ELECTRICAL ENGINEERING, MS

Program Director

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Master of Science Programs

For students who want to expand their technical expertise beyond their undergraduate major, the Department of Electrical Engineering and Computer Science (EECS) offers master of science (M.S.) degrees in computer engineering, computer science, and electrical engineering. EECS has a long and distinguished record of graduate education, with many of our graduates placed in key positions in industry. Graduates from our master's programs are well represented in such corporations as IBM, General Electric, Lockheed Martin, Microsoft, Amazon, Google, Facebook, and Intel. In all of these degrees, students have the option of completing the M.S. degrees by taking only courses, or by combining coursework with a master's thesis.

The M.S. programs consist of at least 30 credits beyond the B.S. degree. A thesis is optional. Students who are contemplating continuing their studies at the Ph.D. level are encouraged to complete an M.S. degree with the thesis option. A maximum of 9 credits of transfer credit may be included in M.S. programs. Professionals having a baccalaureate degree in fields other than computer engineering, computer science, or electrical engineering who are seeking a career change may take advantage of an opportunity to obtain an M.S. degree in one of these fields by combining suitable remedial undergraduate coursework with the regular program of graduate study.

Admission Requirements

Each of these master's programs has its own admission committee that evaluates the overall academic record of an applicant. Each of these committees uses the following guidelines during the evaluation process:

- GRE Verbal score of 150 or better (using New GRE Score System);
- GRE Quantitative score of 155 or better (using New GRE Score System);
- GRE Analytical (multiple choice) score of 650 or better, or a score of 3.5 or better in the new Analytical Writing; *The GRE (Graduate Record Examination) is currently optional for our programs.
- for international students: TOEFL computer-based score of 223 (Internet-based score 85; paper-based score 563) or better;
- grade point average (GPA) of 3.0/4.0 or better.

Electrical Engineer Degree

The degree of electrical engineer allows qualified students to pursue their graduate education beyond the M.S. The program is designed to provide mastery of a field of knowledge and familiarity with related fields, as well as to develop a capacity for independent study.

Admission Requirements

1. B.S. in electrical or computer engineering or a related field with an average of 3.0 or better on a scale of 4.0 from an accredited institution, or
2. M.S. in electrical or computer engineering or a related field.

Applicants are informed of any additional requirements when their applications are processed.

Guidance

Each student is assigned a guidance committee to help plan the program of study.

Program Summary

The program consists of coursework, qualifying examinations, and a project. The minimum program consists of 60 credits beyond the B.S. including 6 credits for the Engineer Degree Project (ELE 995 Engineer Degree Project). The student must maintain at least a 3.0 average.

Required Courses

A student's program must include the coursework required for the M.S. degree in electrical engineering, computer engineering, or an acceptable related area completed either at Syracuse University or elsewhere. In addition, the student must take at least 4 ELE/CSE courses at or above the 700 level beyond M.S. degree; Independent study courses may not be used to satisfy this requirement.

Qualifying Examinations

Students working toward an electrical engineer degree must pass the written qualifying examinations required for the Ph.D. Students are examined on basic undergraduate and graduate material in electrical engineering, computer engineering, and applied mathematics. The current list of areas and descriptions of the nature and scope of these examinations can be obtained from the department office. The examinations may not be taken more than twice. Credit granted for work at other approved institutions does not exempt a student from the qualifying examinations.

The Electrical Engineer Degree Project

ELE 995 Engineer Degree Project carries 6 credits. The student undertakes an investigation which may be original research, an application of the state-of-the-art, a solution of a set of related problems, or a critical survey of a special topic. The student is assigned a project advisor who must approve the topic and agree to direct the work. Students with engineering employment may make arrangements to carry out the project work at the employer's premises or laboratory, provided the advisor has unrestricted access to the work. A formal project report and a final oral examination on the project are required after completion of all graduate work.

