Electrical & Computer Engineering

Electrical engineers find innovative ways to use electricity, electric materials, and electrical phenomena to make people's lives better. Computer engineers design computer systems, both hardware and software, to create new technology and meet new societal needs.

The field of electrical engineering encompasses a very broad spectrum of technical areas, including computers and digital systems, electronics and integrated circuits, communications, systems and control, electromagnetics and electro-optics, energy conversion and power distribution, robotics, and signal processing.

The field of computer engineering covers a wide range of topics including computer architecture, operating systems, communications, computer networks, robotics, artificial intelligence, supercomputers, computer-aided design, and neural nets.

Electrical engineers and computer engineers work at the frontier of high technology and are involved in research, the creation of new ideas, and the design and development of new products, manufacturing, and marketing activities.

Pursuing Electrical & Computer Engineering at Ohio State

Preparation for an engineering career should begin in high school. Math and science courses are the most important, since they will provide the basis for understanding and using technical information. Students must also be able to write and speak well. Also, students should be well-rounded in history, cultural arts, and current events to help them understand the needs of people everywhere.

Students interested in computing careers may pursue their interest through the College of Engineering in either Electrical and Computer Engineering or Computer Science and Engineering. Please note that these programs are not interchangeable and special attention should be made to their curricular requirements, so a student's particular computing interests are met (see major series sheets). Students who come to Ohio State to study engineering that have a minimum ACT Math score of 24 or SAT Math score of 560 will be directly enrolled as pre-engineering students in the College of Engineering. Those students not eligible to directly enroll in engineering may enroll in the Science and Technology Exploration Program that is part of our Exploration Program described further at exploration.osu.edu.

All of our students completing the electrical and computer engineering major will earn the Bachelor of Science in Electrical and Computer Engineering (BSECE) degree. The major has two specialized programs to choose from: electrical engineering (EE) and computer engineering (CpE).

Acceptance to the major is based on the student's cumulative point-hour ratio (CPHR) or secondary point-hour ratio (SPHR) after successful completion of specified pre-major courses. First, all students with a CPHR of 3.0 or better are admitted to the major. Then, for students with a minimum CPHR of 2.0 we will base further admission on the SPHR. For each year we set a minimum SPHR that we estimate will fill our quota. For 2007-8 our statistics show that admitting all students with a SPHR of 2.0 and higher will cause our quota to be filled. The admission SPHR may be adjusted in the future; however, students with an SPHR of less than 2.0 will not be admitted even if the quota is not filled. For electrical and computer engineering, the annual numerical ceiling is 230 students. For electrical engineering, the SPHR is computed after the completion of Engineering 183, Math 254, Physics 133, Chemistry 121, and Engineering Graphics 167. For computer engineering, the SPHR is computed after the completion of Engineering 183, Math 254, Physics 133, Chemistry 121, and Engineering Graphics 167 or Computer Science and Engineering 221.

Program Educational Objectives

- Graduates can apply electrical engineering or computer engineering principles to solve engineering problems and to address the technological challenges of the future based on a solid foundation in (for EE) circuits, systems, electromagnetics and devices, or (for CpE) circuits, systems and computer hardware and software.
- Graduates can apply modern (electrical or computer) engineering techniques, tools, and practices to create and apply technologies to meet the needs of society.
- Graduates have developed an appreciation for and an ability to engage in their life-long learning process. Graduates are also well-prepared for graduate school to further their education.
- Graduates become effective engineers in the workplace of the future or otherwise use the foundation of their technical education to progress in their career.

Electrical & Computer Engineering Requirements

Presently, a total of 196 hours are required for both the electrical engineering and the computer engineering specializations. A summary of requirements includes:

- Chemistry: 1 course, 5 hours
- Computer sciences and engineering:
  EE: Optional
  CpE: 5 courses, 20 hours
- Electrical engineering:
  EE: 16 courses, 43 hours
  CpE: 15 courses, 39 hours

For more information, check these web sites:

Electrical and Computer Engineering: ece.osu.edu
College of Engineering: engineering.osu.edu
Ohio State: osu.edu
Admissions: undergrad.osu.edu
Multicultural Center: multiculturalcenter.osu.edu
First Year Experience Program: fye.osu.edu

Curriculum Sample

This is a sample list of classes a student will take to pursue a degree in electrical & computer engineering*. Since university students need more than specific education in a narrow field, they also will take classes to complete the General Education Curriculum (GEC). The GEC will allow students to develop the fundamental skills essential to collegiate success across major programs. Course work options satisfying the GEC often come from a variety of academic areas of study allowing students to tailor their GEC toward their interests. Note: This sample represents one of several possible paths to a degree in Electrical & Computer Engineering. Consult the departmental web site, ece.osu.edu, for details on each specific track.

