# Civil Engineering, B.S.

**Program Educational Objectives:** Graduates of the Civil Engineering program will (1) establish a Civil Engineering career in industry, government, or academia and achieve professional licensure as appropriate; (2) demonstrate excellence and innovation in engineering problem solving and design in a global and societal context; (3) commit to lifelong learning and professional development to stay current in technology and contemporary issues; and (4) take on increasing levels of responsibility and leadership in technical and/or managerial roles. (Program educational objectives are those aspects of engineering that help shape the curriculum; achievement of these objectives is a shared responsibility between the student and UCI.)

The curriculum provides the opportunity to obtain a firm foundation in engineering science and to develop the techniques of analysis and design, which are basic for the successful practitioner. Emphasis is placed on developing problem-solving skills. Students apply principles of sustainability, leadership, diversity, equity, and inclusion in the formulation and solution of environmental problems.

**High School Students:** See [School Admissions](http://catalogue.uci.edu/thehenrysamuelischoolofengineering/#undergraduatestudytext) information.

**Transfer Students:** Preference will be given to junior-level applicants with the highest grades overall, and who have satisfactorily completed the following **required** courses: two years of approved calculus, one year of calculus-based physics with laboratories (mechanics, electricity and magnetism), completion of lower-division writing, one year of general chemistry (with laboratory), and one course in introductory programming. For course equivalency specific to each college, see [assist.org](https://assist.org).

Students are encouraged to complete as many of the lower-division degree requirements as possible prior to transfer. Students who enroll at UCI in need of completing lower-division coursework may find that it will take longer than two years to complete their degrees. For further information, contact The Henry Samuel School of Engineering at 949-824-4334.

All students must meet the [University Requirements](http://catalogue.uci.edu/informationforadmittedstudents/requirementsforbachelorsdegree/).

All students must meet the [School Requirements](http://catalogue.uci.edu/thehenrysamuelischoolofengineering/#schoolrequirementstext).

**Major Requirements**

### Mathematics and Basic Science Courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 1A</td>
<td>General Chemistry</td>
</tr>
<tr>
<td>or</td>
<td>General Chemistry for Engineers</td>
</tr>
<tr>
<td>CHEM 1B</td>
<td>General Chemistry</td>
</tr>
<tr>
<td>ENGRCEE 11</td>
<td>Methods II: Probability and Statistics</td>
</tr>
<tr>
<td>MATH 2A-2B</td>
<td>Single-Variable Calculus I and Single-Variable Calculus II</td>
</tr>
<tr>
<td>MATH 2D</td>
<td>Multivariable Calculus I</td>
</tr>
<tr>
<td>MATH 3A</td>
<td>Introduction to Linear Algebra</td>
</tr>
<tr>
<td>MATH 3D</td>
<td>Elementary Differential Equations</td>
</tr>
<tr>
<td>MATH 2E</td>
<td>Multivariable Calculus II</td>
</tr>
<tr>
<td>PHYSICS 7C</td>
<td>Classical Physics</td>
</tr>
<tr>
<td>PHYSICS 7LC</td>
<td>Classical Physics Laboratory</td>
</tr>
<tr>
<td>PHYSICS 7D</td>
<td>Classical Physics</td>
</tr>
<tr>
<td>PHYSICS 7LD</td>
<td>Classical Physics Laboratory</td>
</tr>
</tbody>
</table>

One basic science elective selected from any Biological Science or Earth Systems Science course with approved GE II designation.

### Lower-Division Technical Elective:

Select one course from two of the sections:

**Section A:**

- ENGR 7A-7B Introduction to Engineering I and Introduction to Engineering II

**Section B:**

- CHEM 1LE Accelerated General Chemistry Lab
- CHEM 1C-1LC General Chemistry and General Chemistry Laboratory

**Section C:**
EECS 70A  Network Analysis I
ENGR 54  Principles of Materials Science and Engineering
ENGRMAE 80  Dynamics
ENGRMAE 91  Introduction to Thermodynamics

**Engineering Topics Courses:**

ENGRCEE 20  Introduction to Computational Problem Solving
ENGRCEE 21  Computational Problem Solving
ENGRCEE 30  Statics
ENGRCEE 81A  Civil Engineering Practicum I
ENGRCEE 81B  Civil Engineering Practicum II
ENGRCEE 110  Methods III: Modeling, Economics, and Management
ENGRCEE 111  Methods IV: Systems Analysis and Decision-Making
ENGRCEE 121  Transportation Systems I: Analysis and Design
ENGRCEE 130  Soil Mechanics
ENGRCEE 130L  Soil Mechanics Laboratory
ENGRCEE 150  Mechanics of Materials
ENGRCEE 150L  Mechanics of Materials Laboratory
ENGRCEE 151A  Structural Analysis
ENGRCEE 151C  Reinforced Concrete Design
ENGRCEE 160  Environmental Processes
ENGRCEE 170  Introduction to Fluid Mechanics
ENGRCEE 171  Water Resources Engineering
ENGRCEE 181A-181B-181C  Senior Design Practicum I and Senior Design Practicum II and Senior Design Practicum III

