

Computer Engineering

The Field of Computer Engineering

Computer engineering is a discipline that allows the student to gain expertise in the design, programming, and application of computers. It prepares the graduate for professional practice or graduate studies. The program combines the following:

- A strong basis in mathematics and physical sciences
- A strong emphasis in electronics circuits and systems
- A strong foundation in computer science including programming methodology and software engineering
- A strong emphasis on digital systems design, microprocessors, computer architecture, and digital signal processing.

A rich set of technical area courses is available to allow students to broaden their knowledge within any of the several computer engineering areas.

Computer engineers work with the hardware and software aspects of systems design and development. They usually apply the theories and principles of science and mathematics to design hardware, software, networks, and processes to solve technical problems.

Computer hardware engineers usually design, develop, test, and manage the design of computer systems, integrated circuit chips, embedded systems, and device controllers. Computer

software engineers are involved in the design, development, and deployment of software systems for a wide range of applications such as medical equipment, robotics, industrial automation and control, business, wireless communications, management processes, etc. They may research, design, and test operating systems software, compilers, embedded systems, distributed computing, and more.

The Department

The Department of Electrical and Computer Engineering offers the B.S. in Computer Engineering and the B.S. in Electrical Engineering. It also offers the M.S. in Engineering, Computer and Electrical Options. These programs are accredited by the Accreditation Board of Engineering and Technology (ABET). The Computer Engineering Program is designed to provide the student with a comprehensive background in electronics, digital systems, microprocessors, computer architecture, and digital signal processing. The curriculum has been designed to provide a balanced program that emphasizes both computer hardware and software. By the appropriate choice of technical area courses, the student may emphasize one of the following areas:

- Electronics
- VLSI
- Digital Systems
- Communications
- Digital Signal Processing

- Computer Architecture
- Computer Networks
- Optoelectronics
- Embedded Systems

Mission

The mission of the Department of Electrical and Computer Engineering is to fulfill the needs of the region and state by providing an undergraduate technical education in computer engineering and electrical engineering to a diverse group of students. The department strives to continually update its strong programs of study in order to qualify graduates for positions in the industry, while providing sufficient breadth and depth in the programs to assure graduates of a successful practice in the profession. At the same time, students are grounded in the rigorous scientific and theoretical foundations of the discipline. This grounding will not only enable graduates to enter and be successful in any advanced level educational program of their choosing, but also to build upon this strong foundation and extend it to new depths.

The Computer Engineering program awards degrees to students, who, within three to five years of graduation — through work experience and/or graduate education in the engineering field — will be expected to have grown technically and be productive in their respective workplaces. Graduates should be capable of addressing technical problems of increas-

California State
University, Fresno

Department
of Electrical
and Computer
Engineering

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<http://fresnostate.edu/engineering/electrical/computer/>

B.S. in Computer
Engineering

B.S. in Electrical
Engineering

M.S. in Engineering

Options:

- *Electrical*
- *Computer*

Minor in Electrical
Engineering

Minor in Computer
Engineering

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Computer Engineering

ing complexity and of communicating and functioning effectively in a team environment. They also should be able to demonstrate ability for independent learning and continued professional as well as ethical development.

Facilities

The department makes available to students excellent facilities housed in the Engineering East Building. The laboratories support the curriculum in digital systems, microprocessors, software engineering, electronics and communications, optoelectronics, VLSI, instrumentation and controls, and micro-waves. Students can work on both Unix based Sun Workstations available via the College of Engineering's CAD laboratories and PCs available in all department laboratories.

The computer engineering program emphasizes quality education through engineering design and hands-on experiences. Numerous laboratories are available to students for regular exercises, independent work, and projects. Availability of current engineering tools prepares students for practice and enhances their awareness of industry standards.

Careers in Computer Engineering

The fast pace of advances in technology and the increasing dependence of modern society on computers and electronic products drives the continuing demand for electrical engineers for new products in communication, aerospace, automobile, defense, manufacturing, electric utility, automation, transportation, computers, entertainment, and related fields and industries.

According to the U.S. Department of Labor, the average yearly wages of computer engineers were \$106,930 (national) and \$115,970 (California) in 2013. Job opportunities should continue to grow during this decade. The average starting salary for Computer Engineers is \$70,300.

Future Education

The bachelor's degree in computer engineering should prepare a student for graduate work in computer or electrical engineering leading to an M.S. or Ph.D. at any university. Students can also choose to pursue education leading to an M.B.A.

General Preparation

To be successful in the profession of computer engineering, some basic skills are important: the proper background in mathematics, science, written and oral communications, an analytical, creative mind to meet the challenge of open-ended technical problems; the ability to grasp fundamentals well in order to cope with the constant technological changes and the ability to work in a team environment.

High School Preparation

Students should meet California State University's admission requirements in terms of college preparatory course requirements, grade point average, and test scores. Additional recommended courses are advanced mathematics (1/2 year), chemistry and physics (1 year), and computer programming (1/2 year).

College Program

Students should consult the university's *General Catalog* for specific major and university requirements, for General Education requirements, and for approved technical area courses.

General Education

Students should follow the program of the computer engineering major. For specific requirements, see the program outline in the computer engineering curriculum in the university's *General Catalog*.

Course Requirements

The B.S. in Computer Engineering requires a total of 124 units including 60 units in the major and 64 units in other areas such as computer science, mathematics, physics, and general education. The major includes a core of 51 units and 9 units of technical area courses.

For additional information, write

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PLEASE NOTE: This document is for general informational purposes only. The information is subject to change; consult the appropriate department or an academic adviser. Entering freshmen must follow the revised General Education program effective fall 1999 and thereafter. The university catalog and schedule of courses are available online at www.fresnostate.edu/ClassSchedule and www.fresnostate.edu/catalog.

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