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, VSLI 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.

Requirements for the Bachelor of Science Degree in Electrical Engineering

Total Units Required to Graduate 180 units
Major Requirements 115 units
CMPS/CENG/ EENG Courses 62
Cognates 53
Other University Requirements 65-72 units
CSUB 101 2
American Institutions 5
Area A1, A2 10*
Area A2 5*
Area C 15
Area D 15
Theme 1 0*
Theme 2 5**
Theme 3 5
GRE 3-5
GWAR (Exam) or Class 0-5

*A3, B1, B3, B4, Theme 1 satisfied in major or cognate
**PHIL 316 is required

Major Requirements for the Bachelor of Science Degree in Electrical Engineering

1. Lower Division (12 units):
CMPS 221, 224
2. Upper Division required (40 units):
CENG 424, 425, 432, 434, 446, 447, 457
EENG 336, 424, 433, 464

4. Cognate Requirements (53 units):
MATH 201, 202, 203, 204 or MATH 231, 232, 233, 234 and 340
CHEM 211, PHYS 221, 222, 223, PHYS/ENGR 207

Information on General Education Courses
- PHYS 221 will satisfy Areas B1 and B3.
- Any of the Calculus courses (MATH 201, 202, 203, 204 or MATH 231, 232, 233, 234) will satisfy Area B4.
- Theme 1 is waived for Electrical Engineering.
- Area A3 is waived for Electrical Engineering.
- PHIL 316 (Professional Ethics) must be taken and will satisfy Theme 2.

COURSE DESCRIPTIONS

Note: Most of the courses required for Electrical Engineering are listed under the Computer Engineering and Computer Science Programs. Additional upper division engineering courses are as follows:

Upper Division

EENG 325 Properties of Materials (5)
Fundamental electrical, optical, and magnetic properties of materials, elementary quantum mechanics, crystal structure, energy bands, metals and semiconductors. Prerequisite: CENG 307 and PHYS 223.

EENG 332 Fields and Waves (5)
Vector analysis, electrostatic and magnetic fields, Maxwell’s equations, plane waves. Reflection, attenuation, and impedance. Prerequisite: MATH 204 and PHYS 223.

EENG 336 Electrical Machinery (5)
This course is an introduction to the analysis and design of electromechanical energy conversion systems, magnetic circuit theory, general transformer and machinery theory, DC and AC motors and generators. Prerequisite: CENG 304 and 307.

EENG/CENG 424 Microprocessor System Design (5)
Architecture and hardware design of microprocessor-based systems, including bus structure, interrupts handling, I/O ports, control signal, and peripherals. Prerequisite: CMPS 224 and CENG 320.
EENG 443 Mechatronics (5)
Intelligent electro-mechanical systems. Topics include electronics (A/D, D/A converters, op-amps, filters, power devices), software program design (event-driven programming, state machine-based design), DC and stepper motors, basic sensing and basic mechanical design. Prerequisites: CENG 307, 320, and CMPS 223.

EENG 464 Power Electronics and Semiconductors (5)
The course is an introduction to switched-mode power converters. It provides a basic knowledge of circuitry for the control and conversion of electrical power with high efficiency. These converters can change and regulate the voltage, current, or power; dc-dc converters, ac-dc rectifiers, dc-ac inverters, and ac-ac cycloconverters are in common use. Applications include electronic power supplies, aerospace and vehicular hybrid power systems, and renewable energy systems. Prerequisite: CENG 304 and 307.

EENG 490 Senior Project in Computer Engineering (5)
After consultation with the instructor and investigation of relevant literature, the student shall prepare a substantial project with significance in Electrical Engineering. In addition, an oral presentation and a written report of the project will be required. Prerequisite: major in Electrical Engineering and upper-division standing.