California State University, Stanislaus

2023-2024 Academic Catalog

Computer Science B.S.

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View information for the Department of Computer Science, including Learning Objectives for the department and its programs.

View the degree program Roadmap, which provide recommended advising maps to complete the degree program. Please consult your academic advisor as you develop your academic plan.

Program Learning Outcomes

1. Students will gain a strong foundation in:

- the elements of natural science (physics or chemistry or biology)
- general problem-solving skills, and implementing solutions as computer programs
- college-level mathematics including calculus and statistics
- mathematical topics specifically relevant to computer science (discrete mathematics)
- machine-level hardware/architecture and assembly language programming.

2. Students will demonstrate a foundational understanding of:

- data storage systems and algorithms
- data structures, associated algorithms, and analytic techniques concerning such data structures and algorithms
- ethical issues affecting professionals working in technical and other fields
- computer operating system principles and associated algorithms and implementation issues

3. Students will demonstrate an in-depth understanding of:

- computer system organization principles and techniques
- principles of computer programming languages, and associated algorithms and techniques
- several important areas of computer science, including some of the more theoretical aspects of the field

4. Students will achieve a broad exposure to a variety of more advanced topics in computer science.

5. Students will be able to write clearly and effectively about a topic within the discipline, with language and style appropriate to the discipline.

6. Students will be able to use the knowledge and skills developed throughout the degree program to do individual exploration of a specific topic in computer sciences, and to provide an oral and written presentation of this material to an audience.

Requirements

1. Complete the Baccalaureate Degree Requirements.

A student must comply with all University regulations and satisfy the following requirements:

1. Units and Residency (minimum of 120 units: 40 units of upper division coursework and 30 semester units at Stanislaus State. At least 24 of these 30 units must be earned in upper-division courses, at least 12 must be in the major, and at least 9 must be applicable to General Education-Breadth requirements)
2. Grade Point Average (minimum grade point average of 2.0 (C) or better)
3. General Education (minimum of 49 units)
4. Upper Division Writing Proficiency (minimum of 3 units)
   - Writing Proficiency (WP) Course (may double count in the major)
5. United States Constitution and California State and Local Government (minimum of 3 units)
6. Multicultural Requirement (minimum of 3 units) (may double count with General Education requirements or in the major)

Subsequently all students must submit an application for graduation and receive approval from the major advisor, department chair, and Director of Academic Advising. For more information see the Baccalaureate Degree Requirements.

2. Complete the prerequisites to the major.

No more than 8 units of CR-graded coursework may apply toward the prerequisites to the major.

3. Complete the major of not less than 34 upper-division units.

4. Complete PHIL 4401 Professional Ethics, 3 units

PHIL 4401 - Professional Ethics

5. Satisfy the Departmental Writing Proficiency requirement.

View "Baccalaureate Degree Requirements" for information on the Writing Proficiency requirement.

Departmental Writing Proficiency Requirement

- Pass a Computer Science course with a WP designation, or obtain certification from the departmental WP coordinator.

Note:

No upper-division course which applies to the major or to the electives may be taken on a CR-graded basis except CS 4910 (Cooperative Education), CS 4940 (Practicum in Computer Science), and CS 4960 (Seminar in Computer Science). Prerequisites to the major should be completed before upper-division computer science courses are taken. Completion of a minor is not required.

Prerequisites to the Major

(32 units minimum)

- CS 1500 - Computer Programming I *3 unit(s)*
- CS 2500 - Computer Programming II *3 unit(s)*
- CS 2700 - Assembly Language and Computer Architecture *3 unit(s)*
- MATH 1410 - Calculus I *4 unit(s)*
- MATH 1420 - Calculus II *4 unit(s)*

- MATH 1620 - Probability and Statistics *4 unit(s)*
  or

- MATH 1600 - Statistics *4 unit(s)*

  or
- MATH 1602 - Statistics with Support II *3 unit(s)*

- MATH 2300 - Discrete Structures *3 unit(s)*

And any one of the following three sequences:

