Electrical and Computer Engineering

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Chair, Department of Electrical and Computer Engineering

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Director, Graduate Program

Mission

The Master of Science in Electrical Engineering and the Master of Science in Computer Engineering degree programs are designed to provide a higher degree of mastery of electrical and computer engineering fundamentals, emphasizing practical applications, thereby expanding the students’ technological horizons and preparing professionals for advanced level positions and for admission to doctoral programs.

Objectives

The objective of these programs is to prepare graduates for successful and dynamic professional careers through a course of study that provides:

1. a strong grasp of electrical engineering and computer engineering fundamentals through a diverse and flexible curriculum
2. skills in practical applications, contemporary industrial needs and emerging technologies
3. a foundation for increasing professional responsibilities or continued study at the doctoral level

Admission Requirements

Electrical Engineering Degree

Applicants must possess one of the following:

1. A baccalaureate degree in electrical (or computer) engineering from a program accredited by the Engineering Accreditation Commission of ABET or from a recognized foreign institution.

2. Applicants who have a baccalaureate degree in another area of engineering, physics, or mathematics may be admitted into the program provided they complete undergraduate prerequisites specified by the Graduate Program Director. These courses must be completed with a minimum grade point average of 3.00 with no grade lower than C. These courses will not satisfy any requirements for the Master of Science in Electrical Engineering degree. Generally, students must complete prerequisite courses before they are permitted to register for graduate courses. Exceptions require the recommendation of the Graduate Program Director and the approval of the Dean of Engineering.
Computer Engineering Degree

Applicants must possess one of the following:

1. A baccalaureate degree in computer (or electrical) engineering from a program accredited by the Engineering Accreditation Commission of ABET or from a recognized foreign institution.

2. Applicants who have a baccalaureate degree in another area of engineering, physics, or mathematics may be admitted into the program provided they complete undergraduate prerequisites specified by the Graduate Program Director. These courses must be completed with a minimum grade point average of 3.00 with no grade lower than C. These courses will not satisfy any requirements for the Master of Science in Computer Engineering degree. Generally, students must complete prerequisite courses before they are permitted to register for graduate courses. Exceptions require the recommendation of the Graduate Program Director and the approval of the Dean of Engineering.

Degree Requirements

A student must complete a minimum of thirty credit hours of graduate coursework. Specific requirements follow:

Electrical Engineering Degree

The student must select one course from the following:  

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECEG 701</td>
<td>Signals, Systems, and Transforms I</td>
<td>3</td>
</tr>
<tr>
<td>ECEG 702</td>
<td>Signals, Systems and Transforms II</td>
<td>3</td>
</tr>
<tr>
<td>ECEG 710</td>
<td>Probability and Stochastic Processes</td>
<td>3</td>
</tr>
</tbody>
</table>

The student must also take nine courses from any offerings by the Electrical and Computer Engineering Department  

At most, two of the nine courses can be any Graduate Core Courses (ENGG) with the advice and approval of the Graduate Program Director  

[Six course credits can be substituted by the Master’s Thesis option under the direction of a Thesis Advisor.]

Total Credits 30

Any modifications to program requirements must be approved by the Graduate Program Director.

Computer Engineering Degree

The student must select one course from the following:  

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECEG 721</td>
<td>Embedded Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECEG 727</td>
<td>Computer Network Operations</td>
<td>3</td>
</tr>
<tr>
<td>ECEG 781</td>
<td>Computer Architecture I</td>
<td>3</td>
</tr>
</tbody>
</table>

Students must also take nine courses from any offerings by the Electrical and Computer Engineering Department  

Total Credits 27
At most, two of the nine courses can be any Graduate Core Courses (ENGG) with the advice and approval of the Graduate Program Director.

Six course credits can be substituted by the master's Thesis option under the direction of a Thesis Advisor.

Total Credits: 30

Any modifications to program requirements must be approved by the Graduate Program Director.

**Master of Science Degree Description and Options for Electrical Engineering and Computer Engineering**

Master of Science students may elect to complete a Master of Science by coursework or by thesis. The coursework option entails 30 course credits; the thesis option entails 24 course credits and 6 master's thesis research credits, ECEG 799. In both cases, the minimum number of total credits is 30. At this level, research undertaken under the thesis option should exhibit a thorough understanding of advanced scientific thought and an ability to apply advanced engineering design principles, and planning.

