CEE 446 Air Quality Engineering: 4

### Geotechnical: Advanced Technical Courses Recommended:
- CEE 480 Foundation Engineering: 3
- CEE 483 Soil Mechanics and Behavior: 4

### Materials:
- CEE 401 Concrete Materials: 4

### Structures:
- CEE 460 Steel Structures I: 3
- CEE 461 Reinforced Concrete I: 3

### Transportation:
- CEE 405 Asphalt Materials I: 3 or 4
- CEE 406 Pavement Design I: 3 or 4
- CEE 407 Airport Design: 3 or 4
- CEE 408 Railroad Transportation Engrg: 3 or 4
- CEE 409 Railroad Track Engineering: 3 or 4
- CEE 410 Railway Signaling & Control: 3 or 4
- CEE 411 RR Project Design & Constr: 3 or 4
- CEE 412 High-Speed Rail Engineering: 3 or 4
- CEE 415 Geometric Design of Roads: 4
- CEE 416 Traffic Capacity Analysis: 3 or 4
- CEE 417 Urban Transportation Planning: 4
- CEE 418 Public Transportation Systems: 3 or 4

### Water Resources:
- CEE 452 Hydraulic Analysis and Design: 3
- CEE 453 Urban Hydrology and Hydraulics: 4

### Secondary Field Advanced Technical Electives. Select courses from approved lists to complement the primary area and add breadth to the program of study. See list below:
- CEE 423 Construction Engineering and Management
- CEE 424 Construction Materials Engineering
- CEE 425 Environmental Engineering

### Civil Engineering Core Courses Required:
- CEE 320 Construction Engineering: 3
- Advanced Technical Courses Required:
  - CEE 421 Construction Planning: 3 or 4
  - CEE 422 Construction Cost Analysis: 3 or 4

### Advanced Technical Courses Recommended:
- CEE 424 Sustainable Const Methods: 4

### Construction Materials Engineering

### Civil Engineering Core Courses Required:
- CEE 300 Behavior of Materials: 4
- Advanced Technical Courses Required - Pick 2 courses from the recommended list below:
  - CEE 420 Construction Productivity: 3 or 4
  - or CEE 422 Construction Cost Analysis: 3 or 4

### Advanced Technical Courses Recommended:
- CEE 401 Concrete Materials: 4
- CEE 405 Asphalt Materials I: 3 or 4
- MSE 406 Thermal-Mech Behavior of Matls: 3

### Environmental Engineering

### Civil Engineering Core Courses Required:
- CEE 330 Environmental Engineering: 3
- Advanced Technical Courses Required - Choose 2 courses from the recommended list below:
  - CEE 430 Ecological Quality Engineering: 2
  - CEE 434 Environmental Systems I: 3
  - CEE 437 Water Quality Engineering: 3
  - CEE 438 Science & Environmental Policy: 3
  - CEE 445 Air Quality Modeling: 4
  - CEE 442 Environmental Engineering Principles, Physical: 4
  - CEE 443 Env Eng Principles, Chemical: 4
  - CEE 444 Env Eng Principles, Biological: 4
  - CEE 446 Air Quality Engineering: 4
  - CEE 447 Atmospheric Chemistry: 4
  - CEE 449 Environmental Engineering Lab: 3

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Information listed in this catalog is current as of 10/2019
Geotechnical Engineering
Civil Engineering Core Courses Required:
CEE 380 Geotechnical Engineering 3
Advanced Technical Courses Required:
CEE 480 Foundation Engineering 3
Advanced Technical Courses Recommended:
CEE 483 Soil Mechanics and Behavior 4
CEE 484 Applied Soil Mechanics 4

Structural Engineering
Civil Engineering Core Courses Required:
CEE 360 Structural Engineering 3
Advanced Technical Courses Required:
CEE 460 Steel Structures I 3
CEE 461 Reinforced Concrete I 3

Transportation Engineering
Civil Engineering Core Courses Required:
CEE 310 Transportation Engineering 3
Advanced Technical Courses Required: Select 2 courses, each from a different Area
Area 1 - Facilities:
CEE 405 Asphalt Materials I 3 or 4
CEE 406 Pavement Design I 3 or 4
CEE 407 Airport Design 3 or 4
Area 2 - Systems:
CEE 407 Airport Design 3 or 4
CEE 415 Geometric Design of Roads 4
CEE 416 Traffic Capacity Analysis 3 or 4
CEE 418 Public Transportation Systems 3 or 4
Area 3 - Railroad:
CEE 408 Railroad Transportation Engrg 3 or 4
CEE 409 Railroad Track Engineering 3 or 4
CEE 410 Railway Signaling & Control 3 or 4
CEE 411 RR Project Design & Constr 3 or 4
CEE 412 High-Speed Rail Engineering 3 or 4