**Engineering Professional Topics Courses:**

ENGRCEE 40  Fundamentals of Economic Analysis for Scientists and Engineers

or

ECON 20A-20B  Basic Economics I and Basic Economics II
ENGR 190W  Communications in the Professional World
ENGRCEE 60  Contemporary and Emerging Environmental Challenges

or UPPP 8  Introduction to Environmental Analysis and Design

**Specialization Electives:**

Students must select one of the areas of specialization and complete the associated requirements, as shown below. Students select, with the approval of a faculty advisor, any additional engineering topics courses needed to satisfy school and departmental requirements.

**Specialization in General Civil Engineering:**

Requires four courses, at least one course each from three of the following four options:

(1) Select one:
ENGRCEE 122  Transportation Systems II: Operations and Control
ENGRCEE 123  Transportation Systems III: Planning and Forecasting

(2) Select one:
ENGRCEE 149  Introduction to Earthquake Engineering
ENGRCEE 151B  Structural Timber Design
ENGRCEE 152  Computer Methods in Structural Analysis and Design
ENGRCEE 155  Structural Steel Design
ENGRCEE 156  Foundation Design

(3) Select one:
ENGRCEE 163  Wastewater Treatment Process Design
ENGRCEE 164  Carbon and Energy Footprint Analysis
ENGRCEE 165  Physical-Chemical Treatment Processes
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGRCEE 168</td>
<td>Microorganisms and Climate Change</td>
</tr>
<tr>
<td>ENGRCEE 169</td>
<td>Environmental Microbiology for Engineers</td>
</tr>
<tr>
<td>(4) Select one:</td>
<td></td>
</tr>
<tr>
<td>ENGRCEE 172</td>
<td>Groundwater Hydrology</td>
</tr>
<tr>
<td>ENGRCEE 173</td>
<td>Watershed Modeling</td>
</tr>
<tr>
<td>ENGRCEE 176</td>
<td>Hydrology</td>
</tr>
<tr>
<td>ENGRCEE 178</td>
<td>Fluid Mechanics of Open Channels</td>
</tr>
</tbody>
</table>

**Specialization in Environmental Hydrology and Water Resources:**

Select four of the following:

<table>
<thead>
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<tbody>
<tr>
<td>ENGRCEE 163</td>
<td>Wastewater Treatment Process Design</td>
</tr>
<tr>
<td>ENGRCEE 164</td>
<td>Carbon and Energy Footprint Analysis</td>
</tr>
<tr>
<td>ENGRCEE 165</td>
<td>Physical-Chemical Treatment Processes</td>
</tr>
<tr>
<td>ENGRCEE 166</td>
<td>Microbial Processes for Bioremediation</td>
</tr>
<tr>
<td>ENGRCEE 168</td>
<td>Microorganisms and Climate Change</td>
</tr>
<tr>
<td>ENGRCEE 169</td>
<td>Environmental Microbiology for Engineers</td>
</tr>
<tr>
<td>ENGRCEE 172</td>
<td>Groundwater Hydrology</td>
</tr>
<tr>
<td>ENGRCEE 173</td>
<td>Watershed Modeling</td>
</tr>
<tr>
<td>ENGRCEE 176</td>
<td>Hydrology</td>
</tr>
<tr>
<td>ENGRCEE 178</td>
<td>Fluid Mechanics of Open Channels</td>
</tr>
</tbody>
</table>

**Specialization in Structural Engineering:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGRCEE 155</td>
<td>Structural Steel Design</td>
</tr>
</tbody>
</table>

Select three of the following:

<table>
<thead>
<tr>
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<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGRCEE 149</td>
<td>Introduction to Earthquake Engineering</td>
</tr>
<tr>
<td>ENGRCEE 151B</td>
<td>Structural Timber Design</td>
</tr>
<tr>
<td>ENGRCEE 152</td>
<td>Computer Methods in Structural Analysis and Design</td>
</tr>
<tr>
<td>ENGRCEE 156</td>
<td>Foundation Design</td>
</tr>
<tr>
<td>ENGRMAE 155</td>
<td>Composite Materials and Structures</td>
</tr>
<tr>
<td>ENGRMAE 157</td>
<td>Lightweight Structures</td>
</tr>
</tbody>
</table>

**Specialization in Transportation Systems Engineering:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGRCEE 122</td>
<td>Transportation Systems II: Operations and Control</td>
</tr>
<tr>
<td>ENGRCEE 123</td>
<td>Transportation Systems III: Planning and Forecasting</td>
</tr>
</tbody>
</table>

