ENGINEERING, B.S.

Overview

Mission

The mission of the Bachelor of Science in Engineering (https://www.biola.edu/degrees/u/engineering-bs/) program is to provide students an interdisciplinary approach to engineering design that impacts global society for the glory of God.

Degree Program

A Bachelor of Science in Engineering degree is offered upon completion of the University baccalaureate requirements and the departmental-specific requirements.

Learning Outcomes

Program Learning Objectives

Upon completion of the Bachelor of Science in Engineering, students will be able to:

1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (ULO 1).
2. 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 (ULO 1).
3. Communicate effectively with a range of audiences (ULO 2).
4. 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 (ULO 3).
5. Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives (ULO 2).
6. Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions (ULO 1).
7. Acquire and apply new knowledge as needed, using appropriate learning strategies (ULO 1).
8. Summarize the key issues in science and faith and recognize the harmony possible while studying God's creation. (ULO 2, 3).

Each Program Learning Objective (PLO) listed above references at least one of the University Learning Outcomes (ULO 1, 2, 3), which may be found in the General Information (http://catalog.biola.edu/general-information/) section of this catalog.

In addition, PLOs 1-7 reference ABET student learning objectives, which may be found in the Accreditation Criteria & Supporting Documents (https://www.abet.org/accreditation/accreditation-criteria/) section of ABET's website.

Program Educational Objectives

The Bachelor of Science in Engineering program provides students with a general engineering background to tackle design problems and demands. In keeping with Biola University's mission, this program provides students with an experience that equips them with the following:

1. Diverse Knowledge: Graduates will be able to apply interdisciplinary skills to solve problems that impact society.
2. Continuous Growth: Graduates will be equipped with skills associated with lifelong learning.
3. Professional Development: Graduates will be prepared to navigate a diverse and changing job market.

Requirements

Admission Recommendations

Recommended high school courses: Pre-calculus or above and Physics.

GPA Requirement

To continue in the program, a student is required to have a cumulative GPA of 2.5 or higher in their first year of chemistry, physics, math, and engineering courses taken at Biola. Depending on the major, these courses may include: CHEM 105, MATH 150, MATH 151, ENGR 121, ENGR 122, ENGR 124, PHSC 132, PHSC 134, PHSC 233, and PHSC 237.

A minimum grade of a "C" is required in all B.S. Engineering major courses taken at Biola. Anyone receiving a lower grade must repeat the course with a higher grade to receive credit for the course.

Curriculum Requirements

Code	Title	Credits
Program-Specific Core Curriculum Courses		
Engineering majors meet the Core Curriculum requirements in Science and Mathematics.		
The Bible requirement is 18 credits: BBST 103, BBST 165, BBST 209, BBST 210, BBST 260, and BBST 365.		
The foreign language requirement is met by two years in high school or 4 credits of college foreign language.		
Engineering majors are required to take ENGL 313 Writing in the Disciplines: Science and Engineering		
The following courses are strongly recommended: ARTS 111, PHIL 215, ENGL 230: Dystopian Literature.		
Program Courses		
Math and Science Required Courses		
MATH 150	Calculus I	4
MATH 151	Calculus II	4
MATH 250	Calculus III	4
MATH 320	Probability and Statistics for Engineers and Scientists	3
MATH 334	Linear Algebra and Differential Equations	4
CHEM 105	General Chemistry I	4
PHSC 132	General Physics I: Mechanics and Heat	3
PHSC 134	General Physics I Laboratory	1
PHSC 233	General Physics II: Electricity and Magnetism	3
PHSC 237	General Physics II Laboratory	1
Engineering Required Courses		
CSCI 105	Introduction to Computer Science	3

ENGR 121	Introduction to Engineering	1
ENGR 122	Introduction to Engineering Lab	1
ENGR 124	Data Analysis and Presentation	1
ENGR 212	Engineering Economics	3
ENGR 311	Computer Techniques in Science and Engineering	3
ENGR 313	Statics	3
ENGR 314	Mechanics of Materials	3
ENGR 316	Dynamics	3
ENGR 321	Circuits and Instrumentation I	5
ENGR 322	Circuits and Instrumentation II	3
ENGR 360	Mechatronics	3
ENGR 370	Computer Aided Engineering Design	3
ENGR 470	Senior Design Capstone	3
ENGR 471	Engineering Capstone	3
Computer Science, Engineering, Robotics Elective Courses		
Select a minimum of 6 credits of upper-division courses from the list below.		6
CSCI 335	User Interface Design and Programming [1]	
ENGR 331	Thermodynamics	
ENGR 332	Fluid Mechanics	
ENGR 465	Special Topics in Engineering	
ENGR 490	Directed Research in Engineering	
ROBO 320	Robot Modeling and Dynamics	
ROBO 410	Artificial Intelligence [1]	
ROBO 420	Programming of Autonomous Mobile Robots [1]	
ROBO 430	Control Systems	
ROBO 465	Special Topics in Robotics	
ROBO 490	Directed Research	
General Engineering Electives		
Select 3 credits from any of the electives listed above, or from the following:		3
CHEM 106	General Chemistry II	
CSCI 106	Data Structures	
CSCI 220	Computer Organization and Assembly Language Programming	
ENGR 480	Internship in Engineering	
MATH 440	Complex Variables	
PHSC 234	General Physics III: Waves, Optics and Modern Physics	
Program Course Requirements: 81 credits		
Core Curriculum Requirements [2]		**49**
Total Credits		**130**

[1] This course has a prerequisite course, which may be counted as a General Elective for the Engineering, B.S. The prerequisite course must be taken prior to taking this course.

