

ELECTRICAL ENGINEERING (BSE)

Bachelor of Science in Engineering

The Electrical Engineering major requires a total of 126 credits. Electrical Engineering majors are required to complete the following:

Course	Title	Credits
Select one of the following: 3		
CSE 2050	Data Structures and Object-Oriented Design	
ENGR 1166	Foundations of Engineering	
CSE 2301	Principles and Practice of Digital Logic Design	4
ECE 1401	Programming for Electrical Engineers	3
or CSE 3100	Systems Programming	
ECE 2001	Electrical Circuits	4
ECE 3001	Electromagnetic Fields and Waves	3
ECE 3101	Signals and Systems	3
ECE 3111	Systems Analysis and Design	4
ECE 3201	Electronic Circuit Design and Analysis	4
ECE 4900W	Communicating Engineering Solutions in a Societal Context	1
ECE 4901	Electrical and Computer Engineering Design I	2
ECE 4902	Electrical and Computer Engineering Design II	3
MATH 2110Q	Multivariable Calculus	4
MATH 2210Q	Applied Linear Algebra	3
MATH 2410Q	Elementary Differential Equations	3
STAT 3345Q	Probability Models for Engineers	3
or MATH 3160	Probability	
Elective courses		7

Further details and course sequences are given in the Electrical Engineering Guide to Course Selection.

Restricted Electives

A student must take at least one course from each of the four groups:

Course	Title	Credits
Group 1. Power and Energy		
Select one of the following:		
ECE 3211	Power Electronics	
ECE 3212	Electric Machines and Drives	
ECE 3231	Introduction to Modern Power Systems	
Group 2. Circuits and Electronics		
ECE 3221	Digital Integrated Circuits	3
or ECE 4201	Electronic Circuits and Applications	
Group 3. Communications		
ECE 4111	Communication Systems	3
or ECE 4112	Digital Communications and Networks	
Group 4. Semiconductor and Nanotechnology		
Select one of the following:		

ECE 4211	Semiconductor Devices and Nanostructures
or ECE 5211	Semiconductor Devices and Models
ECE 4225	Fundamentals of Electron Device Design and Characterization
or ECE 5225	Electron Device Design and Characterization

Professional Requirements (PR)

A student must take at least 12 credits of technical Professional Requirements (defined as engineering, mathematics, statistics, physical and life sciences, when appropriate) courses numbered 3000 or higher. At least two courses (for a total of six credits or above) of the Professional Requirement coursework must be chosen from Electrical and Computer Engineering (ECE) courses and only three credits can be from ECE 3096 Directed Research in Electrical and Computer Engineering, ECE 4096 Independent Research in Electrical and Computer Engineering, ECE 4079 Independent Design Laboratory, ECE 4097 Thesis in Electrical and Computer Engineering, and ECE 4099 Independent Study in Electrical and Computer Engineering. Non-technical courses (including ENGR 3021 Engineering Ambassadors: Technical Communication and Presentation, ENGR 3022 Intro - Building our Sistas Strength (BOSS) Leveraging Adversity, Diversity and Intellect (LADI), ENGR 3024 Adv - Building our Sistas Strength (BOSS) Leveraging Adversity, Diversity and Intellect (LADI), and ENGR 3025 Engineering for Impact - Advanced Leaders), laboratory courses, and non-ECE independent study courses cannot be used for PR's, unless approved by the Department in writing before the course is taken. Neither STAT 3345Q Probability Models for Engineers nor MATH 3160 Probability can be counted as Professional Requirement. Any non-ECE professional requirement courses must be approved by the advisor and Department UG Director.

Design Laboratory

Course	Title	Credits
A student must take at least six credits of Design Laboratory courses from the following list:		
ECE 3225	Optical Engineering Laboratory	3
ECE 3411	Microprocessor Applications Laboratory	3
ECE 3421	Very Large Scale Integrated (VLSI) Design and Simulation	4
ECE 4079	Independent Design Laboratory ¹	1-3
ECE 4113		3
ECE 4114	Software-Defined Radio Design Laboratory	3
ECE 4122	Systems Laboratory	3
ECE 4132	Image Processing Systems Laboratory	3
ECE 4225	Fundamentals of Electron Device Design and Characterization	3
ECE 4242	Micro/Opto-electronic Devices and Circuits Fabrication Laboratory	3
ECE 4244	Nanotechnology II	3
ECE 4401	Digital Design Laboratory	3
ECE 4402		3
ECE 5242	Micro-Optoelectronic Devices and IC Fabrication	3
ECE 6244	Nanotechnology - II (Laboratory Course)	3

¹ Only one design lab (up to three credits) may be ECE 4079 Independent Design Laboratory.

Note that a course can only count as a restricted elective or as a professional requirement or as a design lab. In other words, the same course cannot satisfy multiple requirements.

Concentrations

Any student in Electrical Engineering can choose from the following five concentrations: Computer Engineering, Electronics and Optics, Power and Energy, Robotics, and Systems and Controls. If a student does not choose a concentration, there is no change in the current requirements for the Electrical Engineering degree.

