

ELECTRICAL ENGINEERING

Department of Computer and Electrical Engineering and Computer Science

School of Natural Sciences, Mathematics, and Engineering

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Program Description

Electrical Engineering is a large and expanding field which is concerned with the following fundamental areas: digital signal processing, semiconductor electronics, microprocessors and embedded systems, VLSI design, cyber-physical systems, data communications, energy systems and power electronics, transmission and distribution, RF and microwave, robotics and control system design, electromechanics and mechatronics, computer networks, digital design, image processing and computer vision. If computer science can be regarded to be on the information processing side of computer engineering, then electrical engineering can be regarded to be on the side which builds upon the fundamental physical properties of electricity and magnetism. Electrical engineers often work with other engineers, physical scientists, and computer scientists.

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 http://www.cs.csubak.edu/all_abet.pdf.

Requirements for the Bachelor of Science Degree in Electrical Engineering

Total Units Required to Graduate	120 units
Major Requirements	90 units
CMPS/ECE Courses	56
Cognate Courses	34
Minor Requirement	0 units
General Education Requirements	24 units
First-Year Seminar	0*
LD Area A Foundational Skills	6*
LD Area B Natural Sciences	0*
LD Area C Arts and Humanities	6
LD Area D Social and Behavioral Sciences	3*
American Institutions	6
SELF	0**
Junior Year Diversity Requirement	3
UD Thematic Areas C and D	0*
Capstone	0*
GWAR (Exam) or Class	0**
Additional Units	6 units***

*The following required major courses also meet general education requirements: ECE/ENGR 1618 and 1628 meet First-year Seminar, MATH 2310 or 2510 meets Foundational Skill A4, PHYS 2210 meets LD Area B1, PHIL 3318 meets UD Thematic Area C, and CMPS 4928 meets Capstone. Engineering majors have the following GE modifications: Foundational Skill A3, LD Area B2, 3 units of LD Area D, and UD Thematic Area D.

**The SELF requirement can be met by selecting another General Education course with a SELF overlay or by taking a stand-alone course. The GWAR may be satisfied by taking the GWAR exam, by taking another General Education course with a GWAR 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.

***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 and GWAR.

SB1440 units required - 58 units*

*Units required for graduation after completion of the Engineering (Electrical 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.

Requirements for the Major in Electrical Engineering

1. **Lower Division** (12 units)
ECE/ENGR 1618, 1628, ENGR/ECE/PHYS 2070, CMPS 2010
2. **Upper Division** (32 units)
ECE 3040, 3070, 3200, 3230, 3320, 3370, 3340, 4910, 4928
3. **Upper Division Elective courses** (12 units)
Select 12 units of elective courses from the following. At least one course must be at the 4000-level:
 - Digital Design and Embedded Systems**
ECE 3220, 3250, 4240
 - Digital Communication and Digital Signal Processing**
ECE 4220, 4250, 4260
 - Control Systems and Robotics**
ECE 3280, 4570
 - Power Systems and Power Electronics**
ECE 3380, 4330, 4370, 4380+4381*
** Students must take both ECE 4380 and 4381 to receive elective credit for the Electrical Engineering degree.*
 - Image Processing and Computer Vision**
ECE 4460, 4470
 - Special Topics and Independent Study**
ECE 3770, 3771, 4770, 4771, 4800, 4860, 4870, 4890
Only a combined total of 4 units of ECE 377x, 477x, 48xx may be used for elective credit.
4. **Required Cognate courses** (36 units):
MATH 2510 or 2310, MATH 2520 or 2320, MATH 2530, 2610, 3200, CHEM 1000, PHYS 2210, 2220, PHIL 3318
5. **General Education Courses and Notes:**
Some of the courses required for the Electrical 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/ENGR 1618 and 1628 satisfy the First-Year Seminar requirement.
 - ECE 4928 satisfies the Capstone requirement.
 - PHIL 3318 satisfies UD Thematic Area C and the Electrical Engineering Ethics requirement.
 - PHYS 2210 satisfies LD Areas B1.
 - MATH 2510 or 2310 with a grade of C or better satisfies Foundational Skill A4.

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, 2220 and ECE/ENGR/PHYS 2070.
- LD Area B2 is embedded throughout the curriculum.

- 3 units of LD Area D is met through EAC/ABET outcomes 3c and 3h.
- UD Thematic Area D is met through EAC/ABET outcomes 3c and 3h.

Note: All Computer Engineering and Electrical Engineering **courses descriptions** are listed under the Computer Engineering Degree Program and carry the ECE prefix.