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
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

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

<table>
<thead>
<tr>
<th>MAJOR COURSES</th>
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<tbody>
<tr>
<td>CE 113</td>
<td>Computer Aided Drafting in Civil Engineering</td>
</tr>
<tr>
<td>CE 204</td>
<td>Mechanics of Materials I</td>
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<tr>
<td>CE 207</td>
<td>Mechanics of Materials II</td>
</tr>
<tr>
<td>CE 251</td>
<td>Programming Applications in Engineering</td>
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<tr>
<td>CE 336</td>
<td>Water Resources Engineering</td>
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<tr>
<td>CE 337</td>
<td>Hydraulics Laboratory</td>
</tr>
<tr>
<td>CE 381</td>
<td>Geotechnical Engineering</td>
</tr>
<tr>
<td>CE 434</td>
<td>Groundwater Hydraulics and Hydrology</td>
</tr>
<tr>
<td>CE 465</td>
<td>Civil Engineering Professional Practice</td>
</tr>
<tr>
<td>ENVE 111</td>
<td>Introduction to the Environmental Engineering Profession</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SUPPORT COURSES</th>
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<tbody>
<tr>
<td>CHEM 124</td>
<td>General Chemistry for Physical Science and Engineering I (B3 &amp; B4)</td>
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<tr>
<td>CHEM 125</td>
<td>General Chemistry for Physical Science and Engineering II</td>
</tr>
<tr>
<td>CHEM 126</td>
<td>General Chemistry for Physical Science and Engineering III</td>
</tr>
<tr>
<td>CHEM 312</td>
<td>Survey of Organic Chemistry (trans equiv CHEM 212)</td>
</tr>
<tr>
<td>ENGL 149</td>
<td>Technical Writing for Engineers (A3)</td>
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<tr>
<td>MATH 141</td>
<td>Calculus I (B1)</td>
</tr>
<tr>
<td>MATH 142</td>
<td>Calculus II (B1)</td>
</tr>
<tr>
<td>MATH 143</td>
<td>Calculus III (Add'l Area B)</td>
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<tr>
<td>MATH 241</td>
<td>Calculus IV</td>
</tr>
<tr>
<td>MATH 244</td>
<td>Linear Analysis I</td>
</tr>
<tr>
<td>MCRO 221</td>
<td>Microbiology (B2)</td>
</tr>
<tr>
<td>MCRO 224</td>
<td>General Microbiology</td>
</tr>
<tr>
<td>ME 211</td>
<td>Engineering Statics</td>
</tr>
<tr>
<td>PHYS 141</td>
<td>General Physics IA (Add'l Area B)</td>
</tr>
<tr>
<td>PHYS 132</td>
<td>General Physics II</td>
</tr>
<tr>
<td>PHYS 133</td>
<td>General Physics III</td>
</tr>
<tr>
<td>STAT 312</td>
<td>Statistical Methods for Engineers</td>
</tr>
</tbody>
</table>

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

FREE ELECTIVES
Free Electives 0
Total units 190-191

1 To be selected in consultation with your academic advisor.
2 A student may petition to take a course not included in the list of electives and receive major technical elective credit, but they must first obtain approval from a faculty advisor, before taking the course.
3 Required in Support; also satisfies GE.

Technical Electives
Technical Electives may be chosen from any 300-500 level CE/ENVE courses not taken to satisfy other curriculum requirements, with the following exceptions: senior project, co-op, graduate seminar, comprehensive exam, and thesis; and ENVE 324, ENVE 323, ENVE 570, ENVE 571.

Technical Electives cannot be used to satisfy other major, support, or general education requirements. No double counting is allowed.

No more than 4 units in total from CE 400/ENVE 400, CE 500/ENVE 500, ENVE 405, ENVE 407, and ENVE 471 combined can be counted towards technical electives.

No more than 4 units of coursework other than CE/ENVE may be used to satisfy the ENVE Engineering technical elective degree requirement.

Air Quality and Climate
ERSC/GEOG 414 Global and Regional Climatology
PHYS 313 Introduction to Atmospheric Physics

Appropriate Technology
PSC/UNIV 492 Appropriate Technology for the World’s People: Design

Biology/Biochemistry/Microbiology
BIO 401 Principles of Conservation Biology
ENGR/ENVE 581 Biochemical Engineering
MCRO 342 Public Health Microbiology
MSCI 307 World Aquaculture: Applications, Methodologies and Trends

Computer Applications and Computations
LA/NR 317 The World of Spatial Data and Geographic Information Technology
STAT 313 Applied Experimental Design and Regression Models
STAT 323 Design and Analysis of Experiments I

Chemistry
CHEM 313 Survey of Biochemistry and Biotechnology
CHEM 341 Environmental Chemistry: Water Pollution
CHEM 350 Chemical Safety

Energy
BRAE 448 Bioconversion
PHYS 310 Physics of Energy

Hydrology and Soils
BRAE 532 Water Wells and Pumps

Law and Policy
CRP/NR 404 Environmental Law

CRP/NR 408 Water Resource Law and Policy
IME 314 Engineering Economics

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) 0

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

Additional Area B units (8 units in Support) 0

Area C Arts and Humanities
C1 Literature 4
C2 Philosophy 4
C3 Fine/Performing Arts 4
C4 Upper-division elective (PHIL 340 or NR 360 recommended) 4

Area D/E Society and the Individual
D1 The American Experience (Title 5, Section 40404 requirement) (40404) 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