BS BIORESOURCE AND AGRICULTURAL 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
- 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 150  Design Graphics and CAD for Agricultural Engineering  2
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 332  Environmental Controls for Agricultural Structures  4
BRAE 403  Agricultural Systems Engineering  4
BRAE 414  Irrigation Engineering  4
BRAE 421  Equipment Engineering  3
BRAE 422  Equipment Engineering  4
BRAE 428  Agricultural Robotics and Automation  4
BRAE 433  Agricultural Structures Design  4
BRAE 460  Senior Project Organization  1
BRAE 461  Senior Project I  2

Approved Electives
Select from the following:  7-9
BRAE 302  Servo Hydraulics
BRAE 333  Aquacultural Engineering
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 436  Food and Agriculture Process Water Engineering
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
BRAE/BMED 213 & BIO 213  Bioengineering Fundamentals and Life Science for Engineers (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 (B1 & B3) 4
CHEM 125  General Chemistry for Physical Science and Engineering II (Area B Electives) 2

Select from the following:  2-3
CSC 231  Programming for Engineering Students
or CSC 232 Computer Programming for Scientists and Engineers
or CSC 234 C and Unix

ECON 201 Survey of Economics (D2) 2 4
or ECON 222 Macroeconomics

EE 321 Electronics 4
& EE 361 and Electronics Laboratory

ENGL 149 Technical Writing for Engineers (A3) 2 4

MATH 141 Calculus I (B4) 2 4
MATH 142 Calculus II (B4) 2 4
MATH 143 Calculus III (Area B Electives) 2 4
MATH 241 Calculus IV 4
MATH 244 Linear Analysis I 4

ME 211 Engineering Statics 3
ME 212 Engineering Dynamics 3

PHYS 141 General Physics IA 4
PHYS 132 General Physics II 4
PHYS 133 General Physics III 4

STAT 312 Statistical Methods for Engineers (Upper-Division B) 2 4

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 Major or Support; also satisfies General Education (GE) requirement.

General Education (GE) Requirements

- 72 units required, 36 of which are specified in Major and/or Support.
- If any of the remaining 36 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (http://catalog.calpoly.edu/generalrequirementsbachelorsdegree/#generaleducationtext).
- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

Area A English Language Communication and Critical Thinking

A1 Oral Communication 4
A2 Written Communication 4
A3 Critical Thinking (4 units in Support) 1 0

Area B Scientific Inquiry and Quantitative Reasoning

B1 Physical Science (4 units in Support) 1 0
B2 Life Science (4 units in Support) 1 0
B3 One lab taken with either a B1 or B2 course
B4 Mathematics/Quantitative Reasoning (8 units in Support) 1 0

Upper-Division B (4 units in Support) 1 0
Area B Electives (8 units in Support) 1 0

Area C Arts and Humanities
Lower-division courses in Area C must come from three different subject prefixes.

C1 Arts: Arts, Cinema, Dance, Music, Theater 4
C2 Humanities: Literature, Philosophy, Languages other than English 4

Lower-Division C Elective - Select a course from either C1 or C2. 4
Upper-Division C 4

Area D Social Sciences

D1 American Institutions (Title 5, Section 40404 Requirement) 4
D2 Lower-Division D (4 units in Support) 1 0
Area D Elective - Select either a lower-division or upper-division course. 4

Area E Lifelong Learning and Self-Development

Lower-Division E 4

Total units 36

1 Required in Major or Support; also satisfies General Education (GE) requirement.