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 identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

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 (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		
CPE 100	Computer Engineering Orientation	1
CPE/CSC 101	Fundamentals of Computer Science	4
CPE/CSC 123	Introduction to Computing [1]	4
CPE/EE 133	Digital Design	4
CPE/CSC 202	Data Structures	4
CPE/CSC 203	Project-Based Object-Oriented Programming and Design	4
CPE/EE 233	Computer Design and Assembly Language Programming	4
CPE 315	Computer Architecture	4
or CPE 333	Computer Hardware Architecture and Design	
CPE/EE 329	Microcontroller-Based Systems Design	4
or CPE 316	Microcontrollers and Embedded Applications	
CPE/CSC 357	Systems Programming	4
CPE 350	Capstone I [2]	4
CPE 450	Capstone II [2]	3
CPE/CSC 453	Introduction to Operating Systems	4
Select from the following: [3]		4-5
CPE 461 & CPE 462	Senior Project I and Senior Project II	
or		
CSC 497 & CSC 498	Research Senior Project I and Research Senior Project II	
CPE 464	Introduction to Computer Networks	4
CSC 248	Discrete Structures	4
CPE 327 & CPE 367	Digital Signals and Systems and Digital Signals and Systems Laboratory	4
or EE 228	Continuous-Time Signals and Systems	
CPE 321	Introduction to Computer Security	4
or CPE 422	Network Security	
or CPE 426	Introduction to Hardware Security	
EE 115 & EE 145	Electrical and Electronic Circuits I and Electrical and Electronic Circuits I Laboratory	4
EE 215 & EE 245	Electrical and Electronic Circuits II and Electrical and Electronic Circuits II Laboratory	4
EE 315	Electrical and Electronic Circuits III	4
Technical Electives [3,4,5]		
Select from the following:		19
Any 300-500 level CPE Course (up to 4 units of CPE 400)		
Any 300-500 level CSC or EE Course		
Up to 8 units of any 200-500 level course offered by the College of Engineering or College of Science and Mathematics		
SUPPORT COURSES		
CHEM 124	General Chemistry for Physical Science and Engineering I (B1 & B3) [6]	4
Select from the following: (C2) [6]		4
PHIL 230	Philosophical Classics: Knowledge and Reality	
PHIL 231	Philosophical Classics: Ethics and Political Philosophy	
Select from the following: (Upper-Division C) [6]		4
PHIL 323	Ethics, Science and Technology	
PHIL 327	Robot Ethics	

PHIL 328	Technologies and Ethics of Warfare	
PHIL 339	Biomedical Ethics	
PHIL 340	Environmental Ethics	
ES 350	Gender, Race, Culture, Science & Technology	4
or ES 351	Gender, Race, Class, Nation in Global Engineering, Technology & International Development	
MATH 141	Calculus I (B4) [6]	4
MATH 142	Calculus II (B4) [6]	4
MATH 143	Calculus III (Area B Electives) [6]	4
MATH 241	Calculus IV	4
MATH 244	Linear Analysis I	4
PHYS 141	General Physics I (Area B Electives) [6]	4
PHYS 142	General Physics II	4
PHYS 143	General Physics III	4
STAT 350	Probability and Random Processes for Engineers (Upper-Division B) [6]	4
GENERAL EDUCATION (GE)		
(See GE program requirements below.)		40
FREE ELECTIVES		
Free Electives		0
Total units		**191-192**

1 An additional 4 units of Technical Electives may be substituted, although new students are strongly encouraged to take CSC 123/CPE 123.

2 ENGR 459, ENGR 460, ENGR 461, and CPE 400 (7) or ENGR 463, ENGR 464, ENGR 465, and CPE 400 (7) may substitute for CPE 350 and CPE 450 (7).

3 Consultation with an advisor is recommended prior to selecting Approved or Technical Electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

4 Courses taken to meet the Technical Electives requirement cannot be double-counted to satisfy another Major or Support requirement.

5 The following courses may not be used to satisfy this requirement: COOP units; BUS 499; CSC 304, CSC 320, CSC 364, CSC 400, CSC 500; EE 321, EE 322, EE 361, EE 400, EE 460, EE 500, EE 563. A student with credit in CPE 327/CPE 367 cannot take EE 328/EE 368 for credit.

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

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).

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

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