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 hydrualics, structural engineering, and transportation engineering) and three interdisciplinary programs (sustainable and resilient infrastructure systems; energy, water, and environmental sustainability; and societal risk and hazard mitigation). 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.

for the degree of Bachelor of Science in Civil Engineering

Graduation Requirements

Minimum Overall GPA: 2.0
Minimum hours required for graduation: 128 hours

General education: Students must complete the Campus General Education (https://courses.illinois.edu/gedenda/DEFAULT/DEFAULT) requirements including the campus general education language requirement. One of the SBS courses must be an introductory economics course (ECON 102 or ECON 103). The Advanced Composition course must be BTW 261.

Orientation and Professional Development

<table>
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<tr>
<th>Code</th>
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<tbody>
<tr>
<td>CEE 195</td>
<td>About Civil Engineering</td>
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<td>CEE 495</td>
<td>Professional Practice</td>
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<td>ENG 100</td>
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Foundational Mathematics and Science

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

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<tr>
<td>CEE 201</td>
<td>Systems Engrg &amp; Economics</td>
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<tr>
<td>CEE 202</td>
<td>Engineering Risk &amp; Uncertainty</td>
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<tr>
<td>CS 101</td>
<td>Intro Computing: Engrg &amp; Sci</td>
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<td>SE 101</td>
<td>Engineering Graphics &amp; Design</td>
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<tr>
<td>TAM 211</td>
<td>Statics</td>
<td>3</td>
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<td>TAM 212</td>
<td>Introductory Dynamics</td>
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<tr>
<td>TAM 251</td>
<td>Introductory Solid Mechanics</td>
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<td>TAM 335</td>
<td>Introductory Fluid Mechanics</td>
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Information listed in this catalog is current as of 09/2020
Science Elective
Code    Title                                Hours
Science elective, selected in accord with recommendations
for the chosen primary field in civil engineering. 3
ATMS 120 Severe and Hazardous Weather        3
CHBE 321 Thermodynamics                      4
CHEM 222 Quantitative Analysis Lecture      2
CS 357 Numerical Methods I                   3
ECE 205 Electrical and Electronic Circuits  3
GEOL 107 Physical Geology                    4
GEOL 118 Natural Disasters                   3
ME 200 Thermodynamics                        3
STAT 420 Methods of Applied Statistics       3 or 4
Civil Engineering Technical Electives
Students choose primary and secondary fields, of which there are
seven traditional areas of study and three interdisciplinary programs.
The specific choices of courses in this category are made through the
submission of a Plan of Study, which is subject to approval by the faculty
Program Review Committee.

Code    Title                                Hours
Civil engineering technical courses, selected as follows, to at
least include: 34
Civil Engineering Core Courses
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:
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
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:
Construction Engineering and Management
Science Electives Required - NONE
Science Electives Recommended - See below:
ATMS 120 Severe and Hazardous Weather         3
ATMS 303 Synoptic-Dynamic Wea Analysis        4
ECE 205 Electrical and Electronic Circuits   3
FIN 221 Corporate Finance                    3
GEOL 107 Physical Geology                    4
GEOL 118 Natural Disasters                   3
GEOL 333 Earth Materials and the Env         4
GEOL 380 Environmental Geology               4
ME 200 Thermodynamics                        3
NPRE 201 Energy Systems                      2 or 3
SE 400 Engineering Law                       3 or 4
STAT 420 Methods of Applied Statistics       3 or 4
UP 205 Ecology & Environmental Sustainability 3
Civil Engineering Core Courses:
CEE 300 Behavior of Materials                4
CEE 320 Construction Engineering             3
CEE 360 Structural Engineering               3
CEE 380 Geotechnical Engineering             3
Civil Engineering Core Courses Recommended: None
Advanced Technical Courses - Required:
CEE 420 Construction Productivity             3 or 4
CEE 421 Construction Planning (Required Integrated
Design Course)                              3 or 4
CEE 422 Construction Cost Analysis           3 or 4
CEE 461 Reinforced Concrete I                3
Advanced Technical Courses - Recommended:
CEE 404 Concrete Materials                   4
CEE 424 Sustainable Constr Methods           4
CEE 460 Steel Structures I                   3
TEE 469 Wood Structures                      3 or 4
CEE 480 Foundation Engineering              3
Construction Materials Engineering
Science Electives Required - None
Science Electives Recommended:
GEOL 107 Physical Geology                    4
ME 430 Failure of Engrg Materials            3 or 4
MSE 201 Phases and Phase Relations          3
TAM 427 Mechanics of Polymers                3
TAM 428 Mechanics of Composites              3
Civil Engineering Core Courses Required:
CEE 300 Behavior of Materials                4
CEE 310 Transportation Engineering          3
Civil Engineering Core Courses Recommended:
CEE 360 Structural Engineering               3
CEE 380 Geotechnical Engineering             3
Advanced Technical Courses Required:
CEE 401 Concrete Materials (Required Integrated
Design Course)                              4
CEE 405 Asphalt Materials I                  3 or 4
Advanced Technical Courses Recommended:
CEE 406 Pavement Design I                    3 or 4
CEE 460 Steel Structures I                   3
CEE 461 Reinforced Concrete I                3
CEE 469 Wood Structures                      3 or 4
CEE 483 Soil Mechanics and Behavior          4
MSE 401 Thermodynamics of Materials          3
MSE 402 Kinetic Processes in Materials       3
MSE 406 Thermal-Mech Behavior of Matls       3
MSE 420 Ceramic Materials & Properties       3
MSE 450 Polymer Science & Engineering        3 or 4
Environmental Engineering
Science Electives Required - None
Civil Engineering Core Courses Recommended:
CEE 380
CEE 360

