

COMPUTER SCIENCE, BS, CONCENTRATION IN COMPUTER INFORMATION SYSTEMS

Natural Sciences, Mathematics, and Engineering (nsme) (<https://catalog.csusb.edu/general-information/csub-information/school-natural-sciences-mathematics-engineering/>)

Department of Computer and Electrical Engineering and Computer Science (<https://catalog.csusb.edu/general-information/csub-information/school-natural-sciences-mathematics-engineering/department-computer-electrical-engineering-computer-science/>)

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www.cs.csusbak.edu (<http://www.cs.csusbak.edu>)

Program Maps for Natural Sciences, Mathematics, and Engineering (<https://programmap.csusb.edu/academics/interest-clusters/4e942a6e-b8e4-4b60-a1ae-334235acc581/>)

Program Description

Computer Science is a constantly evolving discipline. To quote the Association for Computing Machinery, "Computer Science is not simply concerned with the design of computing devices-nor is it just the art of numerical calculation. Computer Science is concerned with information in much the same sense that Physics is concerned with energy; it is devoted to the representation, storage, manipulation, and presentation of information in an environment permitting automatic information systems."

The Computer Science major at CSUB has three pathways that lead to a B.S. in Computer Science. The traditional Computer Science program follows the guidelines recommended by the Association for Computing Machinery (ACM). The Computer Information Systems concentration is intended for training application programmers or for those who wish to apply computer science in another discipline. The Information Security concentration is intended for students who wish to pursue a career in information assurance and security, either with government agencies or with industry. Students in the three pathways will take different advanced courses of their choice. A Computer Science minor is also offered.

The Computer and Electrical Engineering and Computer Science Department moved into a new building in Fall 2008. The department administers its own local area network which includes multiple Unix/Linux servers, two software programming labs, a walk-in lab/tutoring center, one advanced workstation lab, an isolated network lab, an AI/visualization lab, a DSP/communications lab, one digital electronics hardware lab, a power systems/electronics lab, and a robotics/control systems lab. There is also a departmental library/major study room available to students.

An important goal of the department is to enable students to work much more closely with faculty than they would be able to at larger universities. A detailed description of student learning goals and objectives can be found at <https://www.cs.csusb.edu/abet/>.

Academic Regulation

A grade of C- is the minimal grade acceptable for progression in the CMPS 2010 Programming I: Programming Fundamentals and CMPS 2020 Programming II: Data Structures and Algorithms sequence.

Program Requirements

This concentration is intended for training application programmers or for those who wish to apply computer science in another discipline.

| Code | Title | Units |
|---|---|-------|
| General Education Requirements | | |
| | First-Year Seminar (FYS) | 2 |
| | Lower Division Area A: Foundational Skills ³ | 9 |
| | Lower Division Area B: Natural Sciences ³ | 3 |
| | Lower Division Area C: Arts and Humanities | 6 |
| | Lower Division Area D: Social and Behavioral Sciences ³ | 0 |
| | Lower Division Area E: Student Enrichment and Lifelong Learning (SELF) ⁴ | 0 |
| | Lower Division Area F: Ethnic Studies | 3 |
| | American Institutions: Government and History | 6 |
| | Junior Year Diversity & Reflection (JYDR) | 3 |
| | Graduation Writing Assessment Requirement (GWAR) ³ | 0 |
| | Upper Division Thematic Area C and D ³ | 0 |
| | General Education Capstone ³ | 0 |
| | <i>General Education Subtotal</i> ³ | 32 |
| Major Requirements | | |
| <i>Lower Division</i> | | |
| CMPS 2010 | Programming I: Programming Fundamentals | 4 |
| CMPS 2020 | Programming II: Data Structures and Algorithms | 4 |
| CMPS 2120 | Discrete Structures | 4 |
| CMPS 2680 | Web Programming I: Client -side Web Programming | 3 |
| <i>Upper Division</i> | | |
| CMPS 3120 | Algorithm Analysis | 3 |
| CMPS 3350 | Software Engineering | 4 |
| CMPS 3390 | Application Development | 4 |
| CMPS 3420 | Database Systems | 4 |
| CMPS 3500 | Programming Languages | 3 |
| CMPS 3560 | Artificial Intelligence | 3 |
| CMPS 3600 | Operating Systems | 4 |
| CMPS 3620 | Computer Networks | 4 |
| CMPS 3640 | Distributed and Parallel Computation | 3 |
| CMPS 3680 | Web Programming II: Server-side Web Programming | 3 |
| CMPS 4910 | Senior Project I | 2 |
| CMPS 4928 | Senior Project II | 2 |
| <i>Elective Courses or Discipline-based Minor</i> | | |

