ELECTRICAL ENGINEERING, BS

Program Director

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The mission of the electrical engineering program is to promote learning in electrical engineering through integrated activities in teaching, research, scholarship, creative accomplishments, and service.

The Program Educational Objectives of the Bachelor of Science in Electrical Engineering in the Department of Electrical Engineering and Computer Science at Syracuse University are broad statements that describe what graduates are expected to attain within a few years after graduation.

The Program Educational Objectives of the BSEE program are that graduates will be:

- Demonstrating their professional competence, integrity, leadership, innovative thinking, openness to new ideas and opportunites for contiued professional development and ability to work effectively both individually and in diverse teams
- Demonstrating their ability to produce and communicate feasible timely and equitable solutions to important problems in their profession.
- Exhibiting the intellectual flexibility necessary to solve new problems in innovative ways by integrating multiple viewpoints from several disciplines in search of the best possible solutions, or applying their knowledge to different professional disciplines.

Electrical engineering is based on scientific principles governing the motion of charged particles through conductors, semiconductors, or even a vacuum. These phenomena can be harnessed in a variety of applications such as in the treatment of disease, wireless, satellite, and computer communications, power transmission, control of robots, radio and television broadcasting, and development of microelectronics for computers and analog circuits.

This program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

Engineering design is taught in each of the four years of the electrical engineering program. Beginning with ECS 101 Introduction to Engineering and Computer Science in the first year, students are required to formulate solutions to a variety of open-ended laboratory projects. As the students progress through their sophomore and junior years, the projects increase in complexity requiring additional creativity and knowledge. Finally, in the senior year the students are required to complete a major design project that builds upon their mastery of the fundamental concepts of mathematics, basic sciences, the humanities and social sciences, engineering topics, and communication skills.

Student Learning Outcomes

Througouth the undergraduate program in electrical engineering, students will develop:

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

Program Components

The electrical engineering program has five fundamental components: mathematics and sciences, engineering, computing, liberal arts and sciences, and general education. Within each component, a number of courses have been set aside as electives in order to allow students, with the guidance of their advisors, to customize their education according to personal and career objectives. A summary of required and elective credits within each component follows:

Mathematics and Science

27 required, 3 elective, 30 total credits;

Engineering

42 required, 12 elective, 54 total credits;

Computing

9 required

General Education

1 required FYS, 3 required ethics, 6 required communication, 3 communication electives, 12 arts and science electives, 3 free electives, 28 total credits;

Overall

88 required, 33 elective, 121 total credits.

Elective Courses

In order to maximize the flexibility of the Electrical Engineering curriculum while maintaining its structure, electives have been divided into the following categories:

Technical Electives

This 12-credit requirement may be fulfilled by any combination of upper division electives with the ELE, CSE, or CIS prefix. A minimum of 9 credits from courses with a prefix of ELE and a minimum of 6 credit hours must be 400 level or higher.

Mathematics and Sciences Elective

The 3-credit elective may be fulfilled by any mathematics course with a calculus prerequisite, any physics course with a calculus-based physics prerequisite, or any college-level course in other science departments. By taking an appropriate math course, EE students can use this elective to complete a minor in mathematics.

Arts and Science Electives

This 12-credit requirement may be fulfilled by any course with liberal arts content including most courses in the College of Arts and Sciences. These courses, either by themselves or in combination with free electives, present a very attractive opportunity to complete one of the non-technical minors offered in the University.

Program of Study

Year 1		
Fall		**Credits**
ECS 101	Introduction to Engineering and Computer Science	3
CIS 151	Fundamentals of Computing and Programming	3
MAT 295	Calculus I	4
WRT 105	Studio 1: Practices of Academic Writing	3
FYS 101	First Year Seminar	1
	Credits	**14**
Spring		
MAT 296	Calculus II	4
PHY 211	General Physics I	3
PHY 221	General Physics Laboratory I	1
ELE 231	Electrical Engineering Fundamentals	3
ELE 291	Electrical Engineering Laboratory I	1
CSE 283	Introduction to Object-Oriented Design	3
	Credits	**15**
Year 2		
Fall		
PHY 212	General Physics II	3
PHY 222	General Physics Laboratory II	1
MAT 397	Calculus III	4
ELE 251	Fundamentals of Linear Systems	3
ELE 292	Linear Systems Laboratory	1
Liberal Arts & Science Elective		3
	Credits	**15**
Spring		
MAT 485	Differential Equations and Matrix Algebra for Engineers	3
WRT 205	Studio 2: Critical Research and Writing	3
CSE 261	Digital Logic Design	3
CSE 262	Digital Logic Design Laboratory	1
CSE 384	Systems and Network Programming	3
Liberal Arts & Science Elective		3
	Credits	**16**
Year 3		
Fall		
ELE 314	Power Engineering	3
ELE 324	Electromagnetics I	3
ELE 351	System and Signal Analysis	3
CSE 397	Microcontroller Laboratory	3
CIS 321	Introduction to Probability and Statistics	4
	Credits	**16**
Spring		
ELE 333	Analog Electronics	3
ELE 354	Communication Systems	3
ELE 392	Digital Signal Processing and Control Systems Laboratory	3
Technical Elective		3
Advanced Communication Elective		3
	Credits	**15**
Year 4		
Fall		
ELE 491	Senior Design Project I	3
ECS 392	Ethical Aspects of Engineering and Computer Science	3
Technical elective		3
Liberal Arts and Science Elective		3
Math/Science elective		3
	Credits	**15**
Spring		
ELE 492	Senior Design Project II	3
Technical elective		6
Free elective		3
Liberal Arts and Science Elective		3
	Credits	**15**
	Total Credits	**121**

Minors

The electrical engineering curriculum is flexible enough to allow a student to complete minors of interest. Today's engineers work in an environment where they are expected to know not only their specialty areas, but also a collection of other subject areas-from computers to finance. The EE curriculum responds to this need by providing students with a strong basis in the fundamentals of electrical engineering, coupled with an opportunity to broaden the scope of their education. An electrical engineering student may complete one or all of the following types of minors within the normal limits of the curriculum.

Engineering and Computer Science Minor

A student who wishes to complete a technical minor offered by the college may be able to use their elective courses to complete all or some of the courses required for the minor.

Non-technical Minor

A student who would like to complete a non-technical minor has 12 credits of liberal arts and science electives plus 3 credits of free electives, which can be used toward any one of more than 70 minors offered at Syracuse University.

Minor in Mathematics

Electrical engineering curriculum requires students to take 15 credits of courses from the mathematics department. With the 3-credit mathematics and sciences elective and the 3-credit free elective also taken appropriately from that department, a minor in mathematics can be earned.