Civil Engineering Core Courses Required:
GEOL 470
GEOL 440
GEOL 411
GEOL 401
MSE 401

Science Electives Recommended:
GEOL 107

Science Electives Required:

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

Advanced Technical Courses Required:
CEE 320
CEE 330
CEE 350
CEE 360

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

Advanced Technical Courses Required - None

Geotechnical Engineering
Science Electives Required:
GEOL 107 Physical Geology

Science Electives Recommended:
GEOL 333 Earth Materials and the Env
GEOL 380 Environmental Geology
GEOL 401 Geomorphology
GEOL 411 Structural Geol and Tectonics
GEOL 440 Sedimentology and Stratigraphy
GEOL 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: You must select one course from each of the three Areas below and one course from the recommended list.

Information listed in this catalog is current as of 09/2020
<table>
<thead>
<tr>
<th>Area 1 - Facilities</th>
<th>CEE 405</th>
<th>Asphalt Materials I</th>
<th>3 or 4</th>
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<tr>
<td></td>
<td>CEE 406</td>
<td>Pavement Design I</td>
<td>3 or 4</td>
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<td>CEE 407</td>
<td>Airport Design</td>
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<td><strong>Area 2 - Systems:</strong></td>
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<td>CEE 407</td>
<td>Airport Design</td>
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<td>CEE 415</td>
<td>Geometric Design of</td>
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<td>Roads (Required</td>
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<td>Integrated Design</td>
<td></td>
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<td>CEE 416</td>
<td>Traffic Capacity</td>
<td>3 or 4</td>
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<td>CEE 418</td>
<td>Public Transportation</td>
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<td>CEE 408</td>
<td>Railroad TransportationEngg</td>
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<td>CEE 409</td>
<td>Railroad Track</td>
<td>3 or 4</td>
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<td>CEE 410</td>
<td>Railway Signaling &amp;</td>
<td>3 or 4</td>
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<td>Control</td>
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<td>CEE 411</td>
<td>RR Project Design &amp;</td>
<td>3 or 4</td>
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<td>CEE 409</td>
<td>Railroad Track</td>
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<td>CEE 410</td>
<td>Railway Signaling &amp;</td>
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<td>CEE 411</td>
<td>RR Project Design &amp;</td>
<td>3 or 4</td>
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<td><strong>Advanced Technical Courses:</strong></td>
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<td>CEE 450</td>
<td>Surface Hydrology</td>
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<td>CEE 451</td>
<td>Environmental Fluid Mechanics</td>
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<td>CEE 452</td>
<td>Hydraulic Analysis and Design</td>
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<td>CEE 453</td>
<td>Urban Hydrology and Hydraulics</td>
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<td>CEE 457</td>
<td>Groundwater</td>
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<td>CEE 458</td>
<td>Water Resources Field Methods</td>
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<td>CEE 498</td>
<td>Special Topics (Section EH)</td>
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**Energy-Water-Environment Sustainability**