Twelve (12) units are required for this area. Students can opt to take either a discipline-based minor or general Computer Information System (CIS) elective courses to satisfy the 12 unit elective requirement. If a minor is chosen, it must be a discipline-based minor and cannot be a general education thematic minor.

| | | |
|--|--|----------------|
| General CIS elective courses: ¹ | | |
| ENGR 2350 | Engineering Graphics | |
| ENGR 2360 | Intermediate CAD in Engineering | |
| CMPS 2240 | Computer Architecture I: Assembly Language Programming | |
| CMPS 2650 | Linux Environment and Administration | |
| CMPS 2770 | Special Topics | |
| CMPS 2771 | Special Topics Laboratory | |
| Any other 3000-level or 4000-level CMPS course | | |
| <i>Advanced Elective Course</i> | | |
| Select one of the following: | | 4 |
| CMPS 4350 | Advanced Software Engineering | |
| CMPS 4420 | Advanced Database Systems | |
| CMPS 4430 | Introduction to Data Science | |
| CMPS 4450 | Data Mining and Visualization | |
| CMPS 4480 | Computer Animation | |
| CMPS 4490 | Game Development | |
| CMPS 4510 | Vulnerability Analysis | |
| CMPS 4560 | Advanced Artificial Intelligence | |
| CMPS 4620 | Network and Computer Security | |
| <i>Required Cognate Courses</i> ² | | |
| MATH 2200 | Introduction to Statistical Concepts and Methods | 4 |
| Select one of the following: | | 3-8 |
| MATH 1030 | Precalculus I and II Combined, Dual Enrollment Program | |
| MATH 1040 | Precalculus I and II Combined | |
| MATH 1050 & MATH 1060 | Precalculus I and Precalculus II | |
| PHIL 3318 | Professional Ethics | 3 |
| <i>Major Subtotal</i> | | <i>80-85</i> |
| Additional Units Needed Towards Graduation ⁵ | | 3-8 |
| Total Units | | 115-125 |

¹ Only a combined total of 4 units of CMPS 277x, 377x, 477x, and 48xx courses may be used for elective credit.

Students may substitute courses from other departments relevant to this concentration, such as ECE, MATH or PHYS, for elective courses with permission of their department advisor.

² Higher level mathematics courses (Calculus I or higher) may be used for either of (or both of) the mathematics requirements.

³ Some of the courses required for the Computer Science major also satisfy General Education requirements. Students who complete each of these courses with the appropriate grade will also satisfy the GE requirement, even if they were to change majors:

- CMPS 4928 Senior Project II satisfies the Capstone requirement.
- PHIL 3318 Professional Ethics satisfies UD Thematic Area C and the Computer Science Ethics requirement.
- MATH 1040 Precalculus I and II Combined, MATH 1050 Precalculus I, MATH 1060 Precalculus II, MATH 2200 Introduction to Statistical

Concepts and Methods, or Calculus I with a grade of C- or better satisfies Foundational Skills B4.

- PHIL 3318 Professional Ethics satisfies GEAR

Computer Science majors have the following General Education Modifications (GEMs), which means they do not have to take courses to satisfy these GE requirements. These GEMs are specific to the Computer Science major and students who change to another major will not keep the modifications:

- LD Area B2 is embedded throughout the curriculum.
- 3 units of LD Area D is met through Computer Science outcomes 2 and 4.
- UD Thematic Area D is met through Computer Science outcomes 2 and 4.

⁴ The SELF requirement may be met by selecting another General Education course with a SELF overlay or by taking a stand-alone course. If a student opts to take a stand-alone course SELF, the course will add additional units to that student's general education pathway.

⁵ Additional Units are required to meet the 120-unit requirement for graduation. Any accepted university units may be used to meet this requirement, including stand-alone courses for SELF.

Note: One (1) semester unit of credit normally represents one hour of in-class work and 2-3 hours of outside study per week.

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