

COMPUTER ENGINEERING, BS

Natural Sciences, Mathematics, and Engineering (nsme) (<https://catalog.csub.edu/general-information/csub-information/school-natural-sciences-mathematics-engineering/>)

Department of Computer and Electrical Engineering and Computer Science (<https://catalog.csub.edu/general-information/csub-information/school-natural-sciences-mathematics-engineering/department-computer-electrical-engineering-computer-science/>)

Department Chair: Saeed Jafarzadeh

Office: Science Building III, 317

Phone: (661) 654-3082

Email: ceecs@cs.csubak.edu

www.cs.csubak.edu (<http://www.cs.csubak.edu>)

Program Maps for Natural Sciences, Mathematics, and Engineering (<https://programmmap.csub.edu/academics/interest-clusters/4e942a6e-b8e4-4b60-a1ae-334235acc581/>)

Program Description

BS in Computer Engineering program is accredited by the Engineering Accreditation Commission of ABET, <https://www.abet.org>, under the General Criteria and the Electrical, Computer, Communications, and Telecommunication(s) Engineering Program Criteria.

Computer Engineering is a field, which in some sense, resides between the long-established fields of Computer Science and Electrical Engineering. It is concerned with topics such as analog and digital circuit design, embedded controllers, computer hardware, system software, computer system design, data communication, signal processing, computer networks, robotics, computer vision, graphics and image processing, and other topics in computing where hardware plays an important role. Computer engineers often work with other engineers, physical scientists, and software engineers.

The Computer and Electrical Engineering and Computer Science Department moved into a new building in Fall 2008. The department administers its own local area network which includes multiple Unix/Linux servers, two software programming labs, a walk-in lab/tutoring center, one advanced workstation lab, an isolated network lab, an AI/visualization lab, a DSP/communications lab, one digital electronics hardware lab, a power systems/electronics lab, and a robotics/control systems lab. There is also a department library/major study room with computers available to students.

An important goal of the department is to enable students to work much more closely with faculty than they would be able to at larger universities. A detailed description of student learning goals and objectives can be found at <https://www.cs.csub.edu/abet/>.

Academic Regulation

A grade of C- is the minimal grade acceptable for progression in the CMPS 2010 Programming I: Programming Fundamentals and CMPS 2020 Programming II: Data Structures and Algorithms sequence.

Program Requirements

Code	Title	Units
General Education Requirements		
First-Year Seminar (FYS) ¹		0
Lower Division Area A: Foundational Skills ¹		6
Lower Division Area B: Natural Sciences ¹		0
Lower Division Area C: Arts and Humanities		6
Lower Division Area D: Social and Behavioral Sciences ¹		0
Lower Division Area E: Student Enrichment and Lifelong Learning (SELF) ²		0
Lower Division Area F: Ethnic Studies		3
American Institutions: Government and History		6
Junior Year Diversity & Reflection (JYDR)		3
Graduation Writing Assessment Requirement (GWAR) ¹		0
Upper Division Thematic Area C and D ¹		0
General Education Capstone ¹		0
<i>General Education Subtotal</i> ¹		24
Major Requirements		
<i>Lower Division</i>		
ECE/ENGR 1618	Introduction to Engineering I	2
ECE/ENGR 1628	Introduction to Engineering II	2
ECE/ENGR/PHYS 2070	Electric Circuits	4
CMPS 2010	Programming I: Programming Fundamentals	4
CMPS 2020	Programming II: Data Structures and Algorithms	4
CMPS 2120	Discrete Structures	4
<i>Upper Division</i>		
CMPS 3240	Computer Architecture II: Organization	4
CMPS 3600	Operating Systems	4
ECE 3040	Signals and Systems	4
ECE 3070	Analog Circuits	4
ECE 3200	Digital Circuits	4
ECE 3220	Digital Design with VHDL	4
ECE 3250	Embedded Systems	4
ECE 4910	Senior Project I	2
ECE 4928	Senior Project II	2
<i>Upper Division Elective Courses</i>		
Select 12 units of electives from the following, at least one course must be at the 4000-level:		12
Digital Communications and Signal Processing:		
ECE 3230	Digital Communications	
ECE 4220	Digital Signal Processing	
ECE 4250	Wireless Communications	
ECE 4260	Wireless Network	
Control Systems, Robotics, and Digital Design:		
ECE 3280	Instrumentation, Control, and Data Acquisition	
ECE 3340	Control Systems	
ECE 4240	Microprocessor System Design	
ECE 4570	Robotics	
CMPS/ECE 4550	Applied Machine Learning	
Image Processing and Computer Vision:		

