BS BIORESOURCE AND AGRICULTURAL 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
- 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.

MAJOR COURSES
BRAE 128 Careers in Bioresource and Agricultural Engineering 2
BRAE 129 Laboratory Skills and Safety 1
BRAE 133 Introduction to Engineering Design Graphics 1
BRAE 151 CAD for Agricultural Engineering 1
BRAE 152 3-D Solids Modeling 1
BRAE 216 Fundamentals of Electricity 4
BRAE 232 Agricultural Structures Planning 4
BRAE 234 Introduction to Mechanical Systems in Agriculture 4
BRAE 236 Principles of Irrigation 4
BRAE 239 Engineering Surveying 4
BRAE 312 Hydraulics 4
BRAE 320 Principles of Bioresource Engineering 4
BRAE 328 Measurements and Computer Interfacing 4
BRAE 331 Irrigation Theory 3
BRAE 403 Agricultural Systems Engineering 4
BRAE 414 Irrigation Engineering 4
BRAE 421 Equipment Engineering 3
BRAE 422 Equipment Engineering 4
BRAE 428 Agricultural Engineering 4
BRAE 433 Agricultural Structures Design 4
BRAE 460 Senior Project Organization 1
BRAE 461 Senior Project I 2
BRAE 462 Senior Project II 2

Approved Electives
Select from the following: 5-7
BRAE 302 Servo Hydraulics
BRAE 335 Internal Combustion Engines
BRAE 345 Aerial Photogrammetry and Remote Sensing
BRAE 348 Energy for a Sustainable Society
BRAE 400 Special Problems (4 units maximum)
BRAE 405 Chemigation
BRAE/EE 434 Automotive Engineering for a Sustainable Future
BRAE 435 Drainage
BRAE 447 Advanced Surveying with GIS Applications
BRAE 448 Bioconversion
BRAE 450 Solar Photovoltaic System Engineering
BRAE 532 Water Wells and Pumps
BRAE 533 Irrigation Project Design
CHEM 312 Survey of Organic Chemistry
IME 319 Human Factors Engineering
MCRO 421 Food Microbiology
any upper division CE course
any upper division EE course
any upper division ENVE course
any upper division ME course

SUPPORT COURSES
Select from the following: 4
BIO 213 Life Science for Engineers
& BRAE 213 and Bioengineering Fundamentals (also offered as BMED 213; B2) 2
MCRO 221 Microbiology (B2) 2
CE 204 Mechanics of Materials I 3
CE 207 Mechanics of Materials II 2
CHEM 124 General Chemistry for Physical Science and Engineering I (B3 & B4) 2
CHEM 125 General Chemistry for Physical Science and Engineering II (Add'1 Area B) 2

Select from the following: 2-3
CSC 231 Programming for Engineering Students
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>or CSC 232</td>
<td>Computer Programming for Scientists and Engineers</td>
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<tr>
<td>or CSC 234</td>
<td>C and Unix</td>
<td></td>
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<tr>
<td>ECON 201</td>
<td>Survey of Economics (D2)</td>
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<tr>
<td>ECON 222</td>
<td>Macroeconomics</td>
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<tr>
<td>EE 321</td>
<td>Electronics</td>
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<tr>
<td>&amp; EE 361</td>
<td>Electronics Laboratory</td>
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<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>
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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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<tr>
<td>MATH 241</td>
<td>Calculus IV</td>
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</tr>
<tr>
<td>MATH 244</td>
<td>Linear Analysis I</td>
<td>4</td>
</tr>
<tr>
<td>ME 211</td>
<td>Engineering Statics</td>
<td>3</td>
</tr>
<tr>
<td>ME 212</td>
<td>Engineering Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 141</td>
<td>General Physics IA</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 132</td>
<td>General Physics II</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 133</td>
<td>General Physics III</td>
<td>4</td>
</tr>
<tr>
<td>SS 121</td>
<td>Introductory Soil Science</td>
<td>4</td>
</tr>
<tr>
<td>STAT 312</td>
<td>Statistical Methods for Engineers (B6)</td>
<td>2</td>
</tr>
</tbody>
</table>

**GENERAL EDUCATION (GE)**

(See GE program requirements below.) 36

**FREE ELECTIVES**

Free Electives 0

Total units 187-190

1 Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

2 Required in Support; also satisfies GE.

### General Education (GE) Requirements

- 72 units required, 36 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.

<table>
<thead>
<tr>
<th>Area A</th>
<th>Communication</th>
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</thead>
<tbody>
<tr>
<td>A1</td>
<td>Expository Writing</td>
</tr>
<tr>
<td>A2</td>
<td>Oral Communication</td>
</tr>
<tr>
<td>A3</td>
<td>Reasoning, Argumentation and Writing (4 units in Support)</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Area B</th>
<th>Science and Mathematics</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>Mathematics/Statistics (8 units in Support)</td>
</tr>
<tr>
<td>B2</td>
<td>Life Science (4 units in Support)</td>
</tr>
<tr>
<td>B3</td>
<td>Physical Science (4 units in Support)</td>
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<tr>
<td>B4</td>
<td>One lab taken with either a B2 or B3 course</td>
</tr>
<tr>
<td>B6</td>
<td>Upper-division Area B (4 units in Support)</td>
</tr>
</tbody>
</table>

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

1 Required in Support; also satisfies GE