Science Electives Required:

- ME 200 Thermodynamics 3-4
- 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
- NPTE 402 Nuclear Power Engineering 3 or 4
- NPTE 475 Wind Power Systems 3 or 4

**Societal Risk and Hazard Mitigation**

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
Civil Engineering Core Courses Recommended:
- CEE 340

Civil Engineering Core Courses Required:
- UP 406
- STAT 420
- SE 320
- NRES 439
- NPRE 201
- GEOG 103
- FIN 221
- ESE 482
- ESE 320
- ESE 140
- ENSU 300
- CS 357
- ATMS 120

Science Electives Recommended:
- Sustainable and Resilient Infrastructure Systems

Advanced Technical Courses Recommended:
- CEE 491
  - Decision and Risk Analysis (And select 3 courses from the recommended list below)
- CEE 406
- CEE 416
- CEE 417
- CEE 437
- CEE 440
- CEE 449
- CEE 460
- CEE 461
- CEE 465
- CEE 472
- CEE 498
- IE 410
- NPRE 442
- SE 450
- STAT 425
- STAT 429
- STAT 430
- UP 438

Sustainable and Resilient Infrastructure Systems

Science Electives Required - None

Science Electives Recommended:
- Environmental:
  - ATMS 120
  - CS 357
  - ENSU 300
  - ESE 140
  - ESE 482
  - FIN 221
  - GEOG 103
  - NPRE 201
  - NRES 439
  - SE 320
  - STAT 420
  - UP 406

Civil Engineering Core Courses Required:
- CEE 340

Civil Engineering Core Courses Recommended:
- CEE 300
- CEE 310
- CEE 320
- CEE 330
- CEE 350
- CEE 380

Advanced Technical Courses Required:
- CEE 491
  - Decision and Risk Analysis (And select 3 courses from the recommended list below)
- Advanced Technical Courses Recommended:
  - ABE 436
  - CEE 401
  - CEE 406
  - CEE 408
  - CEE 409
  - CEE 416
  - CEE 417
  - CEE 418
  - CEE 421
  - CEE 424
  - CEE 434
  - CEE 453
  - CEE 458
  - CEE 465
  - CEE 493
  - CEE 498
  - MSE 489
  - UP 466
  - UP 480

General Civil Engineering

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

Science Electives Recommended:
- GEOL 107
- CHEM 222
- CHEM 232
- ME 200
- STAT 400

Civil Engineering Core Courses Required - Should take 7 courses from list below:
- CEE 300
- CEE 310
- CEE 320
- CEE 330
- CEE 340
- CEE 350
- CEE 380

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. Option II: Pick 2 courses from one area and no more than one course from each of the remaining areas to total 34 credit hours.

Construction:
- CEE 420
- CEE 421
- CEE 422

Environmental:

Information listed in this catalog is current as of 09/2020
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<td>CEE 440</td>
<td>Fate Cleanup Environ Pollutant</td>
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<td>CEE 446</td>
<td>Air Quality Engineering</td>
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<td>Geotechnical:</td>
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<td>CEE 480</td>
<td>Foundation Engineering</td>
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<td>CEE 483</td>
<td>Soil Mechanics and Behavior</td>
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<td>Materials:</td>
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<td>CEE 401</td>
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<td>Structures:</td>
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<td>CEE 460</td>
<td>Steel Structures I</td>
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<td>Transportation:</td>
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<td>CEE 405</td>
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<td>CEE 406</td>
<td>Pavement Design I</td>
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<td>CEE 407</td>
<td>Airport Design</td>
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<td>CEE 408</td>
<td>Railroad Transportation Engrg</td>
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<td>CEE 409</td>
<td>Railroad Track Engineering</td>
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<td>CEE 410</td>
<td>Railway Signaling &amp; Control</td>
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<td>CEE 411</td>
<td>RR Project Design &amp; Constr</td>
<td>3 or 4</td>
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<td>CEE 412</td>
<td>High-Speed Rail Engineering</td>
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<td>CEE 415</td>
<td>Geometric Design of Roads</td>
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<td>CEE 416</td>
<td>Traffic Capacity Analysis</td>
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<td>CEE 417</td>
<td>Urban Transportation Planning</td>
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<td>CEE 418</td>
<td>Public Transportation Systems</td>
<td>3 or 4</td>
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<td>Water Resources:</td>
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<td>CEE 452</td>
<td>Hydraulic Analysis and Design</td>
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<td>CEE 453</td>
<td>Urban Hydrology and Hydraulics</td>
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<td>Secondary Field Advanced Technical Electives.</td>
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<td>Select courses from approved lists to complement the primary area and add breadth to the program of study. See list below:</td>
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**Construction Engineering and Management**

