ELECTRICAL ENGINEERING, BS

Students who are interested in math and physics are often well-suited for study in electrical and computer engineering. Many ECE students have interests in computing and in hands-on projects with electrical and electronic devices such as household wiring, audiovisual equipment, automobiles, electric motors and much more. Students develop critical thinking and problem solving skills throughout their studies. In addition, they develop their ability to apply their knowledge of mathematics, science and general engineering to attack technical issues associated with electro-technology.

Program Educational Objectives and Program Outcomes

The mission of the undergraduate electrical engineering and computer engineering programs is to provide high-quality and broad-based education in electrical engineering or computer engineering that emphasizes critical thinking and communication skills while preparing graduates for professional careers and lifelong learning. The faculty has adopted the educational objectives listed below for the electrical and computer engineering undergraduate programs. The department has included a process to provide continual improvement of the curricula. Graduates will:

- excel in engineering careers and/or postgraduate education utilizing knowledge of electrical or computer engineering disciplines and underlying fundamental principles of science and mathematics, engineering analysis, problem solving and design
- expand their knowledge of current and emerging issues in electrical and computer engineering and continue career-long professional development through engagement in lifelong learning
- grow professionally and advance throughout their engineering careers utilizing skills in effective communication; responsible, multidisciplinary teamwork; and adherence to principles of professional accountability and ethics

To facilitate attainment of these career-long objectives, the department has defined a set of program outcomes and associated assessments to demonstrate that, by graduation, students have:

- an ability to apply the necessary knowledge of mathematics, science and engineering to analyze and design electrical and electronic devices, as well as software and systems containing hardware and software components, as appropriate to program objectives
- an ability to design and conduct experiments, as well as analyze and interpret data
- an ability to design a system, component or process to meet desired needs
- an ability to function on multidisciplinary teams
- an ability to identify, formulate and solve engineering problems
- an understanding of professional and ethical behavior
- an ability to communicate effectively in oral, written and graphical formats
- the broad education necessary to understand the impact of electrical or computer engineering solutions in a global, societal and environmental context consistent with the principles of sustainable development
- a recognition for the need for and an ability to engage in lifelong learning
- a knowledge of contemporary issues

- an ability to use the techniques, skills and modern engineering tools necessary for engineering practice
- knowledge of probability and statistics, specifically applied to problems in electrical or computer engineering
- for electrical engineering graduates, knowledge of advanced mathematics, typically including differential equations, linear algebra, complex variables and discrete mathematics; for graduates with the computer engineering option, knowledge of discrete mathematics

The information contained here describes the undergraduate curricula in electrical engineering and computer engineering. Graduate students and students participating in the Scholars Program should consult the graduate catalog for information on all cross-listed and graduate-only courses. More information about various programs within the department is available in the electrical and computer engineering office.

The overall goal of the electrical engineering program is to prepare students for engineering careers within the discipline. The first year and a half of the electrical engineering curriculum includes basic courses in mathematics and physical science, broadening courses in humanities and social science and foundation courses in engineering. The next three semesters provide the core education in electrical engineering, with courses in computers, electronics, circuits, systems and electromagnetics. The last year of study includes technical electives to allow students to concentrate in selected areas of the discipline.

For seniors, the department offers advanced courses in computers, communication, control, electromagnetics, microelectronics, materials and power.

Students must select two electrical engineering electives with labs. The elective areas are computers, microelectronics, electromagnetics, power systems, communication systems and control systems. Materials that describe each area are available in the electrical and computer engineering office.

Freshman

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<th>Fall</th>
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Sophomore

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<td>MATH 227</td>
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<td>CS 100</td>
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<td>ECE 380</td>
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Junior

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<th>Spring</th>
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<tr>
<td>MATH 355</td>
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<td>ECE 326</td>
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<tr>
<td>ECE 370</td>
<td>3</td>
<td>ECE 350</td>
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ECE 332  4 ECE 333  4
ECE 383  4 History (HI) or social and
behavioral sciences (SB) elective
Humanities (HU), literature (L), or fine arts (FA) elective
   3 Select one of the following:  3
      PH 301
      OR  ECE 330
      OR  ECE 455

Senior
Fall  
ECE 340  4 ECE or Professional elective  4
Restricted Area Elective  3 ECE elective  3
ECE 492  2 ECE 494  2
ECE elective with laboratory  4 ECE elective with laboratory  4
History (HI) or social and
behavioral sciences (SB) elective
   3 History (HI) or social and
behavioral sciences (SB) elective

