BS CIVIL ENGINEERING

Program Learning Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (http://catalog.calpoly.edu/generalrequirementsbachelorsdegree/#generaleducationtext) section of this catalog, including:

- 60 units of upper division courses
- 2.0 GPA
- Graduation Writing Requirement (GWR)
- U.S. Cultural Pluralism

No major or support courses may be selected as credit/no credit.

MAJOR COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 111</td>
<td>Introduction to Civil Engineering</td>
<td>1</td>
</tr>
<tr>
<td>CE 112</td>
<td>Design Principles in Civil Engineering</td>
<td>2</td>
</tr>
<tr>
<td>CE 113</td>
<td>Computer Aided Drafting in Civil Engineering</td>
<td>2</td>
</tr>
<tr>
<td>CE 204 &amp; CE 207</td>
<td>Mechanics of Materials I and Mechanics of Materials II</td>
<td>5</td>
</tr>
<tr>
<td>CE 208</td>
<td>Mechanics of Materials I</td>
<td>1</td>
</tr>
<tr>
<td>CE 222</td>
<td>Introductory Experiments in Transportation Engineering</td>
<td>1</td>
</tr>
<tr>
<td>CE 251</td>
<td>Programming Applications in Engineering</td>
<td>2</td>
</tr>
<tr>
<td>CE 259</td>
<td>Civil Engineering Materials</td>
<td>2</td>
</tr>
<tr>
<td>CE 321 &amp; CE 322</td>
<td>Fundamentals of Transportation Engineering</td>
<td>4</td>
</tr>
</tbody>
</table>

Select from the following:

- CE 336 Water Resources Engineering Laboratory 5
- CE 352 Structural Engineering 4
- CE 355 Reinforced Concrete Design 4
- CE/CN 371 Construction Management and Project Planning 4
- CE 381 Geotechnical Engineering Laboratory 5
- CE 465 Civil Engineering Professional Practice 1

Select from the following:

- CE 466 Senior Design Project I 6
- CE 467 Senior Design Project II
- CE 468 Community Engineering Senior Design Project I 6
- CE 469 Community Engineering Senior Design Project II

Technical Electives

In consultation with faculty advisor, select from CE 356, ENVE 325, any 400-500 level CE and ENVE courses not required in the major (maximum of 4 units from the following list):

Select a maximum of 4 units from the following:

- ARCE 305 Masonry Design
- ARCE 372 Steel Structures Design Laboratory
- ARCE 403 Advanced Steel Structures Laboratory
- BIO/NR/SS 421 Wetlands
- BMED/CE/ME 404 Applied Finite Element Analysis
- BRAE 345 Aerial Photogrammetry and Remote Sensing
- BRAE 447 Advanced Surveying with GIS Applications
- BRAE 532 Water Wells and Pumps
- CHEM 341 Environmental Chemistry: Water Pollution
- CM 334 Construction Law
- CRP 420 Land Use Law
- CRP 435 Transportation Theory
- CRP/NR 404 Environmental Law
- CRP/NR 408 Water Resource Law and Policy
- ERSC 442 Applied Environmental Groundwater Hydrology
- ERSC/GEOL 401 Field-Geology Methods
- ERSC/GEOL 402 Geologic Mapping
- GEOL 415 Structural Geology
- IME 314 Engineering Economics
- IME 315 Financial Decision Making for Engineers
- MATE 425 Corrosion Engineering
- MATE 450 Fracture and Failure Analysis
- MATH 344 Linear Analysis II
- SS 423 Environmental Soil and Water Chemistry
### SUPPORT COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>BIO 213</td>
<td>Life Science for Engineers (B2)</td>
<td>4</td>
<td></td>
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<tr>
<td>BMED/BRAE 213</td>
<td>Bioengineering Fundamentals (B2)</td>
<td>4</td>
<td></td>
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<tr>
<td>BRAE 239</td>
<td>Engineering Surveying</td>
<td>4</td>
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<tr>
<td>CHEM 124</td>
<td>General Chemistry for Physical Science and Engineering I (B3/B4)</td>
<td>4</td>
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<tr>
<td>CHEM 125</td>
<td>General Chemistry for Physical Science and Engineering II</td>
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<tr>
<td>ENGL 149</td>
<td>Technical Writing for Engineers (A3)</td>
<td>4</td>
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<tr>
<td>ENVE 331</td>
<td>Fundamentals of Environmental Engineering</td>
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<tr>
<td>GEOL 201</td>
<td>Physical Geology</td>
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<tr>
<td>MATE 210</td>
<td>Materials Engineering</td>
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<tr>
<td>MATE 215</td>
<td>Materials Laboratory I</td>
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<tr>
<td>MATH 141</td>
<td>Calculus I (B1)</td>
<td>4</td>
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<tr>
<td>MATH 142</td>
<td>Calculus II (B1)</td>
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<tr>
<td>MATH 143</td>
<td>Calculus III (Add'l Area B)</td>
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<td>MATH 241</td>
<td>Calculus IV</td>
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<tr>
<td>MATH 244</td>
<td>Linear Analysis I</td>
<td>4</td>
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<tr>
<td>ME 211</td>
<td>Engineering Statics</td>
<td>3</td>
<td></td>
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<tr>
<td>ME 212</td>
<td>Engineering Dynamics</td>
<td>3</td>
<td></td>
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<tr>
<td>ME 341</td>
<td>Fluid Mechanics I</td>
<td>3</td>
<td></td>
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<tr>
<td>PHYS 141</td>
<td>General Physics IA (Add'l Area B)</td>
<td>4</td>
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<td>PHYS 132</td>
<td>General Physics II</td>
<td>8</td>
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<tr>
<td>&amp; PHYS 133</td>
<td>and General Physics III</td>
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<tr>
<td>STAT 312</td>
<td>Statistical Methods for Engineers (B6)</td>
<td>4</td>
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**Approved Engineering Science Elective**