Students can complete a concentration by taking nine credits from a list of courses associated with each track. Special topics courses (ECE 4095 Special Topics in Electrical and Computer Engineering/ECE 6095 Special Topics in Electrical and Systems Engineering) may be substituted with the approval of the ECE Undergraduate Programs Director. Up to four concentration credits may be also used as a restricted elective (see above). The courses in each concentration are as follows:

Computer Engineering

Course	Title	Credits
ECE 3221	Digital Integrated Circuits	3
ECE 3401 or ECE 5401	Digital Systems Design Advanced Digital Systems Design	3
ECE 3411	Microprocessor Applications Laboratory	3
ECE 3421 or ECE 6421	Very Large Scale Integrated (VLSI) Design and Simulation Advanced VLSI Design	4
ECE 3431	Numerical Methods in Scientific Computation	3
ECE 4401	Digital Design Laboratory	3
ECE 5402	Computer Architecture	3

Electronics and Optics

Course	Title	Credits
ECE 3211	Power Electronics	4
ECE 3221	Digital Integrated Circuits	3
ECE 3223	Optical Engineering	3
ECE 3225	Optical Engineering Laboratory	3
ECE 3243	Introduction to Nanotechnology	3
ECE 4201	Electronic Circuits and Applications	3
ECE 4211	Semiconductor Devices and Nanostructures	3
ECE 4223	Nanophotonics	3
ECE 4225 or ECE 5225	Fundamentals of Electron Device Design and Characterization Electron Device Design and Characterization	3
ECE 4242 or ECE 5242	Micro/Opto-electronic Devices and Circuits Fabrication Laboratory Micro-Optoelectronic Devices and IC Fabrication	3
ECE 4243 or ECE 6243	Nanoscience and Nanotechnology I Nanotechnology	3

ECE 4244 or ECE 6244	Nanotechnology II Nanotechnology - II (Laboratory Course)	3
ECE 4261 or ECE 5261	Introduction to Memory Device Technologies Memory Device Technologies	3

Power and Energy

Course	Title	Credits
ECE 3211	Power Electronics	4
ECE 3212	Electric Machines and Drives	4
ECE 3231	Introduction to Modern Power Systems	3
ECE 4211	Semiconductor Devices and Nanostructures	3
ECE 4225 or ECE 5225	Fundamentals of Electron Device Design and Characterization Electron Device Design and Characterization	3
ECE 4550 or ECE 5550	Microgrids Microgrids	3
ECE 5510	Power System Analysis	3
ECE 5520	Advanced Power Electronics	3
ECE 5530	Modeling and Control of Electric Drives	3
ECE 5540	Electrical System Protection and Switchgear	3
ECE 5552	Communication Systems in Smart Grids	3
ECE 5554	Distribution Management Systems	3

Robotics

Course	Title	Credits
ECE 3161	Introduction to Robotics	3
ECE 3162	Robot Motion Planning	3
ECE 3163	Robot Control and Dynamics	3
ECE 4161	Robotics Systems Laboratory	3
ECE 6171	Mobile Robotics	3

Systems and Controls

Course	Title	Credits
ECE 4111	Communication Systems	3
ECE 4112	Digital Communications and Networks	3
ECE 4114	Software-Defined Radio Design Laboratory	3
ECE 4121	Digital Control Systems	3
ECE 4122	Systems Laboratory	3
ECE 4131 or ECE 6122	Introduction to Digital Signal Processing Digital Signal Processing	3
ECE 4132	Image Processing Systems Laboratory	3
ECE 4141	Introduction to RF/Microwave Wireless Systems	3
ECE 5101	Introduction to System Theory	3
ECE 6103		
ECE 6111	Applied Probability and Stochastic Processes	3
ECE 6121	Information Theory	3
ECE 6141	Neural Networks for Classification and Optimization	3
ECE 6151	Communication Theory	3

ECE 6152		
ECE 6437	Computational Methods for Optimization	3
ECE 6439	Estimation Theory and Comp Algorithms	3

Concentration in Naval Science and Technology

The concentration in Naval Science and Technology is designed to expose students to engineering concepts and topics of importance to the Navy and industries that support naval science and technology. It is focused on facilitating interactions between students and naval professionals as well as hands-on and experiential activities related to senior design projects or independent study projects that have naval science and technology connections.

To complete this concentration, students must complete nine credits of Naval Science and Technology Coursework topics, distributed as follows:

Course	Title	Credits
ENGR 3109	Navy STEM Professional Development Seminar (at least three credits)	3
Select six credits from the following courses (or five if using Senior Design):		6
ECE 4095	Special Topics in Electrical and Computer Engineering	
ECE 4900W	Communicating Engineering Solutions in a Societal Context	
ECE 4901	Electrical and Computer Engineering Design I	
ECE 4902	Electrical and Computer Engineering Design II	
Total Credits		9

Students electing to complete the concentration must do so in their primary major, and as such select elective coursework from their primary discipline. Students electing to use their Senior Design course sequence must have their project topic approved by both their departmental senior design coordinator and either the director of the Navy STEM Program or the Associate Dean for Undergraduate Education.

Students electing to use Special Topics courses or Independent Study/Research courses must have the course or research topic approved by both their department and either the director of the Navy STEM Program or the Associate Dean for Undergraduate Education. Other courses relevant to naval science and technology may be considered for the concentration by petition to the director of the Navy STEM Program or the Associate Dean of Undergraduate Education. Students may not apply courses used in this concentration to fulfill requirements for other concentrations or minors.

The concentration in Naval Science and Technology is restricted to U.S. citizens.

The Electrical Engineering program educational objectives are that our alumni/ae: make technical contributions to design, development, and manufacturing in their practice of electrical engineering; advance in their professional career; and engage in professional development or post-graduate education to pursue flexible career paths amid future technological changes.

The Electrical Engineering program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org (<https://www.abet.org>).

University General Education Requirements

Every student must meet a set of core requirements to earn a baccalaureate degree, in addition to those required by the student's major course of study and other requirements set by the student's school or college. For more information about these requirements, please see General Education Requirements (<https://catalog.uconn.edu/undergraduate/gen-ed-requirements/>).

College of Engineering Degree Requirements

Students must meet a set of requirements established by the college in addition to the University's General Education requirements. For more information, see the College of Engineering (<https://catalog.uconn.edu/undergraduate/engineering/#requirementstext>) section of this catalog.