

ENGINEERING PHYSICS, B.S.

Mission

The mission of the Bachelor of Science in Engineering Physics (<https://www.biola.edu/degrees/u/engineering-physics-bs/>) is to train and mentor students to become skilled engineers who will glorify God and be good stewards of His creation as they serve others in industry, research, and academia.

Degree Program

A Bachelor of Science degree in Engineering Physics is awarded to students who complete the 3+2 engineering program at Biola and an approved engineering school. The degree requires completion of all the Core Curriculum, Bible requirements, and a minimum of 45 program course credits (at least 15 of these must be upper-division level math/science/engineering credits) at Biola along with the completion of an accredited engineering program. Special arrangement has been made with the University of Southern California for this five-year, dual-degree program in liberal arts/sciences and engineering. Students attend Biola for three years taking courses in physics, engineering, math, chemistry, biblical studies and the liberal arts (all Biola courses must be completed before transferring). The final two years are taken at the University of Southern California (USC) School of Engineering. Upon successful completion of the five-year program, a student receives a B.S. degree in Engineering Physics from Biola and a B.S. degree in their chosen engineering discipline from USC. Students interested in this 3+2 program with USC, or who choose to attend another accredited engineering school following a similar pattern, must plan their course of study under the supervision of the engineering advisor and with the approval of the department.

The student should be aware that engineering schools often have a minimum GPA requirement for application. The program at USC currently requires a 3.0 GPA in core Math and Science courses and requires students to apply for transfer. The required courses taken at Biola for most engineering programs are listed under Program Requirements. Other courses may be required for specific engineering programs.

Learning Outcomes

Program Learning Outcomes

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

1. Demonstrate an understanding of the foundational principles related to engineering physics (ULO 1).
2. Demonstrate an ability to solve quantitative, qualitative, and technical problems related to an ability to engineering physics (ULO 1).
3. Demonstrate safe laboratory technique, proper use of appropriate equipment, and suitable results and data analysis (ULO 1).
4. Demonstrate an ability to obtain and use appropriate engineering and physics related literature and resource materials.(ULO 1).
5. Summarize the key issues in science and faith and recognize the harmony possible while studying God's creation (ULO 1, 2, and 3).

Each Program Learning Outcome (PLO) listed above references at least one of the University Learning Outcomes (ULO 1, 2, 3), which may be

found in the General Information section (<https://catalog.biola.edu/general-information/#UniversityLearningOutcomes>) of this catalog.

Program Requirements

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 and/or math courses taken at Biola. These courses may include: CHEM 105, CHEM 115, MATH 150, MATH 151, PHSC 132, and PHSC 134.

Integration Seminar Requirement

Students enrolled in the Bachelor of Science in Engineering Physics degree program are required to take BBST 4653 Integration Seminar: Christianity and the Natural Sciences, or another approved Integration Seminar topic (see advisor).

Curriculum Requirements

Code	Title	Credits
Engineering Physics majors meet the Core Curriculum requirement of 9 credits in integration seminar, science, and mathematics within the major. The foreign language requirement is met by two years of high school study in the same language or four credits of college foreign language. Students in the engineering 3+2 program sequence are exempt from the Core Curriculum requirement in literature and the last semester residency requirement. ENGL 3133 is recommended.		
Program Courses		
CHEM 107	Introduction to Chemistry ¹	3
CHEM 105 & CHEM 115	General Chemistry I and General Chemistry I Lab	4
MATH 150	Calculus I	4
MATH 151	Calculus II	4
MATH 250	Calculus III	4
MATH 335	Ordinary Differential Equations	3
PHSC 121	Introduction to Engineering	1
PHSC 124	Data Analysis and Presentation	1
PHSC 132 & PHSC 134	General Physics I: Mechanics and Heat and General Physics I Laboratory	4
PHSC 233 & PHSC 237	General Physics II: Electricity and Magnetism and General Physics II Laboratory	4
PHSC 234	General Physics III: Waves, Optics and Modern Physics	4
PHSC 311	Computer Techniques in Science and Engineering	3
PHSC 321	Circuits and Instrumentation I	5
BBST 4653	Integration Seminar: Christianity and the Natural Sciences ²	3
	Select 4 upper-division credits, additional courses may be required by specific engineering programs. Note: Some courses may have prerequisites.	4
CHEM 301 & CHEM 311	Organic Chemistry I and Laboratory in Organic Chemistry I ³	