Student Learning Outcomes

1. Ability to apply advanced electrical engineering theory and methods to identify, formulate and solve complex engineering problems
2. Ability to analyze and design an electrical system with constraints and specifications, and at the same time consider its societal, economic, and environmental influences
3. Proficiency in modern engineering tools to simulate and/or conduct experiments on complex electrical systems

4. Ability to present advanced technical contents effectively through various media
5. Proficiency in the use of advanced mathematical and analytical techniques to analyze, model and optimize electrical systems

M.S. in Electrical Engineering

Course Requirements

1. **Graduate Work Beyond the B.S. Degree**
   A minimum of 30 credits of graduate work beyond the B.S. degree is required.
2. **Cumulative Total GPA**
   The student must maintain a cumulative total GPA of at least a 3.0 in those courses to be credited towards the M.S. degree, and a minimum cumulative total GPA of 2.8 in all graduate courses taken at Syracuse University.
3. **A Maximum of 9 Credits of Transfer Credit of Graduate Coursework**
   A maximum of 9 credits of transfer credit of graduate coursework taken at an other university with a grade of B or better may be included in M.S. programs.
4. **A Maximum of 12 Credits Taken at Syracuse University**
   A maximum of 12 credits taken at Syracuse University before the semester of admission may be included in an M.S. program provided they are relevant to a program in electrical engineering and have a grade of B- or better.
5. **To Maintain Full-time Status in the EECS Department**
   To maintain full-time status in the EECS Department, students must register for 9 credits per semester. Part-time students must complete at least 6 credits per academic year.
6. **Core Course Requirements**
   Each student is required to take four required courses which are composed of:

Code	Title	Credits
Engineering Math Course		
ELE 603	Functional Methods of Engineering Analysis	3
or ELE 606	Probabilistic Methods in Electrical Engineering	
Electromagnetics		
ELE 621	Electromagnetic Fields	3
Digital Communications		
ELE 651	Digital Communications	3
Additional Course		
Select one of the following:		3
ELE 633	Discrete and Integrated Analog Electronic Circuits	
ELE 635	Digital Electronic Circuits	
ELE 643	Theory of Semiconductor Devices	

7. **Programs must include a minimum of 21 credits of ELE courses**
8. **Final Examinations**
   Candidates are required to complete the final examinations in all core courses with an average grade of B- or better.
9. **No more than 6 credits or 500-level courses may be included in the M.S. program**
10. **Students may select a thesis option**
    The Master's Thesis must be prepared in accordance with the Graduate School's instructions for the Preparation of Theses and Dissertations and must receive prior approval from the thesis advisor. Theses must be presented orally and defended before a faculty panel. Students electing the thesis option must include CSE 997 Masters Thesis (normally 6 credits) in their programs of study.
11. **Students Who Do Not Hold a B.S. Degree in Electrical Engineering**
    Students who do not hold a B.S. degree in electrical engineering or a related field may be admitted to a 60-credit program. This program includes the following remedial undergraduate courses.

Code	Title	Credits
The following eight courses:		
ELE 231	Electrical Engineering Fundamentals	3
ELE 291 & ELE 292	Electrical Engineering Laboratory I and Linear Systems Laboratory	2
ELE 346	Semiconductor Devices	3
ELE 324	Electromagnetics I	3
ELE 333	Analog Electronics	3
ELE 351	System and Signal Analysis	3
or ELE 352	Digital Signal Processing	
At least two technical elective courses such as:		6
ELE 416	Electromechanical Devices	
ELE 424	Applied Electromagnetics	
ELE 425	Microwave Engineering	
ELE 458	Data Networks: Basic Principles	
ELE 524	Introduction to Applied Optics	
ELE 551	Communication Systems	

Additional Information

In addition, students, depending on their background, may need to take remedial physics and mathematics courses.

Students who have demonstrated competence in any of the above subjects may request a waiver of the corresponding courses. The remedial coursework must be completed prior to registering for graduate courses. The remaining 30 credits must satisfy the requirements for the MSEE program.