ELECTRICAL ENGINEERING MAJOR (IN-PERSON OR ONLINE)

Department: Electrical and Computer Engineering (https://catalog.bradley.edu/undergraduate/engineering-technology/electrical-computer-engineering/)

The baccalaureate program in electrical engineering is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org (https://www.abet.org/).

Department Mission and Educational Objectives

Department Mission: the mission of the Electrical and Computer Engineering Department is to educate the next generation of electrical and computer engineers to meet the challenges of the future, and empower electrical engineering graduates for immediate and sustained success in their professional practice.

Program Educational Objectives: The ECE faculty recognize that there are a number of common elements inherent to the success in the profession, which include the following: ability to acquire, generate, and use new knowledge; ability to complete complex electrical engineering projects; critical thinking, experience, knowledge, skills, and capabilities relevant to profession. These elements required for success in the profession translate into these educational objectives of the program. It is the expectation of the ECE faculty that graduates of the EE program will attain the following goals within a few years of graduation,

1. Are applying their education to their professional work in the public or private sectors or obtaining an advanced degree in electrical engineering or related areas;
2. Are engaging in lifelong learning using their education as a foundation.
3. Are productive while demonstrating professional growth and assuming positions of increasing responsibility.

Student Outcomes

In order to meet these program educational objectives, students graduating from Bradley's electrical engineering program will attain the following outcomes.

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

The goal of the ECE department is to provide the intellectual and physical learning environment in which students achieve these outcomes. The intellectual component of this environment is supplied by the ECE faculty members, in their roles as mentors, advisors, and engineering professionals, as well as by the curriculum they establish for the programs. The physical component consists of quality facilities equipped with state-of-art instrumentation, equipment, computers, and professional software.

Programs of Study

Academic advisor closely works with students on their BSEE program of study tailored to their academic background, interest and career goals. BSEE programs have an expected total of 126 credit hours. These courses can be listed in five categories: Bradley Core Curriculum (BCC), Mathematics and Sciences, required ECE courses, approved ECE Electives, and approved professional electives.

Code	Title	Hours
Bradley Core Curriculum (BCC)		
BCC Communications Oral Communications (BCC – CM)		3.0
BCC Communications Writing (BCC – W1)		3.0
BCC Communications Advanced Writing (BCC – W2)		3.0
BCC Fine Arts (BCC – FA)		3.0
BCC Global Perspectives (BCC – GP)		3.0
BCC Humanities (BCC – HU)		3.0
BCC Multidisciplinary Integration (BCC – MI)		3.0
Mathematics and Basic Sciences		
CHM 110	General Chemistry I (BCC – NS1)	3.0
CHM 111	General Chemistry I Lab	1.0
MTH 121	Calculus I (BCC – QR1)	4.0
MTH 122	Calculus II (BCC – QR2)	4.0
MTH 207	Elementary Linear Algebra With Applications	3.0
MTH 223	Calculus III	4.0
MTH 224	Elementary Differential Equations	3.0
PHY 110	University Physics I (BCC – NS2)	4.0
PHY 201	University Physics II	4.0
ECE 302	Probability, Statistics, and Random Processes for EE	3.0
Required Courses		
ECE 100	Introduction to Electrical and Computer Engineering	2.0
ECE 102	Intro to EE: Digital Systems	3.0
ECE 103	Intro to EE: Computers and Programming	3.0
ECE 206	Continuous-time Signals and Systems	3.0
ECE 208	Transmission Lines and Electromagnetic Fields	3.0
ECE 214	Linear Circuits Analysis and Design	4.0
ECE 221	Circuits and Systems Laboratory	2.0

ECE 301	Discrete-time Signals and Systems	3.0
ECE 303	Electronics	3.0
ECE 304	Advanced Electronics and Integrated Circuits	3.0
ECE 305	Microcontroller Architecture, Programming and Applications	4.0
ECE 322	Electronics and Interfacing Lab	3.0
ECE 398	Vertical Integrated Project	1.0
ECE 401	Undergraduate Design Seminar I	1.0
ECE 402	Undergraduate Design Seminar II	1.0
ECE 497	Capstone Project System Level Design	1.0
ECE 498	Senior Capstone Project I	2.0
ECE 499	Senior Capstone Project II (BCC WI, EL)	3.0
ECO 100	Introduction to Economics (BCC − SB)	3.0
Approved ECE Electives (choose 15 hours):		**15.0**
Approved Professional Electives (choose 9 hours):		**9.0**
Total Hours		**126**

ECE Electives Description

ECE electives are available in the areas of controls, communication, cyber physical and digital system, digital signal processing, electromechanical systems, embedded systems, mechatronics, power electronics and system, robotics, and wireless components and systems. Approved ECE electives include all 400-level ECE courses except for:

Code	Title	Hours
ECE 401	Undergraduate Design Seminar I	1.0
ECE 402	Undergraduate Design Seminar II	1.0
ECE 497	Capstone Project System Level Design	1.0
ECE 498	Senior Capstone Project I	2.0
ECE 499	Senior Capstone Project II	3.0

ECE EE Electives

Through EE electives, the student can specialize in areas such as controls, communication, digital signal processing, electromechanical systems, mechatronics, power electronics and system, and wireless components and systems.

Five EE electives are required and two must be from the core pool listed below:

Code	Title	Hours
ECE 431	Communication Theory I	3.0
ECE 440	Electromechanical Systems	3.0
ECE 441	Feedback Control of Dynamic Systems	3.0
ECE 451	Radio Frequency Circuits and Systems	3.0
ECE 460	Digital Signal Processing	3.0
ECE 470	Embedded Data Structures and Object Oriented Programming	3.0
ECE 481	Digital Systems: Design and Synthesis	3.0

Special topic courses may be offered as EE electives. See your advisor for a current list of approved EE electives.

Students have the option to complete a concentration in Computer (https://catalog.bradley.edu/undergraduate/programs/electrical-engineering-computer-option-concentration/) or Robotics and Controls (https://catalog.bradley.edu/undergraduate/programs/electrical-engineering-robotics-controls-concentration/).

Introductory Course Exception

Students who do not earn credit for ECE 100 Introduction to Electrical and Computer Engineering may be required to take an extra ECE elective to replace those credit hours.