ECE 4460	Image Processing	
ECE 4470	Computer Vision	
Special Topics and Independent Study:		
Only a combined total of 4 units of ECE 377x, 477x, 48xx may be used for elective credit.		
<i>Required Cognate Courses</i>		
MATH 2510	Single Variable Calculus I	4
	or MATH 2310 Single Variable Calculus I for Engineers	
MATH 2520	Single Variable Calculus II	4
	or MATH 2320 Single Variable Calculus II for Engineers	
Select one of the following:		4
MATH 2533	Multivariable and Vector Calculus	
MATH 2531 & MATH 2532	Multivariable Calculus and Vector Calculus	
MATH 2610	Linear Algebra I	4
MATH 3200	Probability Theory	4
PHYS 2210	Physics for Scientists and Engineers I	4
PHYS 2220	Physics for Scientists and Engineers II	4
PHIL 3318	Professional Ethics	3
<i>Major Subtotal</i>		95
Additional Units Needed Towards Graduation ³		0-1
Total Units		119-120

course. The GVAR may be satisfied by taking the GVAR exam, by taking another General Education course with a GVAR overlay, or by taking a stand-alone course. If a student opts to take a stand-alone course for either or both of these requirements, the course(s) will add additional units to that student's general education pathway.

³ Additional Units are required to meet the 120-unit requirement for graduation. Any accepted university units may be used to meet this requirement, including stand-alone courses for SELF.

SB 1440 units required - 58 units ¹

¹ Units required for graduation after completion of the Engineering (Computer Engineering focus) model curriculum and lower-division general education at a California community college.

Note: One (1) semester unit of credit normally represents one hour of in-class work and 2-3 hours of outside study per week.

¹ Some of the courses required for the Computer Engineering major also satisfy General Education requirements. Students who complete each of these courses with the appropriate grade will also satisfy the GE requirement, even if they were to change majors:

- ECE 1618 Introduction to Engineering I/ENGR 1618 Introduction to Engineering I and ECE 1628 Introduction to Engineering II / ENGR 1628 Introduction to Engineering II satisfy the First-Year Seminar requirement.
- ECE 4928 Senior Project II satisfies the Capstone requirement.
- PHIL 3318 Professional Ethics satisfies UD Thematic Area C and the Computer Engineering Ethics requirement.
- PHYS 2210 Physics for Scientists and Engineers I satisfies LD Area B1.
- MATH 2510 Single Variable Calculus I or MATH 2310 Single Variable Calculus I for Engineers with a grade of C- or better satisfies Foundational Skills B4.
- PHIL 3318 Professional Ethics satisfies GVAR

Computer Engineering majors have the following General Education Modifications (GEMs), which means they do not have to take courses to satisfy these GE requirements. These GEMs are specific to the three engineering majors (Computer Engineering, Electrical Engineering and Engineering Sciences). Students who change to another major will not keep the modifications:

- Foundational Skill A3 is embedded in PHYS 2210 Physics for Scientists and Engineers I, PHYS 2220 Physics for Scientists and Engineers II [B1] and ECE 2070 Electric Circuits/ENGR 2070 Electric Circuits/PHYS 2070 Electric Circuits [A3].
- LD Area B2 is embedded throughout the curriculum.
- 3 units of LD Area D is met through EAC/ABET outcomes 2 and 4.
- UD Thematic Area D is met through EAC/ABET outcomes 2 and 4.

² The SELF requirement may be met by selecting another General Education course with a SELF overlay or by taking a stand-alone