

Computer Science, B.S.

Program of Study

Computer Science is basically the study of problem-solving on computers. We utilize the power of computers in the problem-solving process while dealing with the constraints of computers. We offer to the undergraduate and graduate student a rich mix of modern computer science courses. Common to these offerings are the power, beauty, and utility of computational thought.

Applications of Computer Science knowledge include almost every field from business to education, from humanities to social sciences, or from natural sciences to engineering. Therefore, the study of Computer Science contains many fields such as computer architecture, programming languages, computer networking, database systems, information management, artificial intelligence and numerical analysis.

The California State University San Marcos undergraduate study in Computer Science emphasizes both theoretical foundations and practical applications. Students will learn algorithms, data structures, software design, the concepts of programming languages, computer organization, and computer architecture. The program stresses analysis and design experiences with substantial laboratory work, including software development. The Computer Science major prepares students for careers in applications programming, systems analysis, and software engineering, as well as for entrance into graduate and professional schools.

The educational objectives of the Bachelor of Science in Computer Science at CSUSM are to produce graduates who, within three or five years after graduation, are able to:

1. Be engaged in professional practice as innovative problem solvers with a strong work ethic;
2. Demonstrate the ability to work effectively as a team member and/or leader in an ever-changing professional environment; and
3. Continue their life-long learning such as progressing through an advanced degree or certification in programs in computing, science, engineering, business, and other professionally related fields.

Program Student Learning Outcomes

Students completing the Computer Science degree will 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.

Career Opportunities

Hundreds of job advertisements looking for Computer Science professionals appear in newspapers, professional magazines and newsletters. Due to the enormous demand, degree holders in Computer Science have multiple paths to reach their career goals. They can easily find jobs with excellent pay in many businesses and industries in positions such as: programmers, system analyst/engineer/managers, software analyst/engineer/managers, database managers, network/telecommunications

administrators, customer service representative/managers, computer instructors, technical trainers, technical support, management information system managers, and sales representatives.

Preparation

High school students are encouraged to take four years of English, four years of mathematics including trigonometry, one year of biological science, and one year of physical science. Courses in calculus, physics, and computer programming are recommended. Experience in clear, concise, and careful writing is valuable for success in all courses.

Transfer Credits

A maximum of thirty-two (32) lower-division units including courses in Computer Science, mathematics, and physics may be applied toward the preparation for the major requirements. Of the thirty-two (32) units, twelve (12) units must appropriately match the description for [CS 111](#), [CS 211](#), and [CS 231](#); twelve (12) units must appropriately match the description for [MATH 160*](#), [MATH 162](#), and [MATH 264](#); and eight (8) units must be biology, chemistry, or physics courses that are counted toward a science major and at least one must also fulfill a lower-division Area B requirement other than B4*

**Three (3) units of the above-transferred courses will count toward the lower-division General Education requirements in Area B4. If suitably chosen, three (3) additional units will count in either area B1 or B2. Students are encouraged to consult their faculty advisor to learn about courses that fulfill the General Education requirements.*

Special Conditions for the Bachelor of Science in Computer Science

All courses counted toward the major, including Preparation for the Major courses, must be completed with a grade of C (2.0) or better. No more than a total of three (3) units of either CS 498 or CS 499 may be applied to the major. A minimum of fifteen (15) upper-division units counted toward the major must be completed at Cal State San Marcos.

General Education (48 Units)

[General Education Requirements](#)

Preparation for the Major (38-39 Units)

Lower-Division (12 Units)

- [CS 111 - Computer Science I](#) Units: 4
- [CS 211 - Computer Science II](#) Units: 4
- [CS 231 - Assembly Language and Digital Circuits](#) Units: 4

Non-Computer Science Supporting Courses (26-27 Units)

- [MATH 160 - Calculus with Applications, I](#) Units: 5
- [MATH 162 - Calculus with Applications, II](#) Units: 4
- [MATH 270 - Basic Discrete Mathematics](#) Units: 3

and

- **8 units of coursework in biology, chemistry, or physics that are counted toward a science major.**
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Choose One of the Following Courses: (3-4 Units)

- [MATH 242 - Introduction to Statistics](#) **Units: 3**
- [MATH 440 - Introduction to Mathematical Probability and Statistics](#) **Units: 4**

Choose One of the Following Courses: (3 Units)

- [MATH 264 - Introduction to Linear Algebra](#) **Units: 3**
- [MATH 374 - Linear Algebra](#) **Units: 3**

Note:

*Six (6) lower-division [General Education](#) units in area B (Math and Science) are automatically satisfied by courses taken in Preparation for the Major.

Major Requirements (37 Units)

Upper-Division (28)

- [CS 310L - Social Issues and Professional Practices in Computing: Activities and Lab](#) **Units: 1**
- [CS 311 - Data Structures and Algorithms](#) **Units: 3**
- [CS 331 - Computer Architecture](#) **Units: 3**
- [CS 351 - Programming Languages](#) **Units: 3**

- [CS 370 - Introduction to Software Engineering](#) **Units: 3**
- or
- [SE 370 - Introduction to Software Engineering](#) **Units: 3**

- [CS 433 - Operating Systems](#) **Units: 3**
- [CS 436 - Introduction to Networking](#) **Units: 3**
- [CS 443 - Fundamentals of Database Systems](#) **Units: 3**
- [CS 471 - Introduction to Artificial Intelligence](#) **Units: 3**
- [CS 490 - Capstone Project](#) **Units: 3**

Computer Science Electives (9 Units)

Chosen from CS courses numbered 400 or higher, [CS 440](#), [MATH 464](#), or [MATH 480](#).

Minimum Total (120 Units)

Students must take a sufficient number of elective units to bring the total number of units to a minimum of 120