CHEM 302 & CHEM 312	Organic Chemistry II and Laboratory in Organic Chemistry II ³
ENGR 331	Thermodynamics
ENGR 332	Fluid Mechanics
ENGR 360	Mechatronics
ENGR 370	Computer Aided Engineering Design ³
MATH 440	Complex Variables
PHSC 313	Statics
PHSC 314	Mechanics of Materials
PHSC 316	Dynamics
PHSC 318	Classical Mechanics
PHSC 322	Circuits and Instrumentation II ³
PHSC 352	Fundamentals of Materials Science
PHSC 490	Directed Research
Program Course Requirements: 48-51 credits	
Core Curriculum Requirements (https:// catalog.biola.edu/academic-policies/undergraduate- core-curriculum-program/)	51-55
Total Credits	99-106

¹ CHEM 107 is waived for students who meet the qualifications to enter CHEM 105. See the current Placement Options for CHEM 105 (<https://www.biola.edu/academic-advising/incoming/placement-exams/chemistry-105/>) for more information.

² Fulfills the BBST 465 Biblical and Theological Studies Integration Seminar requirement.

³ Additional courses, which are not program requirements, are required as prerequisites. See department for advising.

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 (<https://catalog.biola.edu/academic-policies/undergraduate-core-curriculum-program/>) for a list of approved Core Curriculum courses.

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First Year		
Fall	Credits	Spring Credits
BBST 103	3	BBST 209 3
BBST 165	3	BBST 210 3
CHEM 107 (if needed per Department)	3	MATH 151 4
ENGL 100 or 112	3	PHSC 121 1
GNST 102	1	PHSC 132 & PHSC 134 4
MATH 150	4	Behavioral Science (see Core Curriculum) 3

PHSC 124	1	
		18
Second Year		
Fall	Credits	Spring Credits
BBST 251	3	BBST 354 3
MATH 250	4	MATH 335 3
PHSC 233 & PHSC 237	4	PHSC 234 4
Fine Arts (see Core Curriculum)	3	PHSC 321 5
Foreign Language (see Core Curriculum)	4	Communication (see Core Curriculum) 3
		18
Third Year		
Fall	Credits	Spring Credits
BBST 300/400 Bible Elective	3	BBST 365 3
BBST 300/400 Bible Elective	3	BBST 4653 (fulfills BBST 465 Integration Seminar requirement) 3
CHEM 105 & CHEM 115	4	Engineering Elective (see list in catalog) 3
ENGL 3133 (recommended; fulfills ENGL 313 Core Curriculum requirement)	3	Engineering Elective (see list in catalog) 1
KNES 107	1	HIST 200, 201, or POSC 225 3
PHSC 311	3	Philosophy (see Core Curriculum) 3
KNES Activity (see Core Curriculum)	1	
Writing Competency Requirement		
Graduation Application due in Registrar's Office		
		18
		16
Total Credits 106		

Notes:

- If two years of the same foreign language was not taken in high school, four credits at college level will be required for graduation.
- Depending on the engineering discipline, the minimum number of PHEP electives may not fully reflect transfer requirements for 3+2 programs. See advisor for further details.
- Students in the Engineering 3+2 sequence are exempt from general education requirements in Literature (3). The student is also exempt from the last semester residency requirement.
- The student's fourth and fifth year will include a minimum of 30-32 credits of upper-division engineering-related courses from USC or other accredited engineering program.

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

See Core Curriculum Program section (<https://catalog.biola.edu/academic-policies/undergraduate-core-curriculum-program/>) for a list of approved Core Curriculum courses.

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First Year		
Fall	Credits Spring	Credits
HNRS 101	4 HNRS 105	4
HNRS 102	4 HNRS 106	4
GNST 102	1 KNES 107	1
MATH 150	4 MATH 151	4
PHSC 124	1 PHSC 121	1
CHEM 107 (if needed per Department)	3 PHSC 132 & PHSC 134	4
	17	18
Second Year		
Fall	Credits Spring	Credits
HNRS 210	4 HNRS 230	4
HNRS 215	4 HNRS 231	4
MATH 250	4 MATH 335	3
PHSC 233 & PHSC 237	4 PHSC 234	4
KNES Activity (see Core Curriculum)	1 PHEP Elective	3
	17	18
Third Year		
Fall	Credits Spring	Credits
HNRS 324	4 HNRS 337	4
HNRS 326	2 HNRS 339	2
HNRS 443	4 BBST 4653 (fulfills BBST 465 Integration Seminar requirement)	3
CHEM 105 & CHEM 115 (recommend taking in summer)	4 PHSC 321	5
PHSC 311	3 PHEP Elective	1
Writing Competency Requirement		
	17	15
Total Credits 102		

Notes:

- If two years of the same foreign language was not taken in high school, four credits at college level will be required for graduation.
- The minimum number of PHEP electives may not fully reflect transfer requirements for 3+2 program; see advisor for further details.
- It is recommended to take CHEM 105 and CHEM 115 during the summer.