B.S. IN COMPUTER ENGINEERING

Overview

Computer engineering is concerned with the characterization, design, analysis and implementation of hardware, software and the overall architecture of computers and computer systems, and with the development of applications enabled by such configurations. This ranges from embedded microprocessors and associated software supporting a variety of familiar devices, to large-scale distributed computer systems interconnected by high-speed telecommunication networks controlled by sophisticated communication protocols. Since modern electronic computing systems are digital in nature, the program provides in-depth coverage of a range of topics dealing with digital information processing systems. Among the topics covered are digital system design, computer organization and architecture, operating systems, software engineering, programming, data structures, algorithms, database systems, microprocessor-based systems, and embedded systems.

The department also offers electives in digital communications, computer networks, wireless and mobile networks, very large scale integration (VLSI), microelectronics, nanotechnology, application specific integrated circuits (ASIC), microelectromechanical systems (MEMS), image processing and computer vision, artificial intelligence, machine learning, data mining, agent technology, and cybersecurity (application, information, network, systems security etc.).

Software Engineering Option

Software Engineering is concerned primarily with the systematic and disciplined approach to developing software systems. It requires the application of both computer engineering and computer science principles and practices to the creation, operation, and maintenance of software systems and applications. The Software Engineering Option of the Bachelor of Science in Computer Engineering degree at the University of Miami is a unique interdisciplinary program developed and administered collaboratively by the Department of Electrical and Computer Engineering and the Department of Computer Science.

This Option prepares students for successful careers in software engineering. Software systems are becoming increasingly complex, and emerging technologies are pushing the boundaries of reusable components and software quality assurance. To prepare students to meet these challenges, this Option establishes a solid foundation of software system fundamentals, coupled with strong hands-on experience and an understanding of professional practice and conduct.

In addition to the core curriculum in software engineering, students are introduced to the paradigms of real-time, adaptive, and collaborative software systems, through a wide range of technical elective courses from both the Department of Electrical and Computer Engineering and the Department of Computer Science. Students may also use courses from other departments with academic advisor approval. The technical electives allow students to apply the knowledge they have gained to different application areas. This provides valuable hands-on experience in contemporary application areas, which enhances the students’ potential career development opportunities.

Students pursuing the Software Engineering Option of the Bachelor of Science in Computer Engineering degree must earn at least 15 credit hours in Computer Science as part of their degree requirements.

Pre-Med Option

Our Department offers a pre-medical option that allows motivated students to obtain the rigorous education of a bachelors degree in computer engineering while simultaneously completing the basic science requirements necessary for applying to medical or dental school. Much of the excitement in engineering involves applications of electrical and computer engineering to problems in health, such as the development of nano-scale biosensors, or the signal processing analysis of DNA sequences or the development and/or use of new hardware and software tools to better serve both medical professionals and patients. With the rapid advancement and application of technology in the medical field, the pre-med option ensures that students learn and understand the fundamentals of Electrical and Computer Engineering while preparing them for entry into either medical school, advanced graduate study, or industry.

Curriculum Requirements: B.S. in Computer Engineering

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**Engineering and Technical Electives**

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**CE Technical Electives**

12

**Other Courses**

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<td>MTH 210</td>
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**Total Credit Hours**

129

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**Curriculum Requirements: B.S. in Computer Engineering - Software Engineering Option**

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**Engineering and Technical Electives**

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**SE Technical Electives**

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**Other Courses**

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**Math & Basic Science Credit Hours**

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Basic Science Elective

Basic Science Elective + Lab

**General Education Credit Hours**

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Arts and Humanities Cognate

People and Society Cognate

**Total Credit Hours**

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**Curriculum Requirements: B.S. in Computer Engineering Pre-Med Option**

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**Civil Engineering Core Elective**

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**Engineering and Technical Electives**

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**Biology and Chemistry Credit Hours**

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**Advanced BioScience Elective**

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**General Education Credit Hours**

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**Suggested Plan of Study: B.S. in Computer Engineering**

**Freshman Year**

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### People and Society Cognate
- 3

### Arts and Humanities Cognate
- 3

#### Spring

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**Credit Hours**: 17

#### Total Credit Hours
- 129

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**Suggested Plan of Study: B.S. in Computer Engineering - Software Engineering Option**

#### Freshman Year

##### Fall

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**Credit Hours**: 14

##### Spring

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**Credit Hours**: 15

#### Sophomore Year

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**Credit Hours**: 16

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**Credit Hours**: 16

#### Junior Year

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1. See description of electives under the Departmental Electives Section.
2. With advisor approval
3. Offered only in the Fall semester.

**Suggested Plan of Study: B.S. in Computer Engineering - Pre-Med Option**

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### Mission
The mission of the Department of Electrical and Computer Engineering is to achieve and maintain, through a continuous improvement process, excellence in undergraduate and graduate education, research, and service to the community and the nation. We endeavor to accomplish this by providing high-quality education and research programs which will impart the requisite knowledge and skills to our students enabling them to assume leadership roles in contributing to the advancement of the underlying electrical and computer engineering technologies which sustain the current world economy, to promote a strong commitment to life-long learning, to prepare them for a variety of alternative career paths and to participate as responsible citizens in a rapidly changing and shrinking global community.

### Program Educational Objectives
We expect that the alumni of the Computer Engineering Program will exhibit the following:

1. Successful careers in dynamic and multidisciplinary fields with the ability to apply computer engineering practices within societal, global, and environmental contexts in an ethical manner.
2. Demonstrating life-long learning through activities such as completion of graduate degrees and/or professional development.

### Student Learning 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.