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:

Advanced Technical Courses Recommended:
CEE 401 Concrete Materials 4
CEE 405 Asphalt Materials I 3 or 4
CEE 406 Pavement Design I 3 or 4

**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

**Geotechnical Engineering**

Civil Engineering Core Courses Required:
CEE 380 Geotechnical Engineering 3

Advanced Technical Courses Required:
CEE 480 Foundation Engineering 3-4
CEE 484 Applied Soil Mechanics 4
CEE 483 Soil Mechanics and Behavior 4

Advanced Technical Courses Recommended - NONE

**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

**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

Information listed in this catalog is current as of 09/2020
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CEE 450</td>
<td>Surface Hydrology</td>
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<td>CEE 451</td>
<td>Environmental Fluid Mechanics</td>
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<td>CEE 452</td>
<td>Hydraulic Analysis and Design</td>
<td>3</td>
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<td>CEE 453</td>
<td>Urban Hydrology and Hydraulics</td>
<td>4</td>
</tr>
<tr>
<td>CEE 457</td>
<td>Groundwater</td>
<td>3</td>
</tr>
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<td>CEE 458</td>
<td>Water Resources Field Methods</td>
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</tr>
<tr>
<td>CEE 498</td>
<td>Special Topics (Section EH)</td>
<td>1-4</td>
</tr>
</tbody>
</table>

**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:**

<table>
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<th>Course Title</th>
<th>Credits</th>
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</thead>
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<td>Renewable Energy Systems</td>
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<tr>
<td>ARCH 441</td>
<td>Heat and Moisture in Buildings</td>
<td>3</td>
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<tr>
<td>CEE 424</td>
<td>Sustainable Const Methods</td>
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<td>CEE 433</td>
<td>Water Technology and Policy</td>
<td>3 or 4</td>
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<td>CEE 434</td>
<td>Environmental Systems I</td>
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<td>CEE 437</td>
<td>Water Quality Engineering</td>
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<td>CEE 446</td>
<td>Air Quality Engineering</td>
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<td>CEE 449</td>
<td>Environmental Engineering Lab</td>
<td>3</td>
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<td>CEE 450</td>
<td>Surface Hydrology</td>
<td>3</td>
</tr>
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<td>CEE 452</td>
<td>Hydraulic Analysis and Design</td>
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<td>CEE 453</td>
<td>Urban Hydrology and Hydraulics</td>
<td>4</td>
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<tr>
<td>CEE 457</td>
<td>Groundwater</td>
<td>3</td>
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<tr>
<td>CEE 498</td>
<td>Special Topics (Section EH)</td>
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<tr>
<td>ENG 471</td>
<td>Seminar Energy &amp; Sustain Engrg</td>
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<tr>
<td>ME 400</td>
<td>Energy Conversion Systems</td>
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<tr>
<td>NPRE 402</td>
<td>Nuclear Power Engineering</td>
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<tr>
<td>NPRE 475</td>
<td>Wind Power Systems</td>
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</table>

