BS COMPUTER ENGINEERING

Program Learning Outcomes
In addition to the general abilities expected of College of Engineering graduates, computer engineering students are expected to graduate with:

1. An ability to apply knowledge of mathematics, science, and engineering.
2. An ability to design and conduct experiments, as well as to analyze and interpret data.
3. An ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. An ability to function on multidisciplinary teams.
5. An ability to identify, formulate, and solve engineering problems.
6. An understanding of professional and ethical responsibility.
7. An ability to communicate effectively.
8. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
9. A recognition of the need for, and an ability to engage in life-long learning.
10. A knowledge of contemporary issues.
11. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

In addition to the general abilities expected of College of Engineering graduates, computer engineering students are expected to graduate with:

- Knowledge of probability and statistics, including applications appropriate to CPE program objectives.
- Knowledge of mathematics through differential and integral calculus, basic sciences, and engineering sciences necessary to analyze and design complex electrical and electronic devices, software, and systems containing hardware and software components, as appropriate to CPE program objectives.
- Knowledge of advanced mathematics, typically including differential equations, linear algebra, complex variables, and discrete mathematics.

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 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

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPE 100</td>
<td>Computer Engineering Orientation</td>
<td>1</td>
</tr>
<tr>
<td>CPE/CSC 101</td>
<td>Fundamentals of Computer Science</td>
<td>4</td>
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<tr>
<td>CPE/CSC 123</td>
<td>Introduction to Computing</td>
<td>1</td>
</tr>
<tr>
<td>CPE/EE 133</td>
<td>Digital Design</td>
<td>4</td>
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<tr>
<td>CPE/CSC 202</td>
<td>Data Structures</td>
<td>4</td>
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<tr>
<td>CPE/CSC 203</td>
<td>Project-Based Object-Oriented Programming and Design</td>
<td>4</td>
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<tr>
<td>CPE/EE 233</td>
<td>Computer Design and Assembly Language Programming</td>
<td>4</td>
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<tr>
<td>CPE 315</td>
<td>Computer Architecture</td>
<td>4</td>
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<tr>
<td>CPE/EE 329</td>
<td>Programmable Logic and Microprocessor-Based Systems Design</td>
<td>4</td>
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<tr>
<td>CPE/CSC 357</td>
<td>Systems Programming</td>
<td>4</td>
</tr>
<tr>
<td>CPE 350</td>
<td>Capstone I</td>
<td>4</td>
</tr>
<tr>
<td>CPE 450</td>
<td>Capstone II</td>
<td>3</td>
</tr>
<tr>
<td>CPE/CSC 453</td>
<td>Introduction to Operating Systems</td>
<td>4</td>
</tr>
<tr>
<td>CPE 461  &amp; CPE 462</td>
<td>Senior Project I and Senior Project II</td>
<td>5</td>
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<tr>
<td>CPE 464</td>
<td>Introduction to Computer Networks</td>
<td>4</td>
</tr>
<tr>
<td>CSC 348</td>
<td>Discrete Structures</td>
<td>4</td>
</tr>
<tr>
<td>EE 112</td>
<td>Electric Circuit Analysis I</td>
<td>2</td>
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<tr>
<td>EE 211   &amp; EE 241</td>
<td>Electric Circuit Analysis and Electric Circuit Analysis Laboratory II</td>
<td>4</td>
</tr>
<tr>
<td>EE 212   &amp; EE 242</td>
<td>Electric Circuit Analysis III and Electric Circuit Analysis Laboratory III</td>
<td>4</td>
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<tr>
<td>EE 228</td>
<td>Continuous-Time Signals and Systems</td>
<td>4</td>
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<tr>
<td>EE 306   &amp; EE 346</td>
<td>Semiconductor Device Electronics and Semiconductor Device Electronics Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>EE 307   &amp; EE 347</td>
<td>Digital Electronics and Integrated Circuits and Digital Electronics and Integrated Circuits Laboratory</td>
<td>4</td>
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</tbody>
</table>