Total Hours: 126
1 Students must satisfy the College of Engineering in-depth
requirement (minimum of six hours in one discipline).
2 The College of Engineering core curriculum requires a minimum of:
ine hours of HU, L, or FA courses; nine hours of HI or SB courses;
six hours of FC courses; six hours of W courses (300- and 400-level
ECE courses); 12 hours of N courses (eight hours of calculus-based
physics); 12 hours of MA courses (MATH 125 Calculus I or higher);
and six hours of C or FL courses.
3 The Restricted Area Elective must be chosen from the list approved
by the Department of Electrical and Computer Engineering.
4 The Professional Elective must be chosen from the list approved by
the Department of Electrical and Computer Engineering.

Computer Engineering Option in Electrical Engineering

The computer engineering option is offered within the electrical
engineering department in order to give students a broad knowledge of
the software and hardware components of modern computing systems,
detailed computer-systems design, and the role of computer systems
in various engineering disciplines. A primary goal of the program is to
prepare the student for a computer-oriented engineering career with
emphasis on computer applications within various subdisciplines of
electrical engineering.

The computer engineering option includes a broad spectrum of electrical
engineering and computer science courses, as well as electives to allow
the student to study a specific area in depth and to gain additional design
experience. Areas of specialization may include computer architecture,
integrated circuit design, microprocessor-based systems, sensor
networks, image processing, robotics and applications-oriented study in
other disciplines of electrical engineering.

Freshman
Fall  
CH 101  4 PH 105  4
MATH 125  4 MATH 126  4
ENGR 111 or ECE 121  1 EGR 103  3
EN 101  3 EN 102  3
Humanities (HU), literature (L), or fine arts (FA) elective  3

Sophomore
Fall
PH 106  4 MATH 301  3
MATH 238  3 ECE 225  4
MATH 227  4 MATH 237  3
CS 100  4 ECE 380  4
Humanities (HU), literature (L), or fine arts (FA) elective  3

Junior
Fall
History (HI) or social and
behavioral sciences (SB) elective
   3 History (HI) or social and
behavioral sciences (SB) elective
ECE 370  3 ECE 332  4
MATH 355  3 ECE 326  3
CS 101  4 CS 201  4
ECE 383  4

Senior
Fall
Humanities (HU), literature (L), or fine arts (FA) elective
   3 History (HI) or social and
behavioral sciences (SB) elective
ECE 333  4 Restricted Area Elective  3
ECE 492  2 ECE 494  2
ECE 484  3 Professional or Restricted Area Elective
Select one of the following lecture/lab combinations
   4 ECE 486
ECE 408
ECE 409
OR
ECE 475
ECE 476
OR
ECE 480
ECE 481

Total Hours: 123
1 Students must satisfy the College of Engineering in-depth
requirement (minimum of six hours in one discipline).
The College of Engineering core curriculum requires a minimum of:
- nine hours of HU, L, or FA courses;
- nine hours of HI or SB courses;
- six hours of FC courses;
- six hours of W courses (300- and 400-level ECE courses);
- 12 hours of N courses (eight hours of calculus-based physics);
- 12 hours of MA courses (MATH 125 Calculus I or higher);
- and six hours of C or FL courses.

The Restricted Area Elective must be chosen from the list approved by the Department of Electrical and Computer Engineering.

The Professional Elective must be chosen from the list approved by the Department of Electrical and Computer Engineering.

Electrical and Computer Engineering graduates have career opportunities in a number of industries and fields including, but not limited to, computing, communications, manufacturing, maintenance, utilities, aerospace, automotive, defense/military, medical and consumer products. The degree also provides an excellent background for graduate study in electrical or computer engineering as well as medicine and law.

**Types of Jobs Accepted**

Electrical and Computer Engineering graduates often gain entry-level positions as utility engineers, plant engineers, programmers, maintenance engineers, or as design engineers with engineering and consulting firms.

**Jobs of Experienced Alumni**

Alumni of the Electrical and Computer Engineering Department currently hold positions such as distribution manager, Alabama Power; vice president, ADTRAN; and senior design engineer, Radiance Technologies.

Learn more about opportunities in this field at the Career Center.