BS CIVIL ENGINEERING

Program Learning Outcomes

1. An ability to apply knowledge of mathematics, science, and engineering
2. An ability to design and conduct experiments, as well as to analyze and interpret data
3. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
4. An ability to function on multidisciplinary teams
5. An ability to identify, formulate, and solve engineering problems
6. An understanding of professional and ethical responsibility
7. An ability to communicate effectively
8. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
9. A recognition of the need for, and an ability to engage in life-long learning
10. A knowledge of contemporary issues
11. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

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</th>
<th>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</td>
<td>Mechanics of Materials I</td>
<td>3</td>
</tr>
<tr>
<td>CE 207</td>
<td>Mechanics of Materials II</td>
<td>2</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</td>
<td>Fundamentals of Transportation</td>
<td>5</td>
</tr>
<tr>
<td>&amp; CE 322</td>
<td>Engineering and Fundamentals of Transportation Engineering Laboratory</td>
<td>5</td>
</tr>
<tr>
<td>CE 336</td>
<td>Water Resources Engineering</td>
<td>5</td>
</tr>
<tr>
<td>&amp; CE 337</td>
<td>Water Resources Engineering and Hydraulics Laboratory</td>
<td>5</td>
</tr>
<tr>
<td>CE 352</td>
<td>Structural Engineering</td>
<td>4</td>
</tr>
<tr>
<td>CE 355</td>
<td>Reinforced Concrete Design</td>
<td>4</td>
</tr>
<tr>
<td>CE 381</td>
<td>Geotechnical Engineering</td>
<td>5</td>
</tr>
<tr>
<td>&amp; CE 382</td>
<td>Geotechnical Engineering Laboratory</td>
<td></td>
</tr>
<tr>
<td>CE 465</td>
<td>Civil Engineering Professional Practice</td>
<td>1</td>
</tr>
<tr>
<td>Select from the following:</td>
<td></td>
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</tr>
<tr>
<td>CE 466</td>
<td>Senior Design Project I</td>
<td></td>
</tr>
<tr>
<td>&amp; CE 467</td>
<td>Senior Design Project II</td>
<td></td>
</tr>
<tr>
<td>CE 468</td>
<td>Community Engineering Senior Design Project I</td>
<td></td>
</tr>
<tr>
<td>&amp; CE 469</td>
<td>Community Engineering Senior Design Project II</td>
<td></td>
</tr>
</tbody>
</table>

Technical Electives

In consultation with faculty advisor, select from CE 356, CE 371 or CM 371, 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
- CM 432 Design-Build Project Management
- CRP 420 Land Use Law
- CRP 435 Transportation Theory
- CRP/NR 404 Environmental Law
- CRP/NR 408 Water Resource Law and Policy
- ERSC/GEOL 401 Field-Geology Methods
- ERSC/GEOL 402 Geologic Mapping
- GEOL 415 Structural Geology
- IME 314 Engineering Economics
- MATE 425 Corrosion Engineering
- MATE 450 Fracture and Failure Analysis
- MATH 344 Linear Analysis II
- SS 423 Environmental Soil and Water Chemistry
- SS 442 Vadose Zone and Groundwater Processes

SUPPORT COURSES

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 213</td>
<td>Life Science for Engineers (B2)</td>
<td>2</td>
</tr>
<tr>
<td>BMED/BRAE 213</td>
<td>Bioengineering Fundamentals (B2)</td>
<td>2</td>
</tr>
<tr>
<td>BRAE 239</td>
<td>Engineering Surveying</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 124</td>
<td>General Chemistry for Physical Science and Engineering I (B3/B4)</td>
<td>4</td>
</tr>
</tbody>
</table>
CHEM 125 General Chemistry for Physical Science and Engineering II 4
ENGL 149 Technical Writing for Engineers (A3) 1 4
ENVE 331 Introduction to Environmental Engineering 4
GEOL 201 Physical Geology 3
MATE 210 Materials Engineering 3
MATE 215 Materials Laboratory I 1
MATH 141 Calculus I (B1) 1 4
MATH 142 Calculus II (B1) 1 4
MATH 143 Calculus III (Add'l Area B) 1 4
MATH 241 Calculus IV 4
MATH 244 Linear Analysis I 4
ME 211 Engineering Statics 3
ME 212 Engineering Dynamics 3
ME 302 Thermodynamics I 3
ME 341 Fluid Mechanics I 3
PHYS 141 General Physics IA (Add'l Area B) 1 4
PHYS 132 General Physics II 8
PHYS 133 and General Physics III 8
STAT 312 Statistical Methods for Engineers (B6) 1 4
Approved Engineering Science Elective 2, 4
Select from the following: 2-4
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
MATH 304 Vector Analysis
MATH 344 Linear Analysis II

GENERAL EDUCATION (GE)
(See GE program requirements below.) 40

FREE ELECTIVES
Free Electives 0

Total units 189-191

1 Required in Support; also satisfies GE
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 The courses selected to satisfy this requirement may not be used to satisfy other major, support, or general education 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 4
A2 Oral Communication 4
A3 Reasoning, Argumentation and Writing (4 units in Support) 1 0

Area B Science and Mathematics
B1 Mathematics/Statistics (8 units in Support) 1 0
B2 Life Science (4 units in Support) 1 0
B3 Physical Science (4 units in Support) 1 0
B4 One lab taken with either a B2 or B3 course
B6 Upper-division Area B (4 units in Support) 1 0

Additional Area B units (8 units in Support) 1 0

Area C Arts and Humanities
C1 Literature 4
C2 Philosophy 4
C3 Fine/Performing Arts 4
C4 Upper-division elective 4

Area D/E Society and the Individual
D1 The American Experience (Title 5, Section 40404 requirement) 4
D2 Political Economy 4
D3 Comparative Social Institutions 4
D4 Self Development (CSU Area E) 4

Total units 40

1 Required in Support; also satisfies GE