Freshman Year	
Engineering Survey	1
Calculus and Geometry	15
Physics	10
Chemistry	5
Engineering Graphics	4
Introduction to Engineering	6
GEC (English composition)	5
Total hours	**46**

Sophomore Year	
Calculus and Differential Equations	9
Mathematics	3
Physics	5
Analog Circuits (including laboratories)	8
Digital Circuits and Systems (including laboratories)	7
Energy Conversion	3
GEC courses	15
Total hours	**50**

Junior Year	
Mathematics or Statistics elective	3
Analog Circuits and Electronics	3
Signals and Systems	6
Electromagnetics	6
Materials	3
Semiconductor devices	3
GEC courses	10
Technical electives/selected core	16
Total hours	**50**

Senior Year	
Engineering Economic Analysis	3
Professional Aspects of Engineering	1
Technical electives/selected core	36
GEC (Design I)	3
GEC courses	5
Design Project	3
Total hours	**51**

*Electrical engineering curriculum listed. Computer engineering replaces some electrical engineering classes with computer classes.

- Engineering:
  2 courses, 6 hours
- Introduction to programming: 1 course, 4 hours
- Industrial and systems engineering: 1 course, 3 hours
- Mathematics:
  EE: 7 courses, 30 hours
  CpE: 8 courses, 33 hours
- Physics: 3 courses, 15 hours
- Technical electives and selected core:
  EE: 52 hours**
  CpE: 33 hours**

**see handbook for details at ece.osu.edu/pdfs/ugrad_handbook.pdf

The college requirements total 158 credit hours and the General Education Curriculum requirements total 38 credit hours, for a total of 196 credit hours required for graduation.

Electrical and computer engineering honors students may enrich their academic experiences by completing the Freshman Engineering Honors Program, completing a research project to Graduate with Distinction, earning the Graduation with Honors in Engineering designation, or pursuing our BSMS program.

Co-Curricular Opportunities

Ohio State offers many opportunities for students to learn and grow outside of the classroom. These range from cooperative education (co-op) and internships to study abroad programs to student organizations. Co-ops and internships place students in professional environments while they are Ohio State students. Ohio State offers more than 100 study abroad programs in 40 countries around the world. In addition, there are hundreds of student organizations on campus to meet the interests of a diverse student population.

These opportunities enable students to gain valuable work experience, learn about cultures, and take on leadership roles before they enter the workforce. All of these experiences enhance learning and may provide an advantage in the job market.

Career Prospects in Electrical & Computer Engineering

Career opportunities for graduates with degrees in electrical and computer engineering continue to be diverse and in demand. As technology expands, the demand for electrical and computer engineers will also increase. A new graduate in electrical and computer engineering faces a bright and challenging future, with positions to be found in research, design and development, manufacturing, marketing, management, and other areas.

Electrical and computer engineering graduates are heavily recruited by large and small companies for positions throughout the United States and abroad. These companies include computer, aerospace, automotive, telephone and power utilities, electronics manufacturers, and other industries. There are also positions available in many government agencies.

An electrical and computer engineering degree is also a good background for pre-medicine, as well as for careers in business and law. Electrical and computer engineers have become entrepreneurs, beginning new businesses by applying electrical and computer engineering systems and technology to new areas of service.

The average beginning salary for electrical and computer engineers having a bachelor's degree is approximately $56,000 per year.

Revised July 2007. For the most up-to-date information on the electrical and computer engineering program, please visit ece.osu.edu.

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Ohio State's electrical and computer engineering program is accredited by the Engineering Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 | (410) 347-7700.