Water Resources Engineering and Science
Civil Engineering Core Courses Required:
CEE 350 Water Resources Engineering 3
Advanced Technical Courses Required: 2 courses from the recommended list below:
Advanced Technical Courses Recommended:
CEE 432 Stream Ecology 3 or 4
CEE 433 Water Technology and Policy 3 or 4
CEE 450 Surface Hydrology 3
CEE 451 Environmental Fluid Mechanics 3
CEE 452 Hydraulic Analysis and Design 3
CEE 453 Urban Hydrology and Hydraulics 4
CEE 457 Groundwater 3
CEE 458 Water Resources Field Methods 4
CEE 498 Special Topics (Section EH) 1 to 4

Energy-Water-Environment Sustainability
Civil Engineering Core Courses Required:
CEE 340 Energy and Global Environment 3
Advanced Technical Courses Required:
CEE 493 Sustainable Design Eng Tech (and select one course from the recommended list below) 4

Advanced Technical Courses Recommended:
ABE 436 Renewable Energy Systems 3 or 4
ARCH 441 Heat and Moisture in Buildings 3
CEE 424 Sustainable Const Methods 4
CEE 433 Water Technology and Policy 3 or 4
CEE 434 Environmental Systems I 3
CEE 437 Water Quality Engineering 3
CEE 446 Air Quality Engineering 4
CEE 449 Environmental Engineering Lab 3
CEE 450 Surface Hydrology 3
CEE 452 Hydraulic Analysis and Design 3
CEE 453 Urban Hydrology and Hydraulics 4
CEE 457 Groundwater 3
CEE 498 Special Topics (Section EH) 1 to 4
ENG 471 Seminar Energy & Sustain Engrg 1
ME 400 Energy Conversion Systems 3 or 4
NPRE 402 Nuclear Power Engineering 3 or 4
NPRE 475 Wind Power Systems 3 or 4

Societal Risk Management
Civil Engineering Core Courses Required - None
Advanced Technical Courses Required:
CEE 491 Decision and Risk Analysis (and select one course from the recommended list below) 3 or 4

Advanced Technical Courses Recommended:
CEE 406 Pavement Design I 3 or 4
CEE 416 Traffic Capacity Analysis 3 or 4
CEE 417 Urban Transportation Planning 4
CEE 437 Water Quality Engineering 3
CEE 440 Fate Cleanup Environ Pollutant 4
CEE 449 Environmental Engineering Lab 3
CEE 460 Steel Structures I 3
CEE 461 Reinforced Concrete I 3
CEE 465 Design of Structural Systems 3
CEE 472 Structural Dynamics I 3 or 4
CEE 498 Special Topics (Section EW) 1 to 4
IE 410 Advanced Topics in Stochastic Processes & Applications 3 or 4
NPRE 442 Radioactive Waste Management 3
SE 450 Decision Analysis I 3 or 4
STAT 425 Applied Regression and Design 3 or 4
STAT 429 Time Series Analysis 3 or 4
STAT 430 Topics in Applied Statistics 3 or 4
UP 438 Disasters and Urban Planning 4

Sustainable and Resilient Infrastructure Systems
Civil Engineering Core Courses Required:
CEE 340 Energy and Global Environment 3
Civil Engineering Core Courses Recommended:
CEE 300 Behavior of Materials 4
CEE 310 Transportation Engineering 3
CEE 320 Construction Engineering 3

Information listed in this catalog is current as of 10/2019
CEE 330  Environmental Engineering  3
CEE 350  Water Resources Engineering  3
CEE 380  Geotechnical Engineering  3

Advanced Technical Courses Required:
CEE 491  Decision and Risk Analysis (And select one course from the recommended list below)  3 or 4

