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 (https://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 I	4
BRAE 422	Equipment Engineering II	4
BRAE 428	Agricultural Robotics and Automation	4
BRAE 433	Agricultural Structures Design	4
BRAE 460	Senior Project Organization	1
BRAE 465	Senior Project Operation, Testing, and Safety	2
Approved Electives [1]		
Select from the following:		6-8
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/NR 349	Water 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	Organic Chemistry: Fundamentals and Applications	
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		
BRAE 220	Introduction to Biological Systems (B2) [2]	4
or MCRO 221	Microbiology	
Select from the following:		5
CE 204 & CE 207	Mechanics of Materials I and Mechanics of Materials II	
or CE 208	Mechanics of Materials	

CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3) [2]	4
CHEM 125	General Chemistry for Physical Science and Engineering II (Area B Electives) [2]	4
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 (Area D Elective) [2]	4
or ECON 222	Macroeconomics	
EE 321 & EE 361	Electronics and Electronics Laboratory	4
ENGL 147	Writing Arguments about STEM (A3) [2]	4
or ENGL 145	Writing Arguments	
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 I	4
PHYS 142	General Physics II	4
PHYS 143	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 (https://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
Area D Elective - Select either a lower-division D2 or upper-division D course. (4 units in Support) [1]		0
Area E	**Lifelong Learning and Self-Development**	
Lower-Division E		4
Area F	**Ethnic Studies**	
F	Ethnic Studies	4
Total units		**36**

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