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 (http://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  Introduction to Computer Science  4
CSC/CPE 123  Introduction to Computing  1  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  Professional Responsibilities  4
or PHIL 323  Ethics, Science and Technology  4
Select from the following:  4
CSC 307  Introduction to Software Engineering  4
or
CSC 308  Software Engineering I  4
& CSC 309  and Software Engineering II  2
CPE 315  Computer Architecture  4
Select from the following:  4
CSC 321  Introduction to Computer Security  2
or CSC 323  Cryptography Engineering  4
or CSC 325  Introduction to Privacy: Policy and Technology  4
CSC 349  Design and Analysis of Algorithms  4
CSC/CPE 357  Systems Programming  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  Senior Project I  4
& CSC 492  and Senior Project II (2, 2)
or
CSC 497  Research Senior Project I  4
& CSC 498  and Research Senior Project II (2, 2)

SUPPORT COURSES

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

Life Science Support Elective

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

Physical Science Support Elective

Select one sequence from the following (B1 & B3):  4
CHEM 124  General Chemistry for Physical Science and Engineering I  4
& CHEM 125  and General Chemistry for Physical Science and Engineering II  4
& CHEM 126  and General Chemistry for Physical Science and Engineering III  4
PHYS 141  General Physics IA  4
& PHYS 132  and General Physics II  4
& PHYS 133  and General Physics III  4

Additional Science Support Elective

Select from the following (Area B Electives):  4,5
BIO 111  General Biology  4
BIO 161  Introduction to Cell and Molecular Biology  4
BOT 121  General Botany  4
CHEM 124  General Chemistry for Physical Science and Engineering I  4
MCRO 221  Microbiology  4
PHYS 141  General Physics IA  4
Concentration or General Curriculum in Computer Science
(See list of Concentrations and General Curriculum in Computer Science below) 28

GENERAL EDUCATION (GE)
(See list of GE program requirements below.) 40

FREE ELECTIVES
Free Electives 6 0

Total units 180

1 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.
2 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.
3 Students in the Privacy and Security Concentration must take CSC 321.
4 Required in Major or Support; also satisfies General Education (GE) requirement.
5 No double-counting is allowed between Additional Science Support Elective and Life Science Support Elective or Physical Science Support Elective.
6 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 (http://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).

<table>
<thead>
<tr>
<th>Area A</th>
<th>English Language Communication and Critical Thinking</th>
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<tbody>
<tr>
<td>A1</td>
<td>Oral Communication</td>
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<tr>
<td>A2</td>
<td>Written Communication</td>
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<td>A3</td>
<td>Critical Thinking</td>
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<tr>
<th>Area B</th>
<th>Scientific Inquiry and Quantitative Reasoning</th>
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<tr>
<th>B1</th>
<th>Physical Science (4 units in Support)</th>
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<tr>
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<tr>
<td>B2</td>
<td>Life Science (4 units in Support) 1</td>
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<tr>
<td>B3</td>
<td>One lab taken with either a B1 or B2 course</td>
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<td>B4</td>
<td>Mathematics/Quantitative Reasoning (8 units in Support) 1</td>
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Upper-Division B (4 units in Support) 1        0
Area B Electives (8 units in Support) 1        0

Area C    Arts and Humanities
Lower-division courses in Area C must come from three different subject prefixes.

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<thead>
<tr>
<th>C1</th>
<th>Arts: Arts, Cinema, Dance, Music, Theater</th>
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<tr>
<th>C2</th>
<th>Humanities: Literature, Philosophy, Languages other than English (4 units in Support) 1</th>
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Lower-Division C Elective - Select a course from either C1 or C2. 4
Upper-Division C 4

Area D    Social Sciences

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<thead>
<tr>
<th>D1</th>
<th>American Institutions (Title 5, Section 40404 Requirement)</th>
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Area D Elective - Select either a lower-division D2 or upper-division D course. 4

Area E    Lifelong Learning and Self-Development

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<thead>
<tr>
<th>E1</th>
<th>Lifelong Learning and Self-Development</th>
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<tr>
<th>F1</th>
<th>Ethnic Studies</th>
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Total units 40

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