Select from the following:

- CM 280 Building Information Modeling
- CSC 231 Programming for Engineering Students
- CSC 234 C and Unix
- EE 201 Electric Circuit Theory
- IME 314 Engineering Economics
- IME 315 Financial Decision Making for Engineers
- MATH 304 Vector Analysis
- MATH 344 Linear Analysis II
- ME 302 Thermodynamics I

### GENERAL EDUCATION (GE)

(See GE program requirements below.)

**FREE ELECTIVES**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>Free Electives</td>
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<td>0</td>
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</tbody>
</table>

**Total units**: 190-192

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1. Transfer students take CE 208 in the Fall Quarter.
2. Consultation with advisor is recommended prior to selecting technical electives or approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
3. Additional guidelines for technical electives:
   1. More than 4 units of coursework outside CE/ENVE is only permitted in special/ unusual cases and requires written justification by the student, and approval by the Department Chair.
   2. No more than 4 combined units of CE 400, CE 500 and ENVE 400, ENVE 500 can count towards the degree.
   3. No more than 8 combined units of CE 470 / ENVE 470, CE 471 / ENVE 471, CE 570 / ENVE 570, CE 571 / ENVE 571 can be credited.
   4. Co-op, graduate seminar, senior project/design, and thesis courses are not permitted.
   5. Only one course can be credited for CE 458 / CE 558; CE 459 / CE 556.
4. Required in Support; also satisfies GE
5. The courses selected to satisfy this requirement may not be used to satisfy other major or support requirements (no double counting of coursework).

### General Education (GE) Requirements

- 72 units required, 32 of which are specified in Major and/or Support.
- See the complete GE course listing (http://catalog.calpoly.edu/generalrequirementsbachelorsdegree/#generaleducationtext).
- Minimum of 8 units required at the 300 level.

#### Area A Communication

- A1 Expository Writing
- A2 Oral Communication
- A3 Reasoning, Argumentation and Writing (4 units in Support)

#### Area B Math, Science, and Quantitative Reasoning

- B1 Mathematics/Statistics (8 units in Support)
- B2 Life Science (4 units in Support)
- B3 Physical Science (4 units in Support)
- B4 One lab taken with either a B2 or B3 course
- B6 Upper-division Area B (4 units in Support)

Additional Area B units (8 units in Support)

#### Area C Arts and Humanities

- C1 Literature
- C2 Philosophy
- C3 Fine/Performing Arts
- C4 Upper-division elective

#### Area D Society and the Individual

- D1 The American Experience (Title 5, Section 40404 requirement)
- D2 Political Economy
- D3 Comparative Social Institutions

#### Area E Lifelong Learning and Self-Development

- E Lower-division elective

**Total units**: 40

1. Required in Support; also satisfies GE