

# ELECTRICAL ENGINEERING, BS

The Electrical Engineering program gives students a broad knowledge of the math, physics, electronics, and power concepts necessary for a career in the discipline. Students will become familiar with topics such as electronics, electromechanical systems, embedded systems, power electronics, micro and nanoelectronics, microwave engineering, optoelectronics, semiconductor devices, photonics, photovoltaics, solar power, biomedical devices, microelectromechanical systems, internet of things, laser, RF/analog/digital circuit design, radar, robotics, sensors, signal processing, control, software development, machine learning, cyber-physical security, artificial intelligence, and vehicle technology. Students develop critical-thinking and problem-solving skills throughout their studies. In addition, they develop an ability to apply their knowledge of mathematics, science, and general engineering to address technical issues.

Graduates with an Electrical Engineering BS degree commonly begin their careers in a variety of functions including: power generation, management, and distribution engineers; analog electronics designers; digital hardware designers; printed circuit board designers; and embedded hardware and software developers. Graduates often work in a wide range of industries including aerospace, defense/military, automotive, medical, software, semiconductors, and consumer electronics. These graduates also pursue post-graduate degrees in Electrical Engineering, Computer Engineering, Computer Science, Business & Commerce, and even professional areas such as Law and Medicine.

The information contained here describes the undergraduate curriculum in Electrical Engineering. Graduate students and students participating in the Accelerated Masters Program (AMP) 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 departmental office located in 3027 SERC.

## Accreditation

Information can be found on Department website.

Students earning the Bachelor of Science in Electrical Engineering (BS) degree must complete all University, College and departmental degree requirements for a total of 126 credits. These include General Education requirements and the following major requirements and ancillary requirements. Additional information, including a semester-by-semester flowchart of degree requirements, can be found on the departmental website. Students completing the Bachelor of Science in Electrical Engineering (BS) degree must comply with all College of Engineering academic policies and requirements.

Major and Ancillary Requirements		Hours
<b>Major Courses</b>		
ENGR 101	The World of Engineering	1
ENGR 104	Fundamentals of Engineering	3
CS 100 or CS 110	CS I for Majors Honors CS I for Majors	4
ECE 225	Electric Circuits	4
ECE 332	Electronics I	4
ECE 333	Electronics II	4
ECE 341	Electromagnetics	3
ECE 350	Electric Power & Machines	3

ECE 370	Signals And Systems	4
ECE 380	Digital Logic	4
ECE 383	Microcomputers	4
ECE 394	Prep Global Elec and Comp Eng	3
ECE 492	Capstone Design I	2
ECE 494	Capstone Design II	2
Electrical Engineering Lecture/Lab Series (choose from two of the following)		8

ECE 400 level lecture/lab series must be taken as a pair (either both lecture and lab taken off-campus at the same institution as a pair and transferred to UA, or both taken at UA)

ECE 408 & ECE 409	Communications and Communications Lab	
ECE 451 & ECE 452	Power Electronics and Power Electronics Laboratory	
ECE 453 & ECE 454	Power Systems and Power Systems Laboratory	
ECE 475 & ECE 476	Control Systems Analysis and Control Systems Lab	
ECE 480 & ECE 481	Digital Systems Design and Digital Systems Design Lab	
ECE 486 & ECE 487	Embedded Systems and Embedded Systems Laboratory	

ECE, Technical, and Professional Electives	12
ECE options include ECE courses from 300 to 489 and 493, except 397 and 399.	

Technical options include courses in the below subjects from course numbers 200 to 489 and 493, except 397 and 399. AEM, CHE, CS, CE, ME, MTE, GES, CH, MATH (except courses with math education as the primary emphasis), PH, AY, ST

Professional options include courses in the below subjects from course numbers 200 to 489 and 493, except 397 and 399. AC, AFS, BSC, RRS, EC, FI, GBA, GEO, IHP, LGS, MGT, MS, MKT, MIL

Students must meet prerequisites required by the selected course. At least 6 of the 12 credits must be completed by 400 level ECE or Technical Electives. At least 6 of the 12 credits must be in the same discipline. A maximum of 3 credits are allowed from 200 level Technical Electives or 200-400 level Professional Electives.

Mechanics Elective	3
ECE 330 or Intro. to Semiconductor Device	
ECE 455 Electromechanical Systems	
or	
PH 301 Mechanics I	
Credit Hours Subtotal:	68

<b>Ancillary Courses</b>		
CH 101 or CH 117	General Chemistry Honors General Chemistry	4
MATH 125 or MATH 145	Calculus I Honors Calculus I	4
MATH 126 or MATH 146	Calculus II Honors Calculus II	4

MATH 227 or	Calculus III	4
MATH 247	Honors Calculus III	
MATH 237	Introduction to Linear Algebra	3
MATH 238	Appld Diff Equations I	3
MATH 355	Theory Of Probability	3
PH 105 or	General Physics W/Calc I	4
PH 125	Honors Gen Ph W/Calculus	
PH 106 or	General Physics W/Calc II	4
PH 126	Honors Gen Ph W/Calculus II	
PH 253	Intro Modern Physics	3
Credit Hours Subtotal:		36

### General Education Courses

The specific courses each student completes in order to fulfill the University of Alabama's general education requirements will depend upon the particular degree program in which the student is enrolled. To determine how these general education requirements are integrated into your program of study, review your semester-by-semester flowchart and discuss with your academic advisor.

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, power, and systems. The last year of study includes two semesters of Capstone Design as well as technical electives to allow students to concentrate in selected areas of the discipline. For seniors, the department offers advanced courses in computers, communications, controls, electromagnetics, microelectronics, materials, and power.

Credit hour substitutions for a course must come from a course within the same discipline (for example, a CS hour must be used to substitute for a missing CS hour). The course used as substitution cannot be used for any other Electrical Engineering program requirement. This is accomplished through a petition to the ECE Department.

Electrical 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, robotics and automation, semiconductors, and consumer electronics. The degree also provides an excellent background for graduate study in Electrical Engineering or Computer Engineering as well as Law and Medicine.

## Types of Jobs Accepted

Electrical Engineering graduates often gain entry-level positions as utility engineers, facilities engineers, programmers, or design engineers with various engineering firms, consulting firms, and companies across a wide range of industries.

## Jobs of Experienced Alumni

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

Learn more about opportunities in this field at the Career Center