Advanced Technical Courses Recommended:
ABE 436  Renewable Energy Systems  3 or 4
CEE 401  Concrete Materials  4
CEE 406  Pavement Design I  3 or 4
CEE 408  Railroad Transportation Engrng  3 or 4
CEE 409  Railroad Track Engineering  3 or 4
CEE 416  Traffic Capacity Analysis  3 or 4
CEE 417  Urban Transportation Planning  4
CEE 418  Public Transportation Systems  3 or 4
CEE 421  Construction Planning  3 or 4
CEE 424  Sustainable Const Methods  4
CEE 434  Environmental Systems I  3
CEE 453  Urban Hydrology and Hydraulics  4
CEE 458  Water Resources Field Methods  4
CEE 465  Design of Structural Systems  3
CEE 493  Sustainable Design Eng Tech  4
CEE 498  Special Topics (Section PS)  1 to 4
MSE 489  Matl Select for Sustainability  3 or 4
UP 466  Energy, Plng & Blt Environment  4
UP 480  Sustainable Design Principles  2

Global Context
Science Electives Recommended:
CPSC 116  The Global Food Production Web  3
ESE 140  Climate and Global Change  3
ESE 320  Water Planet, Water Crisis  3
ESE 482  Challenges of Sustainability  3

Civil Engineering Core Courses Recommended:
CEE 330  Environmental Engineering  3
or CEE 350  Water Resources Engineering  3
CEE 340  Energy and Global Environment  3

Advanced Technical Courses Recommended: Must take at least 3 credit hours in each of the 2 areas below:

- Knowledge and Skills Needed to Effectively Address Global Issues:
  - ACE 451  Agriculture in Int'l Dev  3 to 4
  - ATMS 421  Earth Systems Modeling  4
  - CEE 438  Science & Environmental Policy  3
  - CEE 445  Air Quality Modeling  4
  - CEE 447  Atmospheric Chemistry  4
  - CEE 450  Surface Hydrology  3
  - ECON 420  International Economics  2 to 4

- Global CEE Design:
  - CEE 408  Railroad Transportation Engrng  3 or 4
  - CEE 417  Urban Transportation Planning  4
  - CEE 437  Water Quality Engineering  3
  - CEE 449  Environmental Engineering Lab  3
  - CEE 465  Design of Structural Systems  3

CEE Multidisciplinary
Science Electives Recommended: Any recommended science electives from existing CEE Primary and Secondary listed above

Civil Engineering Core Courses Recommended: Core courses relevant to the student's interests

Advanced Technical Courses: Students work with CEE Academic Advisors

Atmosphere Science (Primary Field: Environmental Engineering)

Civil Engineering Core Courses Required:
CEE 330  Environmental Engineering  3

Advanced Technical Courses Recommended:
ATMS 302  Atmospheric Dynamics I  3
ATMS 410  Radar Remote Sensing  4
ATMS 411  Satellite Remote Sensing  4
ATMS 421  Earth Systems Modeling  4
CEE 445  Air Quality Modeling  4
CEE 447  Atmospheric Chemistry  4

Chemistry (Primary Field: Environmental Engineering)

Civil Engineering Core Courses Required:
CEE 330  Environmental Engineering  3

Advanced Technical Courses Recommended:
CHEM 232  Elementary Organic Chemistry I  3 or 4
CHEM 315  Instrumental Chem Systems Lab  2
CHEM 332  Elementary Organic Chem II  4
CHEM 420  Instrumental Characterization  2
CHEM 440  Physical Chemistry Principles  4

Chemical Engineering (Primary Field: Environmental Engineering)

Civil Engineering Core Courses Required:
CEE 330  Environmental Engineering  3

Advanced Technical Courses Recommended:
CHBE 321  Thermodynamics  4
CHBE 421  Momentum and Heat Transfer  4
CHBE 422  Mass Transfer Operations  4
CHBE 424  Chemical Reaction Engineering  3

Microbiology (Primary Field: Environmental Engineering)

Civil Engineering Core Courses Required:
CEE 330  Environmental Engineering  3

Advanced Technical Courses Recommended:
MCB 301  Experimental Microbiology  3
MCB 341  Microbial Physiology  3
MCB 450  Introductory Biochemistry  3
CEE 444  Environ Eng Principles, Biological  4

Toxicology (Primary Field: Environmental Engineering)

Civil Engineering Core Courses Required:
CEE 330  Environmental Engineering  3

Advanced Technical Courses Recommended:
CHEM 332  Elementary Organic Chem II  4
ENVS 431  Environ Toxicology & Health  3
**General Education Requirements**

<table>
<thead>
<tr>
<th>Code</th>
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<th>Hours</th>
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<tbody>
<tr>
<td>A</td>
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<tr>
<td>ENVS 480</td>
<td>Basic Toxicology</td>
<td>3</td>
</tr>
<tr>
<td>MCB 450</td>
<td>Introductory Biochemistry</td>
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**Non-Primary Language Requirement**

<table>
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<td>0-9</td>
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</table>

Completion of the third semester or equivalent of a non-primary language is required. Completion of three years of a single language in high school satisfies this requirement.

