

# Department of Electrical and Computer Engineering

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## BS in Electrical Engineering

The Electrical Engineering curriculum is concerned with analysis and design of modern electronic systems, devices, and signals for a broad range of applications such as wireless or network communication, electrical power and control, and multimedia information technology. The curriculum provides a wide background in the fundamental theory of electrical engineering and in the mathematical and scientific tools necessary for an electrical engineer to meet the current and future challenges of a professional career. The field of electrical engineering is currently evolving at a rapid pace since it has a major role in the accelerated growth of the technological world. This requires the modern electrical engineer not only to have a sound basis in the fundamental principles but also to have the capacity to learn and assimilate novel advances as soon as they materialize. These qualities are anticipated in the curriculum, which includes not only a sound theoretical background but also offers a variety of courses that develop the student's ability to gain knowledge autonomously and to combine it with contemporary design techniques. Courses are in diverse areas such as signal processing, power electronics, communications, optical and electromagnetic technologies, control systems, integrated circuits, multimedia networks, and image analysis.

The curriculum includes both required and elective courses. The required courses are in engineering, mathematics, and physics; they provide a wide backdrop in science and engineering. The elective courses are more specialized and offer a broad range of electrical engineering applications. Each student is assigned a faculty advisor who assists in the selection of the courses.

In addition to classroom experience, the Electrical Engineering curriculum is planned to provide laboratory experience in electrical and electronic circuits, electromagnetics, communication and signal processing, controls, computers, and digital systems. The curriculum incorporates design projects in the student's experience starting from the freshman year and culminating in a capstone design project in the senior year. The project requires the students to undertake a significant group design that enriches their knowledge in practical aspects of engineering principles and methodologies. Most of these projects solve realistic problems and the results are presented in an exposition. The curriculum also requires the students to acquire oral and writing skills in expressing their professional ideas and ethical norms.

The educational objectives of the Electrical Engineering undergraduate program are for its graduates to:

- have knowledge of fundamental principles in electrical engineering and fundamental scientific principles and tools to design and develop products and practical solutions for problems in public and private sectors;
- demonstrate an ability to function independently and in multidisciplinary teams with the communication skills and ethical conduct necessary for professional success;
- demonstrate an understanding of the need for life-long learning, acquiring new knowledge, and mastering emerging technologies and new tools and methods;
- have knowledge necessary to pursue graduate/professional education and/or engineering practice.

Opportunities are available to participate in the activities of the student chapter of the Institute of Electrical and Electronic Engineers (IEEE) and Eta Kappa Nu, the honor society of electrical and computer engineering. An interest in robotics can be pursued by joining the Engineering Design Team, a College of Engineering student group.

## BS in Computer Engineering

Computer Engineering is concerned with the application of electrical engineering and computer science principles to the design of computer systems and digital networks. Through creative utilization of tools and knowledge, a computer engineer designs digital systems that are being employed in virtually all fields of human endeavor. This requires a background in physical sciences, information sciences, electrical engineering, and computer science. Computer engineering requires skills in both the design and development of computer hardware and computer software. Depending on need, the computer engineer may work with electrical engineers, computer scientists, information systems experts, biomedical researchers, and people in almost any other field. The diversity of products that involve the design talents of a computer engineer is unlimited. These range from large to small computers to special purpose computing hardware and software embedded within devices and systems. The applications, for example, are in business to organize, process, and communicate data, communications over mobile and satellite networks, digital sound and picture processing for entertainment, household appliances, automotive systems, manufacturing process control, biomedical instrumentation, machine control, and innumerable other fields. The emphasis in computer engineering is on the design of hardware as well as software tools and systems for the acquisition, processing, storage, and transmission of data and signals by digital means.

All students are required to obtain a strong mathematical foundation, including discrete mathematics and probability and statistics. Each student acquires a common background in the fundamentals of electrical engineering and computer science. This includes course work in computer languages, data structures and algorithms, software design and development, circuit analysis, signal processing, computer architecture, digital networks, microprocessor-based design, digital electronic circuits design, and computer operating systems design. Furthermore, in consultation with an advisor, each student can follow an individualized program by taking courses selected from a departmentally approved list of technical elective courses for computer engineering. In almost all course work, students do design projects while learning to apply basic computer tools. The curriculum also requires the students to acquire oral and writing skills in expressing their professional ideas and ethical norms. As a senior, each student gains further design experience working in a

group on a two-semester design project involving practical application of engineering principles.

The educational objectives of the Computer Engineering undergraduate program are for its graduates to:

- have knowledge of fundamental principles in computer engineering and fundamental scientific principles and tools to design and develop products and practical solutions for problems in public and private sectors;
- demonstrate an ability to function independently and in multidisciplinary teams with the communication skills and ethical conduct necessary for professional success;
- demonstrate an understanding of the need for life-long learning, acquiring new knowledge, and mastering emerging technologies and new tools and methods;
- have knowledge necessary to pursue graduate/ professional education and/or engineering practice.

Students are encouraged to participate in the activities of the student chapters of the Institute of Electrical and Electronic Engineers (IEEE) and the Association for Computing Machinery (ACM). An interest in robotics can be pursued by joining the Engineering Design Team, a College of Engineering student group. Qualified students will be invited to join Eta Kappa Nu, the honor society for electrical and computer engineers.

## BS in Engineering Physics

The BS in Engineering Physics is offered by the Department of Electrical and Computer Engineering (College of Engineering) in association with the Department of Physics (College of Liberal Arts and Sciences).

The Engineering Physics major bridges the gap between science and technology by combining a strong background in physics and mathematics with exposure to the most fundamental areas of engineering. The program is based on the recognition that most engineering disciplines are rooted in the field of physics, and that new and emerging technologies rarely fall neatly within a single engineering discipline but often straddle different fields. The program highlights, for instance, the subtle and deep relations between materials science and civil engineering, between solid-state physics and chemical engineering, and between electromagnetics and telecommunication engineering.

This training is especially well suited to students who wish to pursue careers in research and development in advanced technology and applied science. In particular, students majoring in this program are well qualified to pursue graduate studies in most areas of engineering and applied physics. They may also pursue a master's degree in education, thus qualifying to teach physics in high school.

The content of this program strongly emphasizes topics in physics and mathematics; however, this curriculum also gives students great flexibility in the choice of topics for technical electives. Students can customize their curriculum by choosing three technical elective courses from many fields.

Students interested in the Engineering Physics major should contact the Department of Electrical and Computer Engineering at [ugrad-info@ece.uic.edu](mailto:ugrad-info@ece.uic.edu) ([uslenghi@uic.edu](mailto:uslenghi@uic.edu)).

## Degree Programs

- BS in Electrical Engineering (<http://catalog.uic.edu/ucatalog/colleges-depts/engineering/ece/bs-ee>)

- BS in Computer Engineering (<http://catalog.uic.edu/ucatalog/colleges-depts/engineering/ece/bs-ce>)
- BS In Engineering Physics (<http://catalog.uic.edu/ucatalog/colleges-depts/engineering/ece/bs-eng-phys>)

## Minors

- Minor in Electrical Engineering (<http://catalog.uic.edu/ucatalog/colleges-depts/engineering/ece/minor-ee>)
- Minor in Computer Engineering (<http://catalog.uic.edu/ucatalog/colleges-depts/engineering/ece/minor-ce>)