

# Electrical and Computer Engineering

**E**lectrical engineers find innovative ways to use electricity, electronic materials and electrical phenomena to improve people's lives. 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, signal processing, solid state electronics, and photonics.

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 and Computer Engineering at Ohio State

Preparation for an engineering career should begin in high school. Math and science courses are the most important; however students must also be able to write and speak well and 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 either Electrical and Computer Engineering or Computer Science and Engineering (CSE). These programs are not interchangeable—students should examine the curricular requirements for each major to determine which one meets their interests (find the CSE major series sheet at [majors.osu.edu](http://majors.osu.edu)).

Students may directly enroll as pre-engineering students; however, selection is competitive. Factors used to determine eligibility to directly enroll include ACT/SAT scores (emphasis on math), strong college prep curriculum (emphasis on math, science and rigorous courses), and class rank or GPA. The middle 50% of directly enrolled pre-majors for autumn 2014 had an ACT score range of 28–32 and 96 percent were in the top 25% of their high school classes. Students not eligible to directly enroll in engineering may enroll in Science, Technology and Environment Exploration (see [exploration.osu.edu](http://exploration.osu.edu)).

Acceptance to the major is based on the following:

- Cumulative point-hour ratio (CPHR)—calculated from all courses taken at Ohio State for a grade
- Completion of pre-major courses—Engineering 1181 and 1182, Math 1151 and 1172, Chemistry 1250, CSE 1222, and Physics 1250 and 1251
- Eligibility grade point average (EGPA)—calculated from pre-major courses

All students with a CPHR of a 3.2 or better are admitted into the major. Students with a CPHR of less than 3.2 but at least a 2.0 must have an EGPA of a 2.7 or better to be admitted into the major.

English 1110 and a survey course must also be successfully completed before entering into the major, but grades from these classes are not calculated into the EGPA.

## Electrical and Computer Engineering Requirements

All 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 programs of study to choose from: electrical engineering (EE), accredited under the ABET Electrical and Electronics Engineering program criteria; and computer engineering (CpE), accredited under the ABET Computer Engineering program criteria.

Electrical engineering requirements (and credit hours):

- Chemistry: 1 course (4)
- Physics: 2 courses (10)
- Mathematics and statistics: 5 courses (19)
- Computer programming: 1 course (3)
- Electrical and computer engineering: 14 courses (33)
- Engineering: 3 courses (5)
- Industrial and systems engineering: 1 course (2)
- Electives: 28 hours

Computer engineering requirements (and credit hours):

- Chemistry: 1 course (4)
- Physics: 2 courses (10)
- Mathematics and statistics: 5 courses (19)
- Computer programming: 1 course (3)
- Electrical and computer engineering: 13 courses (28)
- Computer sciences and engineering: 5 courses (16)
- Engineering: 3 courses (5)
- Industrial and systems engineering: 1 course (2)
- Electives: 17 hours

For each program above, the required credit hours (104) and the General Education requirements (24 credit hours) combine for a total of 128 credit hours required for graduation.

**For more information, check these websites:**

Electrical and Computer Engineering: [ece.osu.edu](http://ece.osu.edu)  
College of Engineering: [engineering.osu.edu](http://engineering.osu.edu)  
Ohio State: [osu.edu](http://osu.edu)

Admissions: [undergrad.osu.edu](http://undergrad.osu.edu)  
Multicultural Center: [multiculturalcenter.osu.edu](http://multiculturalcenter.osu.edu)  
First Year Experience: [fye.osu.edu](http://fye.osu.edu)

## Electrical Engineering Curriculum Sample

This is a sample list of classes a student will take to pursue a degree in electrical and computer engineering in the electrical engineering\* program. Since university students need more than specific education in a narrow field, they also will take classes to complete General Education (GE) requirements. Because GE courses come from a variety of academic areas of study, this course work helps students develop fundamental skills essential to collegiate success and allows them to tailor these courses toward their interests.

Note: This sample represents one of several possible paths to a degree in electrical and computer engineering. Consult the departmental website, [ece.osu.edu](http://ece.osu.edu), for details on specific paths.

Freshman Year	
Engineering survey	1
Calculus and Analytical Geometry	10
Physics	5
Chemistry	4
Computer Programming	3
Fundamentals of Engineering	4
GE courses	6
<b>Total hours</b>	<b>33</b>

Sophomore Year	
Differential Equations	3
Linear Algebra	3
Physics	5
Digital Logic	3
Analog Systems and Circuits	3
Discrete Time Signals and Systems	3
Microcontroller Based Systems	2
GE courses	12
<b>Total hours</b>	<b>34</b>

Junior Year	
Statistics	3
Electronics	3
Electronics Laboratory	1
Signals and Systems	3
Radio Frequency and Optical Engineering	3
Semiconductor Electronic Devices	3
Sustainable Energy and Power Systems	3
Ethics and Professionalism	1
GE courses	6
Electives	6
<b>Total hours</b>	<b>32</b>

Senior Year	
Engineering Economic Analysis	2
Technical Communications	1
Design Project	4
Electives	22
<b>Total hours</b>	<b>29</b>

\*The computer engineering curriculum replaces some electrical engineering classes with computer engineering and computer science classes.

Electrical and computer engineering (ECE) honors students may enrich their academic experiences through the Freshman Engineering Honors Program, earning the graduation with honors in engineering designation, completing a research project to graduate with distinction or pursuing the BS/MS program.

Ohio State's Electrical Engineering and Computer Engineering programs are accredited by the Engineering Accreditation Commission of ABET, [abet.org](http://abet.org).

## Program Educational Objectives

The student outcomes supporting our educational objectives can be found at [go.osu.edu/ece\\_outcomes](http://go.osu.edu/ece_outcomes).

### Electrical Engineering

- Graduates apply electrical engineering principles to solve engineering problems and address evolving technological challenges based on a solid foundation in circuits, systems, electromagnetics and devices.
- Graduates apply modern electrical engineering techniques, tools and practices to create and apply technologies to meet the needs of society.
- Graduates engage in life-long learning.
- Graduates are effective engineers in the workplace, attend graduate or professional school, or otherwise use the foundations of their technical education to progress in their career.

### Computer Engineering

- Graduates apply computer engineering principles to solve engineering problems and address evolving technological challenges based on a solid foundation in circuits, systems, and computer hardware and software.
- Graduates apply modern computer engineering techniques, tools and practices to create and apply technologies to meet the needs of society.
- Graduates engage in life-long learning.
- Graduates are effective engineers in the workplace, attend graduate or professional school, or otherwise use the foundations of their technical education to progress in their career.

## Co-Curricular Opportunities

Ohio State offers many opportunities for students to learn and grow outside of the classroom. 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 countries around the world. In addition, there are hundreds of student organizations on campus to meet the interests of a diverse student population.

## Career Prospects in Electrical and Computer Engineering

ECE graduates are heavily recruited by employers including computer, aerospace and automotive companies, telephone and electric utilities, electronics manufacturers, and government agencies. Electrical and computer engineers have also become entrepreneurs, applying their training to new areas of service. The average beginning annual salary for ECE graduates is approximately \$61,500.

**Revised January 2016.** Information may change. For the most up-to-date information on the electrical and computer engineering program, visit [ece.osu.edu](http://ece.osu.edu).

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