Technical Electives 2,3,4

Select from the following: 12

- Any 300-500 level CPE Course
- Any 300-500 level CSC or EE Course
- CPE 400 Special Problems for Undergraduates (up to 4 units)
- Up to four units from the following:
  - BMED 432 Micro/Nano System Design
  - BMED 434/EE 423/MATE 430 Micro/Nano Fabrication
  - BMED/MATE 435 Microfabrication Laboratory
  - CHEM 312 Survey of Organic Chemistry
  - CSC 300 Professional Responsibilities
  - CPE 488/IME 458/MATE 458 Microelectronics and Electronics Packaging
  - DATA 301 Introduction to Data Science
  - ENGR 551 Advanced Topics in Bioengineering
  - IME 301 Operations Research I
  - IME 303 Project Organization and Management
IME 314  Engineering Economics
IME 319  Human Factors Engineering
IME 401  Sales Engineering
IME 457  Advanced Electronic Manufacturing
MATH 304  Vector Analysis
MATH 408  Complex Analysis I
MATH 409  Complex Analysis II
MATH 451  Numerical Analysis I
ME 405  Mechatronics
PHYS 322  Vibrations and Waves
PHYS 323  Optics
PHYS 408  Electromagnetic Fields and Waves I
PHYS 412  Solid State Physics
PHYS 452  Solid State Physics Laboratory
UNIV/HNRS 424  Design of Museum Displays of Science, Engineering and Technology

SUPPORT COURSES
CHEM 124  General Chemistry for Physical Science and Engineering I (B3/B4)  5
Approved CSC, EE, Math or Science Elective.  2
3-4
Select from the following:
CHEM 125  General Chemistry for Physical Science and Engineering II
CPE/EE 328  Discrete Time Signals and Systems
CSC 349  Design and Analysis of Algorithms
MATE 210  Materials Engineering
& MATE 215  Materials Laboratory I (both needed)
ME 211  Engineering Statics
ENGL 149  Technical Writing for Engineers (A3)  5
IME 156  Basic Electronics Manufacturing  2-4
or IME 157  Electronics Manufacturing
or IME 458  Microelectronics and Electronics Packaging
MATH 141  Calculus I  8
& MATH 142  and Calculus II (B1)  5
MATH 143  Calculus III (Add'l Area B)  5
4
MATH 241  Calculus IV  4
MATH 244  Linear Analysis I  4
PHYS 141  General Physics IA (Add'l Area B)  5
PHYS 132  General Physics II  8
& PHYS 133  and General Physics III
PHYS 211  Modern Physics I  4
STAT 350  Probability and Random Processes for Engineers (B6)  5
4

GENERAL EDUCATION (GE)
(See GE program requirements below.)  44

FREE ELECTIVES
Free Electives  0

Total units  192-195

1 An additional 4 units of approved technical electives may be substituted, although new students are strongly encouraged to take CSC 123/CPE 123.
2 Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.
3 The courses selected to satisfy this requirement may not be used to satisfy other major, support, or general education requirements (no double counting of coursework).
4 The following courses may not be used to satisfy this requirement: COOP units; BUS 499; CSC 302, CSC 303, CSC 310, CSC 400, CSC 500; EE 321, EE 322, EE 361, EE 400, EE 460, EE 500, EE 563.
5 Required in Major/Support; also satisfies GE

General Education (GE) Requirements

- 72 units required, 28 of which are specified in Major and/or Support.
- See the complete GE course listing (http://catalog.calpoly.edu/generalrequirementsbachelorsdegree/#generaleducationtext).
- Minimum of 8 units required at the 300 level.

Area A  Communication
A1  Expository Writing  4
A2  Oral Communication  4
A3  Reasoning, Argumentation and Writing (4 units in Support)  1

Area B  Science and Mathematics
B1  Mathematics/Statistics (8 units in Support)  1
B2  Life Science  4
B3  Physical Science (4 units in Support)  1
B4  One lab taken with either a B2 or B3 course
B6  Upper-division Area B (4 units in Support)  1

Additional Area B units (8 units in Support)  1

Area C  Arts and Humanities
C1  Literature  4
C2  Philosophy  4
C3  Fine/Performing Arts  4
C4  Upper-division elective  4

Area D/E  Society and the Individual
D1  The American Experience (Title 5, Section 40404 requirement) (40404)  4
D2  Political Economy  4
D3  Comparative Social Institutions  4
D4  Self Development (CSU Area E)  4

Total units  44

1 Required in Major/Support; also satisfies GE