

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 |
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| Engineering Major Requirements ^{1, 2, 3, 4} | | |
| ENGR 101 | Introduction to Engineering and Computing ¹ | 3 |
| ENGR 110 | STEM as Vocation ² | 3 |
| CS 115 | Impact of Social Media ⁵ | 3 |
| CS/ENGR 120 | Introduction to Computer Science I ⁶ | 4 |
| CS/ENGR 125 | Introduction to Computer Science II | 4 |
| ENGR 215 | Electrical Circuits and Systems | 4 |
| ENGR 240 | Digital Logic Systems ⁶ | 4 |
| ENGR 245 | Electronics | 4 |
| ENGR 325 | Control Systems | 3 |
| ENGR 470 | Senior Design Project I | 2 |
| ENGR 480 | Senior Design Project II ⁶ | 2 |
| ENGR 491 | Engineering Internship (3 units needed for graduation) ⁷ | 3 |
| WRIT 242 | Writing 2: Entrepreneurial Tech Start-ups ³ | 3 |
| Choose one of the following: | | 3 |
| ENGR 150 | Introduction to Mechanics | |
| ENGR 281 | Statics | |
| Math and Physics Requirements | | |
| 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 ⁸ | 5 |
| Concentration/Electives ⁹ | | 12 |
| Choose one of the following concentrations, or general engineering (no concentration) below: | | |
| Mechanical Engineering | | |

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| 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 | |
| Electrical Engineering | |
| 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 | |
| Computer Engineering | |
| 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 | |
| Systems Engineering | |
| 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 | |
| General Engineering (no concentration) | |
| 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 | |
| Engineering Electives | |
| 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 |

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| 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 ⁴ |

Total Units

85

- ¹ The General Education Civic Knowledge and Engagement course recommended by the Department of Engineering and Computer Science is ENGR 101.
- ² The General Education Intercultural Competence course recommended by the Department of Engineering and Computer Science is ENGR 110.
- ³ The General Education Writing 2 course recommended by the Department of Engineering and Computer Science is WRIT 242.
- ⁴ The General Education Writing 3 course recommended by the Department of Engineering and Computer Science is CS 496.
- ⁵ Meets the General Education Social Sciences requirement.
- ⁶ 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).
- ⁷ Meets the General Education Integrative and Applied Learning requirement.
- ⁸ Meets the General Education Natural Sciences requirement.
- ¹⁰ 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

Program Learning Outcomes

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.