BS in Computer Science

79-81 units

Computer science, like engineering disciplines, is an "applied science" that deals with how things ought to be. This is different from mathematics and other natural sciences that are concerned with how things are. Computer science is concerned with design and synthesis more than analysis and deduction (as with physics, chemistry, mathematics, and biology).

The BS in Computer Science (https://www.apu.edu/clas/programs/computer-science-major/) equips students to:

- Understand the computational process and the design of software systems.
- Analyze and design data structures and algorithms.
- Understand programming concepts in order to acquire computer language proficiency independently.
- Program computers with knowledge of at least two programming languages.
- Understand and apply software development principles.

With dedicated faculty, small classes, excellent computer labs, and up-to-date software, computer science at Azusa Pacific University is challenging, professional, intellectually stimulating, and directly applicable to current problems in society and industry.

The computer science major covers the following topics:

1. Artificial Intelligence
2. Machine Learning
3. Cybersecurity
4. Social Media
5. Mobile Apps
6. All functional levels of computing, from applications to microcode
7. Programming theory and practice (in multiple languages)
8. Software engineering: principles, procedures, techniques, and applications

Upper-level electives are available in advanced topics such as artificial intelligence and machine learning, software engineering, Internet of Things (IoT), and computer security. Students who plan to pursue an advanced degree in computer science should review their program of studies with their advisor as early as possible.

Career Opportunities

The BS in Computer Science prepares graduates for advanced studies and careers in fields such as computer science, computer engineering, software engineering, telecommunications, and systems analysis.

The computer science program requires an internship. Students gain hands-on experience at several local and national businesses and organizations that continue to turn to APU to seek our students for internships and employment. Employment opportunities include careers as systems programmers, software engineers, scientific programmers, high school computer science and mathematics teachers, and other computing fields. Missionary and other Christian organizations need computer science graduates for their increasingly complex applications, such as Bible translation work, as well as administrative, financial, fundraising, and technical support activities. Job opportunities are available globally.

Requirements

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

BS in Computer Science students are required to have a laptop for classroom work.

Code	Title	Units
Computer Science Core Courses [1]		
CS 115	Impact of Social Media [2]	3
CS/ENGR 120	Introduction to Computer Science I [3]	4
CS/ENGR 125	Introduction to Computer Science II	4
CS 230	Systems Programming and Operating Systems	3
CS/ENGR 260	Algorithms and Data Structures	3
CS 290	Database Management Systems [3]	3

CS 360	Computer Architecture and Organization	3
CS 470	Software Engineering [4]	3
CS 480	Senior Capstone Project [3]	3
CS 491	Computer Science Internship [4]	3
ENGR 101	Introduction to Engineering and Computing [5]	3
ENGR 110	STEM as Vocation [6]	3
WRIT 242	Writing 2: Entrepreneurial Tech Start-ups [7]	3
Select at least one of the following (if both are selected, one will count as an elective):		3
CS 363	Web Programming	
CS 440	Mobile App Development	
Math Courses		**15**
MATH 165	Calculus I	
MATH 166	Calculus II	
CS/ENGR 160	Discrete Structures	
MATH 361	Introduction to Modeling with Probability	
Choose one of the following:		
MATH 268	Multivariable Calculus	
MATH 290	Linear Algebra	
MATH 295	Applied Linear Algebra	
MATH 455	Numerical Analysis	
Natural Sciences Courses		**8-10**
Choose two of the following:		
PHYC 165 & PHYC 145	Physics for Science and Engineering: Mechanics and Physics Laboratory I [8]	
PHYC 166 & PHYC 146	Physics for Science and Engineering: Electricity and Magnetism and Physics Laboratory II	
CHEM 151	General Chemistry I [8]	
CHEM 152	General Chemistry II	
BIOL 151	General Biology I [8]	
BIOL 152	General Biology II	
Select 12 units from the list of electives below.		12
Total Units		**79-81**

Computer Science Elective Courses

Code	Title	Units
CS 242/ENGR 240	Digital Logic Systems [3]	4
CS 315	Fundamentals of Network Administration	3
CS 325	Telecommunications and Interfacing	3
CS 363	Web Programming	3
CS 370	Compiler Construction	3
CS 430	Artificial Intelligence	3
CS 432	Machine Learning	3
CS 435	Advanced Database Application Programming	3
CS 440	Mobile App Development	3
CS/ENGR 452	Internet of Things	3
CS 460	Software Project	3
CS 465	Team Software Project	1-3
CS 484	Cyber Security	3
CS 495	Topics in Computer Science	3
CS 496	Writing 3: Ethics in Computing and Engineering [1]	3
CS 497	Readings	1-4
CS 498	Directed Research	1-4

CS 499	Thesis/Project	1-4
ENGR 335	Embedded Systems	4
ENGR 340	Digital Signal Processing	3
ENGR 350	Computer Networks	3

[1]   The Writing 3 course recommended by the Department of Engineering and Computer Science is CS 496.

[2]   Meets the General Education Social Sciences requirement.

[3]   Meets 1 unit of the General Education Oral Communication requirement (taking CS 120, CS 290, and CS 480—or CS 120, ENGR 240, and ENGR 480—satisfies the General Education Oral Communication requirement).

[4]   Meets the General Education Integrative and Applied Learning requirement.

[5]   Meets the General Education Civic Knowledge and Engagement Requirement.

[6]   Meets the General Education Intercultural Competence requirement.

[7]   Meets the General Education Writing 2 requirement.

[8]   Meets the General Education Natural Sciences requirement.

Students must start with CS 120 Introduction to Computer Science I during their first semester at Azusa Pacific University. Math is also extremely important for students within our major. It is imperative that students determine which math course they qualify for and enroll in that course their first semester, continuing with all math courses until they have completed math requirements for the computer science major. If the student does not know which math course they qualify for, they should contact the Academic Success Center (https://www.apu.edu/academic-success/services/testing/math/) at (626) 815-3849 to make an appointment for placement testing.

See the Student Services Center (https://www.apu.edu/student-services/) and/or the Academic Success Center for all General Education advising.

Program Learning Outcomes

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Students who successfully complete this program shall be able to:

1. Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Apply computer science theory and software development fundamentals to produce computing-based solutions.
7. Apply scientific knowledge of computation comprising computer architecture, algorithm analysis, programming principles, and software design.