Select two of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EECS 70A</td>
<td>Network Analysis I (EECS 70A may not be used in this Specialization if used for a Lower-Division Technical Elective.)</td>
</tr>
<tr>
<td>ENGRCEE 124</td>
<td>Transportation Systems IV: Freeway Operations and Control</td>
</tr>
<tr>
<td>ENGRCEE 125</td>
<td>Transportation and the Environment</td>
</tr>
<tr>
<td>ENGRMAE 170</td>
<td>Introduction to Control Systems</td>
</tr>
<tr>
<td>ENGRMAE 171</td>
<td>Digital Control Systems</td>
</tr>
</tbody>
</table>

* ENGR 7A-ENGR 7B is available only to lower-division students in Fall and Winter quarters. Both ENGR 7A-ENGR 7B must be taken to be counted as one Lower-Division Technical Elective.

(The nominal Civil Engineering program will require 185 units of courses depending on specialization to satisfy all university and major requirements. Because each student comes to UCI with a different level of preparation, the actual number of units will vary.)

At most an aggregate total of 6 units of 199 or H199 courses may be used to satisfy degree requirements.

The sample program of study chart shown is typical for the accredited major in Civil Engineering. Students should keep in mind that this program is based upon a rigid set of prerequisites, beginning with adequate preparation in high school mathematics, physics, and chemistry. Therefore, the course sequence should not be changed except for the most compelling reasons. Students must have their programs approved by their faculty advisor. Civil Engineering majors are encouraged to consult with academic counselors as needed, and students who are academically at risk are mandated to see a counselor as frequently as deemed necessary by the advising staff.
# Sample Program of Study — Civil Engineering

## Freshman

### Fall
- MATH 2A
- CHEM 1A or ENGR 1A
- General Education
- Lower-Division Technical Elective

### Winter
- MATH 2B
- PHYSICS 7C
- PHYSICS 7LC
- CHEM 1B
- General Education

### Spring
- MATH 2D
- PHYSICS 7D
- PHYSICS 7LD
- ENGRCEE 81A
- Basic Science Elective

## Sophomore

### Fall
- MATH 3A
- ENGRCEE 20
- ENGRCEE 30
- General Education

### Winter
- MATH 3D
- ENGRCEE 11
- ENGRCEE 81B
- General Education

### Spring
- MATH 2E
- ENGRCEE 21
- Lower-Division Technical Elective
- General Education

## Junior

### Fall
- ENGRCEE 121
- ENGRCEE 150
- ENGRCEE 150L
- ENGRCEE 170
- ENGR 190W

### Winter
- ENGRCEE 130
- ENGRCEE 130L
- ENGRCEE 151A
- ENGRCEE 171
- General Education

### Spring
- ENGRCEE 111
- ENGRCEE 151C
- ENGRCEE 160
- General Education

*Note: ENGR 7A-ENGR 7B is available only to lower-division students in Fall and Winter quarters. Both ENGR 7A-ENGR 7B must be taken to be counted as one Lower-Division Technical Elective."

The following sample plans of study are provided for the senior year only; the first three years are common to all specializations.

## Senior-Year Sample Programs of Study — Civil Engineering

### Senior: General Civil Engineering Specialization

#### Senior

##### Fall
- ENGRCEE 181A
- Spec. Elective
- General Education
- General Education

##### Winter
- ENGRCEE 181B
- ENGRCEE 111
- Spec. Elective
- General Education

##### Spring
- ENGRCEE 181C
- Spec. Elective
- Spec. Elective
- General Education

### Senior: Environmental Hydrology and Water Resources Specialization

#### Senior

##### Fall
- ENGRCEE 181A
- Spec. Elective
- General Education
- General Education

##### Winter
- ENGRCEE 181B
- ENGRCEE 111
- Spec. Elective
- General Education

##### Spring
- ENGRCEE 181C
- Spec. Elective
- Spec. Elective
- General Education

### Senior: Structural Engineering Specialization

#### Senior

##### Fall
- ENGRCEE 181A
- ENGRCEE 155
- Spec. Elective
- General Education

##### Winter
- ENGRCEE 181B
- ENGRCEE 111
- Spec. Elective
- General Education

##### Spring
- ENGRCEE 181C
- Spec. Elective
- General Education
- General Education

### Senior: Transportation Systems Engineering

#### Senior

##### Fall
- ENGRCEE 181A
- Spec. Elective
- General Education
- General Education

##### Winter
- ENGRCEE 181B
- ENGRCEE 111
- ENGRCEE 122
- General Education

##### Spring
- ENGRCEE 181C
- ENGRCEE 123
- Spec. Elective
- General Education
• Civil and Environmental Engineering, M.S.
• Civil and Environmental Engineering, Ph.D.
• Environmental Engineering, B.S.