

# BS COMPUTER SCIENCE

## Program Learning Outcomes

Graduates of the program will have an ability to:

1. Analyze a complex computing problem and to 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.

## Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (<https://catalog.calpoly.edu/generalrequirementsbachelorsdegree/#generaleducationtext>) section of this catalog, including:

- 60 units of upper-division courses
- Graduation Writing Requirement (GWR)
- 2.0 GPA
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit.

### MAJOR COURSES

CSC/CPE 101	Fundamentals of Computer Science	4
CSC/CPE 123	Introduction to Computing <sup>1</sup>	4
CSC/CPE 202	Data Structures	4
CSC/CPE 203	Project-Based Object-Oriented Programming and Design	4
CSC 225	Introduction to Computer Organization	4
CSC 248	Discrete Structures	4
CSC 300 or PHIL 323	Professional Responsibilities Ethics, Science and Technology	4
Select from the following:		4
CSC 307	Introduction to Software Engineering	
or		
CSC 308 & CSC 309	Software Engineering I and Software Engineering II <sup>2</sup>	
Select from the following:		4
CSC 321 or CSC 323 or CSC 325	Introduction to Computer Security <sup>3</sup> Cryptography Engineering Introduction to Privacy: Policy and Technology	
CSC 349	Design and Analysis of Algorithms	4
CSC/CPE 357	Systems Programming	4
Select from the following:		4

CSC 364	Introduction to Networked, Distributed, and Parallel Computing	
or		
CPE 464 & CPE 469	Introduction to Computer Networks and Distributed Systems <sup>4</sup>	
CSC 365	Introduction to Database Systems	4
CSC 430	Programming Languages	4
CSC 445	Theory of Computation I	4
CSC/CPE 453	Introduction to Operating Systems	4
Select from the following:		4
CSC 491 & CSC 492	Senior Project I and Senior Project II (2, 2)	
or		
CSC 497 & CSC 498	Research Senior Project I and Research Senior Project II (2, 2)	

### SUPPORT COURSES

ES/WGQS 350 or ES 351	Gender, Race, Culture, Science & Technology Gender, Race, Class, Nation in Global Engineering, Technology & International Development	4
MATH 141	Calculus I (B4) <sup>5</sup>	4
MATH 142	Calculus II (B4) <sup>5</sup>	4
MATH 143	Calculus III (Area B Electives) <sup>5</sup>	4
MATH 206 or MATH 244	Linear Algebra I Linear Analysis I	4
PHIL 230 or PHIL 231	Philosophical Classics: Knowledge and Reality (C2) <sup>5</sup> Philosophical Classics: Ethics and Political Philosophy	4
STAT 312	Statistical Methods for Engineers (Upper-Division B) <sup>5</sup>	4

### Life Science Support Elective

Select from the following (B2): <sup>5</sup>		4
BIO 111	General Biology	
BIO 161	Introduction to Cell and Molecular Biology	
BIO 213 & BMED 213	Life Science for Engineers and Bioengineering Fundamentals	
BOT 121	General Botany	
MCRO 221	Microbiology	

### Physical Science Support Elective

Select one sequence from the following (B1 & B3): <sup>5</sup>		12
CHEM 124 & CHEM 125 & CHEM 126	General Chemistry for Physical Science and Engineering I and General Chemistry for Physical Science and Engineering II and General Chemistry for Physical Science and Engineering III	
PHYS 141 & PHYS 142 & PHYS 143	General Physics I and General Physics II and General Physics III	

### Additional Science Support Elective

Select from the following (Area B Electives): <sup>5,6</sup>		4
BIO 111	General Biology	

BIO 161	Introduction to Cell and Molecular Biology	
BOT 121	General Botany	
CHEM 124	General Chemistry for Physical Science and Engineering I	
MCRO 221	Microbiology	
PHYS 141	General Physics I	
<b>Concentration or General Curriculum in Computer Science</b>		
(See list of Concentrations and General Curriculum in Computer Science below)		24
<b>GENERAL EDUCATION (GE)</b>		
(See list of GE program requirements below.)		40
<b>FREE ELECTIVES</b>		
Free Electives <sup>7</sup>		0
<b>Total units</b>		<b>180</b>

<sup>1</sup> Although new students are strongly encouraged to take CSC/CPE 123, an additional 4 units of CPE/CSC Technical Electives within your selected concentration or, if not selected, the General Curriculum may substitute for CSC/CPE 123.

<sup>2</sup> CSC 309 counts as a Technical Elective. Students in the Artificial Intelligence and Machine Learning concentration or the Privacy and Security concentration are advised to take CSC 307 instead of CSC 308 and CSC 309.

<sup>3</sup> Students in the Privacy and Security Concentration must take CSC 321.

<sup>4</sup> CPE 469 counts as a Technical Elective for the General Curriculum, and the following concentrations: Graphics, Privacy and Security, and Data Engineering.

<sup>5</sup> Required in Major or Support; also satisfies General Education (GE) requirement.

<sup>6</sup> No double-counting is allowed between Additional Science Support Elective and Life Science Support Elective or Physical Science Support Elective.

<sup>7</sup> If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

## General Curriculum in Computer Science or Concentrations (select one)

- General Curriculum in Computer Science
- Artificial Intelligence and Machine Learning
- Data Engineering
- Game Development
- Graphics
- Privacy and Security

## General Education (GE) Requirements

- 72 units required, 32 of which are specified in Major and/or Support.
- If any of the remaining 40 units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (<https://catalog.calpoly.edu/generalrequirementsbachelorsdegree/#generaleducationtext>).

- A grade of C- or better is required in one course in each of the following GE Areas: A1 (Oral Communication), A2 (Written Communication), A3 (Critical Thinking), and B4 (Mathematics/Quantitative Reasoning).

<b>Area A</b>	<b>English Language Communication and Critical Thinking</b>	
A1	Oral Communication	4
A2	Written Communication	4
A3	Critical Thinking	4
<b>Area B</b>	<b>Scientific Inquiry and Quantitative Reasoning</b>	
B1	Physical Science (4 units in Support) <sup>1</sup>	0
B2	Life Science (4 units in Support) <sup>1</sup>	0
B3	One lab taken with either a B1 or B2 course	
B4	Mathematics/Quantitative Reasoning (8 units in Support) <sup>1</sup>	0
Upper-Division B (4 units in Support) <sup>1</sup>		0
Area B Electives (8 units in Support) <sup>1</sup>		0
<b>Area C</b>	<b>Arts and Humanities</b>	
Lower-division courses in Area C must come from three different subject prefixes.		
C1	Arts: Arts, Cinema, Dance, Music, Theater	4
C2	Humanities: Literature, Philosophy, Languages other than English (4 units in Support) <sup>1</sup>	0
Lower-Division C Elective - Select a course from either C1 or C2.		4
Upper-Division C		4
<b>Area D</b>	<b>Social Sciences</b>	
D1	American Institutions (Title 5, Section 40404 Requirement)	4
Area D Elective - Select either a lower-division D2 or upper-division D course.		4
<b>Area E</b>	<b>Lifelong Learning and Self-Development</b>	
Lower-Division E		4
<b>Area F</b>	<b>Ethnic Studies</b>	
F	Ethnic Studies	4
<b>Total units</b>		<b>40</b>

<sup>1</sup> Required in Major or Support; also satisfies General Education (GE) requirement.