**Thesis Manuscript Presentation**

Degree candidates must present their research to the appointed guidance committee in final manuscript form for official acceptance no later than two weeks before the end of the semester.

Graduate students registered for thesis credits must submit four final bound copies to the Electrical and Computer Engineering Department for necessary signatures one week before the end of the semester.

**Concentration Options**

Electrical Engineering and Computer Engineering graduate programs offer the following optional concentrations:

- Applied Artificial Intelligence in Electrical Engineering Concentration
- Applied Artificial Intelligence in Computer Engineering Concentration
- Cybersecurity Concentration in Electrical Engineering
- Cybersecurity Concentration in Computer Engineering

**Applied Artificial Intelligence Concentration**

Applied Artificial Intelligence (AI) concentration will enable students to develop in-depth expertise in artificial intelligence and its ECE applications. The concentration focuses on practical, real-world and applications such as the Internet of Things (IoT), intelligent energy grids, computer visualization, imaging, and robotics.

The course listings for the Electrical Engineering and the Computer Engineering programs are the same as indicated below:
Plan of Study for Applied Artificial Intelligence Concentration

Students who plan to concentrate in the area of Applied Artificial Intelligence must select three courses (9 credits total) from the following list:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECEG 729</td>
<td>Artificial Intelligence Applications in Electrical &amp; Computer Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ECEG 742</td>
<td>Computer Vision &amp; Imaging</td>
<td>3</td>
</tr>
<tr>
<td>ECEG 748</td>
<td>Applied Machine Learning for Electrical &amp; Computer Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ECEG 749</td>
<td>Unmanned Autonomous Vehicles</td>
<td>3</td>
</tr>
<tr>
<td>ECEG 757</td>
<td>Bioinspired Robotic Vision Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECEG 767</td>
<td>Big Data &amp; Deep Learning for Electrical &amp; Computer Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ECEG 769</td>
<td>Introduction to Remote Sensing</td>
<td>3</td>
</tr>
<tr>
<td>ECEG 790</td>
<td>Advanced Topics in Artificial Intelligence (AI) in Electrical &amp; Computer Engineering</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits 9

Note: Elective courses may be substituted by the Graduate Director as the need arises.

Cybersecurity Concentration

The graduate cybersecurity concentration provides advanced knowledge and skills to tackle complex cybersecurity challenges and develop innovative solutions for securing digital systems and networks, and applications of cybersecurity in engineering fields.

The course listings for the Electrical Engineering and the Computer Engineering programs are the same as indicated below:

Plan of Study for Cybersecurity Concentration

Students who plan to concentrate in the Cybersecurity area must select three courses from the following list:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECEG 717</td>
<td>Mobile Applications and Cybersecurity</td>
<td>3</td>
</tr>
<tr>
<td>ECEG 758</td>
<td>Cybersecurity Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECEG 760</td>
<td>Data and Applications Security</td>
<td>3</td>
</tr>
<tr>
<td>ECEG 761</td>
<td>Network Security Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECEG 748</td>
<td>Applied Machine Learning for Electrical &amp; Computer Engineering</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>or</td>
<td></td>
</tr>
<tr>
<td>ECEG 767</td>
<td>Big Data &amp; Deep Learning for Electrical &amp; Computer Engineering</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits 9
Note: *Elective courses may be substituted by the Graduate Director as the need arises.

Unless otherwise noted, courses in this program may be applied to a Master of Science Degree in either the Electrical Engineering or the Computer Engineering program. While approval of the Graduate Program Director is required to enroll in a graduate course, admission to the Graduate Program is not required to participate in a Concentration area. It is expected, however, that individuals desiring to take graduate-level courses in a Concentration Program will have a baccalaureate degree in either an engineering field, a science or applied science field, or mathematics, and will meet the prerequisite requirements of the courses they wish to take in that Concentration.

Find Learning That Matches Your Lifestyle

- The 30-credit electrical engineering and computer engineering programs can be completed within one or two years.

- Courses are available during the fall, spring, and summer semesters with schedules that are suitable for individuals working full-time.

- Graduate courses are delivered in either the online mode or in-person mode.