

# BS in Engineering

85 units

Azusa Pacific's BS in Engineering (<https://www.apu.edu/clas/programs/engineering-major/>) equips students with an excellent foundation in principles that prepare them for careers in a variety of engineering fields, including aerospace, agriculture, automotive, business, computer science, defense, energy, and health care. The engineering curriculum includes courses in mechanics, electrical circuits, electronics, digital systems, and control systems, and all courses are strongly anchored on foundational coursework in mathematics and physics including calculus, differential equations, and probability theory. Four concentration areas are available: mechanical engineering, electrical engineering, systems engineering, and computer engineering.

A two-semester design project in the senior year challenges students to work in teams and design, build, and test a major engineering product as the culmination of all coursework completed. These projects usually involve external sponsors and mentors. An engineering internship that provides hands-on experience also is part of the curriculum requirements.

Job opportunities for engineering graduates are plentiful in Southern California, nationwide, and globally—a multitude of aerospace, entertainment, construction, and electronics companies need mechanical, electrical, systems, and computer engineers.

## Requirements

Academic advising is required each semester; consult with the department for each semester's offerings, since courses are not necessarily offered every semester.

Engineering students are required to have a laptop for classroom work. In addition to General Education requirements, a minimum of 51 computer science/engineering units, and 30 mathematics and physics units (for a total of 81 units), are required for the Bachelor of [Science in Engineering](#).

Code	Title	Units
<b>Engineering Major Requirements</b> <sup>1, 2, 3, 4</sup>		
ENGR 101	Introduction to Engineering and Computing <sup>1</sup>	3
ENGR 110	STEM as Vocation <sup>2</sup>	3
CS 115	Impact of Social Media <sup>5</sup>	3
CS/ENGR 120	Introduction to Computer Science I <sup>6</sup>	4
CS/ENGR 125	Introduction to Computer Science II	4
ENGR 215	Electrical Circuits and Systems	4
ENGR 240	Digital Logic Systems <sup>6</sup>	4
ENGR 245	Electronics	4
ENGR 325	Control Systems	3
ENGR 470	Senior Design Project I	2
ENGR 480	Senior Design Project II <sup>6</sup>	2
ENGR 491	Engineering Internship (3 units needed for graduation) <sup>7</sup>	3
WRIT 242	Writing 2: Entrepreneurial Tech Start-ups <sup>3</sup>	3
Choose one of the following:		3
ENGR 150	Introduction to Mechanics	
ENGR 281	Statics	
<b>Math and Physics Requirements</b>		
MATH 165	Calculus I	3
MATH 166	Calculus II	3
CS/ENGR 160	Discrete Structures	3
MATH 268	Multivariable Calculus	3
MATH 270	Ordinary Differential Equations	4
ENGR 271	Advanced Math for Engineers	4
MATH 361	Introduction to Modeling with Probability	3
PHYC 165 & PHYC 145	Physics for Science and Engineering: Mechanics and Physics Laboratory I <sup>8</sup>	5
<b>Concentration/Electives</b> <sup>9</sup>		<b>12</b>
Choose one of the following concentrations, or general engineering (no concentration) below:		
<b>Mechanical Engineering</b>		

ENGR 384	Mechanics of Materials
PHYC 168 & PHYC 146	Physics for Science and Engineering: Waves and Thermodynamics and Physics Laboratory II
Choose one of the following:	
ENGR 210	Engineering Thermodynamics
ENGR 282	Dynamics
Choose two additional electives	
<b>Electrical Engineering</b>	
ENGR 340	Digital Signal Processing
ENGR 355	Communications Systems
PHYC 166 & PHYC 146	Physics for Science and Engineering: Electricity and Magnetism and Physics Laboratory II
Choose two additional electives	
<b>Computer Engineering</b>	
ENGR 260	Algorithms and Data Structures
ENGR 360	Computer Architecture and Organization
Choose one of the following:	
PHYC 166 & PHYC 146	Physics for Science and Engineering: Electricity and Magnetism and Physics Laboratory II
PHYC 168 & PHYC 146	Physics for Science and Engineering: Waves and Thermodynamics and Physics Laboratory II
Choose two additional electives	
<b>Systems Engineering</b>	
ENGR 345	Systems Engineering Principles
Choose one of the following:	
ENGR 340	Digital Signal Processing
ENGR 420	Decision and Risk Analysis
Choose one of the following:	
PHYC 166 & PHYC 146	Physics for Science and Engineering: Electricity and Magnetism and Physics Laboratory II
PHYC 168 & PHYC 146	Physics for Science and Engineering: Waves and Thermodynamics and Physics Laboratory II
Choose two additional electives	
<b>General Engineering (no concentration)</b>	
Choose one of the following:	
PHYC 166 & PHYC 146	Physics for Science and Engineering: Electricity and Magnetism and Physics Laboratory II
PHYC 168 & PHYC 146	Physics for Science and Engineering: Waves and Thermodynamics and Physics Laboratory II
Choose four additional electives	
<b>Engineering Electives</b>	
ENGR 210	Engineering Thermodynamics
ENGR 260	Algorithms and Data Structures
ENGR 282	Dynamics
ENGR 310	Discrete Systems Modeling and Simulation
ENGR 335	Embedded Systems
ENGR 340	Digital Signal Processing
ENGR 350	Computer Networks
ENGR 345	Systems Engineering Principles
ENGR 355	Communications Systems
ENGR/CS 360	Computer Architecture and Organization
ENGR 380	Systems Design
ENGR 384	Mechanics of Materials

ENGR 390	Green Power Systems
ENGR 420	Decision and Risk Analysis
ENGR 495	Topics in Engineering
CS 363	Web Programming
CS 430	Artificial Intelligence
CS 432	Machine Learning
CS 440	Mobile App Development
CS/ENGR 452	Internet of Things
CS 484	Cyber Security
CS 495	Topics in Computer Science
CS 496	Writing 3: Ethics in Computing and Engineering <sup>4</sup>

**Total Units**

**85**

- <sup>1</sup> The General Education Civic Knowledge and Engagement course recommended by the Department of Engineering and Computer Science is ENGR 101.
- <sup>2</sup> The General Education Intercultural Competence course recommended by the Department of Engineering and Computer Science is ENGR 110.
- <sup>3</sup> The General Education Writing 2 course recommended by the Department of Engineering and Computer Science is WRIT 242.
- <sup>4</sup> The General Education Writing 3 course recommended by the Department of Engineering and Computer Science is CS 496.
- <sup>5</sup> Meets the General Education Social Sciences requirement.
- <sup>6</sup> Meets 1 unit of the General Education Oral Communication requirement (taking CS 120 or ENGR 120, CS 290, and CS 480; OR CS 120 or ENGR 120, ENGR 240, and ENGR 480 satisfies the General Education Oral Communication requirement).
- <sup>7</sup> Meets the General Education Integrative and Applied Learning requirement.
- <sup>8</sup> Meets the General Education Natural Sciences requirement.
- <sup>10</sup> To receive credit for a concentration, students must take 12 units from a single concentration. Students may choose any 4 electives to meet the 12-unit major requirement, but they will not earn a concentration.

## Program Learning Outcomes

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Students who successfully complete this program shall be able to:

1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
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.
3. Communicate effectively with a range of audiences.
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.
5. Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. Acquire and apply new knowledge as needed, using appropriate learning strategies.
8. Use relevant software systems and tools pertinent to modern engineering practice.