[2] See Core Curriculum Program section (http://catalog.biola.edu/general-information/undergraduate-core-curriculum-program/) for details.

Course Sequence

NOTE: The course sequence table is designed by the major department and is one way that the classes will work out properly in sequence for your major. However, there are alternative or flexible ways to rotate some of the classes within the same year/level and sometimes between year levels. Please contact your major department advisor to discuss flexible alternatives in scheduling the sequence of your classes.

Taking coursework during the summer session may also be an option to accelerate your degree path.

See Core Curriculum Program section (http://catalog.biola.edu/general-information/undergraduate-requirements-policies/#text) for a list of approved Core Curriculum courses.

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First Year

Fall	Credits	Spring	Credits
BBST 103 or 165	3	BBST 103 or 165	3
ARTS 111 (strongly recommended; fulfills Core Curriculum Fine Arts)	3	ENGL 100 or 112	3
ENGR 124	1	ENGR 121	1
GNST 102	1	ENGR 122	1
MATH 150	4	MATH 151	4
PHSC 132	3	PHSC 233	3
PHSC 134	1	PHSC 237	1
	16		**16**

Second Year

Fall	Credits	Spring	Credits
BBST 209 or 210	3	BBST 210 or 209	3
CSCI 105	3	ENGR 212	3
ENGR 313	3	ENGR 314 or 316	3
KNES 107	1	ENGR 321	5
MATH 250	4	MATH 334	4
Foreign Language (see Core Curriculum)	4		
	18		**18**

Third Year

Fall	Credits	Spring	Credits
BBST 260	3	ENGL 313 (Science & Engineering)	3
ENGR 311	3	ENGR 314 or 316	3
ENGR 360	3	ENGR 322	3
MATH 320	3	ENGR 370	3
Communication (see Core Curriculum)	3	PHIL 215 (strongly recommended; fulfills Core Curriculum Philosophy)	3
KNES Activity (see Core Curriculum)	1		
	16		**15**

Fourth Year

Fall	Credits	Spring	Credits
BBST 365	3	ENGR 471	3
CHEM 105	4	CSCI/ENGR/ROBO Elective	3
ENGL 230 (Dystopian Literature strongly recommended; fulfills Core Curriculum Literature)	3	General Engineering Elective	3
ENGR 470	3	HIST 200, 201, or POSC 225	3

CSCI/ENGR/ROBO Elective	3	Behavioral Science (see Core Curriculum)	3
	16		**15**

Total Credits 130

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For students who enroll in more than 18 semester credits, please note the additional cost per credit in the catalog's Financial Information section **(**http://catalog.biola.edu/general-information/financial-information/**).**

First Year

Fall	Credits	Spring	Credits
HNRS 101	4	HNRS 105	4
HNRS 102	4	HNRS 106	4
ENGR 124	1	ENGR 121	1
GNST 102	1	ENGR 122	1
MATH 150	4	MATH 151	4
PHSC 132	3	PHSC 233	3
PHSC 134	1	PHSC 237	1
	18		**18**

Second Year

Fall	Credits	Spring	Credits
HNRS 210	4	HNRS 230	4
HNRS 215	4	HNRS 231	4
CSCI 105	3	ENGR 321	5
ENGR 313	3	MATH 334	4
MATH 250	4		
	18		**17**

Third Year

Fall	Credits	Spring	Credits
HNRS 324	4	HNRS 337	4
HNRS 326	2	HNRS 339	2
ENGR 311	3	ENGR 314	3
ENGR 360	3	ENGR 316	3
MATH 320	3	ENGR 322	3
CSCI/ENGR/ROBO Elective	3	ENGR 370	3
	18		**18**

Fourth Year

Fall	Credits	Spring	Credits
HNRS 443	4	HNRS 458	4
CHEM 105	4	ENGR 212	3
ENGL 313 (Science & Engineering)	3	ENGR 471	3
ENGR 470	3	General Engineering Elective	3
CSCI/ENGR/ROBO Elective	3	Foreign Language (see Core Curriculum)	4
KNES 107	1	KNES Activity (see Core Curriculum)	1
	18		**18**

Total Credits 143

Note: If two years of the same foreign language were not taken in high school, four credits at the college level will be required for graduation.