- PHYS 2250 - General Physics I *4 unit(s)*
- PHYS 2252 - General Physics I Laboratory *1 unit(s)*
- PHYS 2260 - General Physics II *4 unit(s)*
- PHYS 2262 - General Physics II Laboratory *1 unit(s)*

  or
- CHEM 1100 - General Chemistry I *4 unit(s)*
- CHEM 1102 - General Chemistry I Laboratory *1 unit(s)*
- CHEM 1110 - General Chemistry II *4 unit(s)*
- CHEM 1112 - General Chemistry II Laboratory *1 unit(s)*

  or
- BIOL 1050 - General Biology I *4 unit(s)*
- BIOL 1150 - General Biology II *4 unit(s)*

The Major

(34 units)

1. Complete the following required courses:

(13 units)

- CS 3100 - Data Structures and Algorithms *3 unit(s)*
- CS 3740 - Computer Organization *3 unit(s)*
- CS 3750 - Operating Systems I *3 unit(s)*
- CS 4100 - Programming Languages (WP) *3 unit(s)*
- CS 4960 - Seminar in Computer Science *1 unit(s)*

2. Theory Requirement

(6 units)

Complete two of the following:

- CS 4300 - Compiler Theory *3 unit(s)*
- CS 4410 - Automata, Computability, and Formal Languages *3 unit(s)*
- CS 4440 - Theory of Algorithms *3 unit(s)*
- CS 4450 - Coding and Information Theory *3 unit(s)*

3. Practice Requirement

(3 units)

Complete one of the following:

- CS 4250 - Database Management Systems *3 unit(s)*

- CS 4270 - Ecommerce Systems Design *3 unit(s)*
- CS 4800 - Software Engineering *3 unit(s)*

4. Select 12 units from the following courses.

A course may not be used as an elective if it used to satisfy the Theory or Practice requirements; at least 9 units must be in computer science courses. Units from CS 4910, CS 4940,and CS 4950 may be used with prior departmental approval. No more than one of CS 3500, CS 3550 or CS 4010 may be used to satisfy elective requirements.

- CS 3000 - Communication Networks *3 unit(s)*
- CS 3150 - Nonlinear Systems and Chaos *3 unit(s)*
- CS 3200 - Computer Simulation Techniques *3 unit(s)*
- CS 3400 - Neural Networks and Intelligent Machines *3 unit(s)*
- CS 3500 - Human-Centered Design *3 unit(s)*
- CS 3550 - Introduction to Computational Thinking *3 unit(s)*
- CS 3600 - Computer Graphics I *3 unit(s)*
- CS 3810 - Android Mobile Application Development *3 unit(s)*
- CS 4010 - Computing for the Sciences *3 unit(s)*
- CS 4250 - Database Management Systems *3 unit(s)*
- CS 4270 - Ecommerce Systems Design *3 unit(s)*
- CS 4280 - Non-Relational (NoSQL) Database Systems *3 unit(s)*
- CS 4300 - Compiler Theory *3 unit(s)*
- CS 4410 - Automata, Computability, and Formal Languages *3 unit(s)*
- CS 4440 - Theory of Algorithms *3 unit(s)*
- CS 4450 - Coding and Information Theory *3 unit(s)*
- CS 4480 - Artificial Intelligence *3 unit(s)*
- CS 4520 - Graph and Network Data Analytics *3 unit(s)*
- CS 4600 - Computer Graphics II *3 unit(s)*
- CS 4710 - Mobile Robotics *3 unit(s)*
- CS 4750 - Operating Systems II *3 unit(s)*
- CS 4800 - Software Engineering *3 unit(s)*
- CS 4840 - Cybersecurity Fundamentals *3 unit(s)*
- CS 4980 - Individual Study *1-4 unit(s)*

  No more than one of:
  - CIS 4770 - Systems Analysis and Design
  - PHYS 4250 - Analog and Digital Electronics
  - Math: any approved upper-division course

Cybersecurity Concentration

The Cybersecurity Concentration (CC) provides guidance to students about courses that are particularly relevant to cybersecurity careers. This concentration requires students to place a particular focus in their choice of courses.

Specifically, to complete the Practice Requirement (#3 above), CC students must take:

- CS 4250 Database Management Systems

To complete the 12 unit elective requirement (#4 above) for the major, CC students must take:

- CS 3000 Communication Networks and
- CS 4840 Cybersecurity Fundamentals

The remaining 6 units of electives are to be completed using the guidelines of section #4 above.

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