**University Composition**

These courses teach fundamentals of expository writing.

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<thead>
<tr>
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<th>Hours</th>
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<tbody>
<tr>
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<tr>
<td>RHET 105</td>
<td>Writing and Research</td>
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</tr>
<tr>
<td>CMN 111</td>
<td>Oral &amp; Written Comm I</td>
<td></td>
</tr>
<tr>
<td>&amp; CMN 112</td>
<td>and Oral &amp; Written Comm II</td>
<td></td>
</tr>
<tr>
<td>ESL 111</td>
<td>Intro to Academic Writing I</td>
<td></td>
</tr>
<tr>
<td>&amp; ESL 112</td>
<td>and Intro to Academic Writing II</td>
<td></td>
</tr>
<tr>
<td>ESL 115</td>
<td>Principles of Academic Writing</td>
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</tr>
<tr>
<td>BTW 261</td>
<td>Principles Tech Comm</td>
<td>3</td>
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</tbody>
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**Free Electives**

Free electives. Additional unrestricted course work, subject to certain exceptions as noted by the College, so that there are at least 128 credit hours earned toward the degree.

<table>
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<tr>
<th>Code</th>
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<th>Hours</th>
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</table>

**Total Hours of Curriculum to Graduate**

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<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
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<td></td>
<td>128</td>
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</tbody>
</table>

1. External transfer students take ENG 300 instead.
2. MATH 220 may be substituted, with four of the five credit hours applying toward the degree. MATH 220 is appropriate for students with no background in calculus.

**Suggested Sequence**

The schedule that follows is illustrative, showing the typical sequence in which courses would be taken by a student with no college course credit already earned and who intends to graduate in four years. Each individual’s case may vary, but the position of required named courses is generally indicative of the order in which they should be taken.
CEE 495  Professional Practice  0
Civil engineering technical courses\(^5\)  9
Liberal education electives\(^4\)  6
\[\text{Semester Hours}\ 15\]

**Second Semester**
Civil engineering technical courses\(^5\)  9
Liberal education elective\(^4\)  3
Free elective  3
\[\text{Semester Hours}\ 15\]

Total Hours: 128

1. Offered in the fall semester should be taken in the first or second semester of enrollment in Civil Engineering.
2. RHET 105 may be taken in the first or second semester of the first year as authorized. The alternative is SE 101.
3. MATH 220 may be substituted, with four of the five credit hours applying toward the degree. MATH 220 is appropriate for students with no background in calculus.
4. Liberal education electives (https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements/#DegreeRequirements-LiberalEducationElectives) must include 6 hours of social & behavioral sciences and 6 hours of humanities & the arts course work from the campus General Education lists. ECON 102 or ECON 103 must be one of the social & behavioral sciences courses. The remaining 6 hours may be selected from a list maintained by the college, or additional course work from the campus General Education lists for social & behavioral sciences or humanities & the arts. Students must also complete the campus cultural studies requirement by completing (i) one western/comparative culture(s) course, (ii) one non-western culture(s) course, and (iii) one U.S. Minority Culture(s) course from the General Education cultural studies lists. Most students select liberal education courses that simultaneously satisfy these cultural studies requirements. Courses from the western, non-western, and US minority lists that fall into free electives or other categories may also be used satisfy the cultural studies requirements.
5. Civil engineering technical courses are defined as core courses and advanced technical electives and must total 34 hours of credit. Five courses and a minimum of fifteen hours must be core courses as outlined in the Civil Engineering Undergraduate Handbook (http://cee.illinois.edu/handbooks) Advanced technical electives are selected to correspond with chosen primary and secondary areas of emphasis in civil engineering as outlined in the Civil Engineering Undergraduate Handbook (http://cee.illinois.edu/handbooks) A minimum of twelve and six hours must be taken for the primary and secondary areas, respectively.
6. The science elective is selected in accord with recommendations for the chosen primary area of emphasis in civil engineering as outlined in the Civil Engineering Undergraduate Handbook (http://cee.illinois.edu/handbooks).