**Societal Risk and Hazard Mitigation**

**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:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CEE 406</td>
<td>Pavement Design I</td>
<td>3 or 4</td>
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<tr>
<td>CEE 416</td>
<td>Traffic Capacity Analysis</td>
<td>3 or 4</td>
</tr>
<tr>
<td>CEE 417</td>
<td>Urban Transportation Planning</td>
<td>4</td>
</tr>
<tr>
<td>CEE 437</td>
<td>Water Quality Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEE 440</td>
<td>Fate Cleanup Environ Pollutant</td>
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<tr>
<td>CEE 449</td>
<td>Environmental Engineering Lab</td>
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<td>CEE 460</td>
<td>Steel Structures I</td>
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</tr>
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<td>CEE 461</td>
<td>Reinforced Concrete I</td>
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</tr>
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<td>CEE 465</td>
<td>Design of Structural Systems</td>
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<tr>
<td>CEE 472</td>
<td>Structural Dynamics I</td>
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<tr>
<td>IE 410</td>
<td>Advanced Topics in Stochastic Processes &amp; Applications</td>
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<td>NPRE 442</td>
<td>Radioactive Waste Management</td>
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<td>SE 450</td>
<td>Decision Analysis I</td>
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<td>STAT 425</td>
<td>Applied Regression and Design</td>
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<tr>
<td>STAT 429</td>
<td>Time Series Analysis</td>
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<tr>
<td>STAT 430</td>
<td>Topics in Applied Statistics</td>
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<tr>
<td>UP 438</td>
<td>Disasters and Urban Planning</td>
<td>4</td>
</tr>
</tbody>
</table>

**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
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:**

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<td>Concrete Materials</td>
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<td>Pavement Design I</td>
<td>3 or 4</td>
</tr>
<tr>
<td>CEE 408</td>
<td>Railroad Transportation Engrg</td>
<td>3 or 4</td>
</tr>
<tr>
<td>CEE 409</td>
<td>Railroad Track Engineering</td>
<td>3 or 4</td>
</tr>
<tr>
<td>CEE 416</td>
<td>Traffic Capacity Analysis</td>
<td>3 or 4</td>
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<td>CEE 417</td>
<td>Urban Transportation Planning</td>
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<td>CEE 418</td>
<td>Public Transportation Systems</td>
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<td>CEE 421</td>
<td>Construction Planning</td>
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<td>CEE 424</td>
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<td>Design of Structural Systems</td>
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<td>Sustainable Design Eng Tech</td>
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<td>CEE 498</td>
<td>Special Topics (Section PS)</td>
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<tr>
<td>MSE 489</td>
<td>Matl Select for Sustainability</td>
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<tr>
<td>UP 466</td>
<td>Energy &amp; the Built Environment</td>
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<tr>
<td>UP 480</td>
<td>Sustainable Design Principles</td>
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</table>

**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
CEE 350  Water Resources Engineering  3
CEE 340  Energy and Global Environment  3

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

**Knowledge and Skills Needed to Effectively Address Global Issues:**
ACE 451  Agriculture in Intl Dev  3 or 4
ATMS 421  Earth Systems Modeling  4
CEE 438  Science & Environmental Policy  3
MCB 431    Microbial Physiology            3
MCB 450    Introductory Biochemistry      3
CEE 444    Env 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
ENVS 480   Basic Toxicology                3
MCB 450    Introductory Biochemistry      3

Electives

<table>
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<tr>
<th>Code</th>
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<tr>
<td></td>
<td>The Grainger College of Engineering Liberal Education course list, or additional courses from the campus General Education lists for Social and Behavioral Sciences or Humanities and the Arts</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>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.</td>
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</tbody>
</table>

Total Hours of Curriculum to Graduate 128

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.
3. The Grainger College of Engineering approved liberal education course list can be found here (https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements/#DegreeRequirements-GeneralEducationElectives). Note that these credit hours could carry the required cultural studies designation required for campus general education requirements.
4. The Grainger College of Engineering restrictions to free electives can be found here (https://wiki.illinois.edu/wiki/display/ugadvise/Degree+Requirements/#DegreeRequirements-FreeElectives).

Suggested Sequence

The curriculum sequence below is a suggested sequence, as all Grainger Engineering students work with a department academic advisor to achieve their educational goals, specific to their needs and preparation. Dynamic and Static curricular maps, which include prerequisite sequencing, can be found here (https://grainger.illinois.edu/academics/undergraduate/majors-and-minors/cee-map).

First Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CEE 195</td>
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<tr>
<td>ENG 100</td>
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<tr>
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<tr>
<td>CHEM 102</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 103</td>
<td>1</td>
</tr>
<tr>
<td>RHET 105</td>
<td>4-3</td>
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</table>

First Year

<table>
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<th>Hours</th>
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<tr>
<td>CEE 195</td>
<td>1</td>
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<tr>
<td>ENG 100</td>
<td>0</td>
</tr>
<tr>
<td>MATH 221</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 102</td>
<td>3</td>
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<tr>
<td>CHEM 103</td>
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<tr>
<td>RHET 105</td>
<td>4-3</td>
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First Year

<table>
<thead>
<tr>
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<th>Hours</th>
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<tr>
<td>CEE 195</td>
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<tr>
<td>MATH 221</td>
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<td>CHEM 102</td>
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<tr>
<td>CHEM 103</td>
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<tr>
<td>RHET 105</td>
<td>4-3</td>
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First Year

<table>
<thead>
<tr>
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<th>Hours</th>
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<tbody>
<tr>
<td>CEE 195</td>
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<td>CHEM 102</td>
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<td>CHEM 103</td>
<td>1</td>
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<tr>
<td>RHET 105</td>
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General education elective\(^4\)  3  
Semester Hours  16-15  

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<th>Second Semester</th>
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<tbody>
<tr>
<td>MATH 231 Calculus II</td>
</tr>
<tr>
<td>CHEM 104 General Chemistry II</td>
</tr>
<tr>
<td>CHEM 105 General Chemistry Lab II</td>
</tr>
<tr>
<td>PHYS 211 University Physics: Mechanics</td>
</tr>
<tr>
<td>CS 101 Intro Computing: Engrg Sci</td>
</tr>
<tr>
<td>SE 101 Engineering Graphics Design or RHET 105(^5)</td>
</tr>
<tr>
<td>Semester Hours</td>
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### Second Year

#### First Semester
- CEE 201 Systems Engrg Economics | 3 |
- MATH 241 Calculus III | 4 |
- PHYS 212 University Physics: Elec Mag | 4 |
- TAM 211 Statics | 3 |
- MATH 225 Introductory Matrix Theory | 2 |

#### Second Semester
- CEE 202 Engineering Risk Uncertainty | 3 |
- PHYS 213 Univ Physics: Thermal Physics | 2 |
- TAM 212 Introductory Dynamics | 3 |
- TAM 251 Introductory Solid Mechanics | 3 |
- General education elective\(^4\) | 3 |
- Free elective | 3 |

#### Semester Hours

| 16 |

### Third Year

#### First Semester
- MATH 285 Intro Differential Equations | 3 |
- TAM 335 Introductory Fluid Mechanics | 4 |

#### Second Semester
- Civil engineering technical courses\(^5\) | 6 |
- Science elective\(^6\) | 3 |

#### Semester Hours

| 16 |

### Fourth Year

#### First Semester
- CEE 495 Professional Practice | 0 |
- Civil engineering technical courses\(^5\) | 9 |
- General education electives\(^4\) | 6 |

#### Semester Hours

| 15 |

#### Second Semester
- Civil engineering technical courses\(^5\) | 9 |
- General education elective\(^4\) | 3 |

#### Total Hours:  

| 128 |

---

1. Offered in the fall semester, student should take in the first or second semester of enrollment in Civil Engineering.
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.
3. RHET 105 (or an alternative Composition I sequence) is taken either in the first or second semester of the first year, according to the student's UIN (Spring if your UIN is Odd). SE 101 is taken the other semester. Composition I guidelines can be found at [http://catalog.illinois.edu/general-information/degree-general-education-requirements/] under Written Communication Requirement.
4. Students must take 6 hours from the campus General Education Social and Behavioral Sciences list, 6 hours from campus General Education Humanities and the Arts list, and 6 hours from a liberal education list approved by the college or from the campus General Education lists for Social and Behavioral Sciences or Humanities and the Arts. ECON 102 or ECON 103 must be one of the Social and Behavioral Sciences courses. 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 general education courses that simultaneously satisfy these 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. 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. 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].