

Electrical and Computer Engineering - Master of Engineering, Master of Science

For information, contact:

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Electrical and Computer Engineering - Master of Engineering

The Master of Engineering (M. Eng.) in Electrical and Computer Engineering offers a course-intensive program with a culminating experience (internship, industrial practicum, or a non-thesis project). The program's mission is to prepare graduates with the versatile skills and mindset to meet the needs of a demanding and dynamic career in electrical/electronic, computer, and robotics industries. Students have the opportunity to gain experience in areas including artificial intelligence, machine learning, communications and networking, computer engineering, robotics and control, electromagnetics, power conversion, radars, signal processing, and others.

Program Requirements

(30 semester hours required)

Students design a program of study in consultation with a faculty advisor.

Note: Applicants must have completed an undergraduate degree to enroll in this program, and no BS/MS double counting of courses is allowed.

Code	Title	Credit Hours
Culminating Experience ¹		3-6
ECE 640	Internship	
ECE 704	Non-Thesis Project	
ECE 711	Industrial Practicum	
Electrical and Computer Engineering Courses ²		15
Select from the following:		
ECE 511	Sensors and Data Fusion with Robotics Applications	
ECE 514	Design and Modeling of Robotic Systems	
ECE 525	Digital Signal Processing	
ECE 526	Biomedical Signal Analysis and Machine Learning	
ECE 527	Radar Signal Processing	
ECE 529	Digital Image Processing	

ECE 530	Electromagnetics in Wireless Sensing and Communications
ECE 536	Control of Dynamic Systems
ECE 553	Communication Systems
ECE 561	Network Performance Analysis
ECE 570	Special Topics
ECE 587	Computer Aided Design Tools for Computer Engineering
ECE 591	Power Systems Engineering
ECE 593	Power Electronics
ECE 597	Electric Vehicle Technology
ECE 601	State Variables for Engineers
ECE 661	Advanced Optical Network Architectures

Elective Courses

Select 12 hours from unused ECE courses (above) or elective courses (below). 12

Total Credit Hours 30-33

- ¹ Students must register for at least 3 credit hours of ECE 640, ECE 704, or ECE 711 for their culminating experience. The student will write a summary report and make a formal presentation, which should be evaluated and approved by a committee of at least two (2) members with Miami University graduate-level A or B standing.
- ² Students design a program of study in consultation with their faculty advisor. Students are required to complete a minimum of 15 ECE credit hours but may take up to 27 credit hours to fulfill the requirements for the degree.

Elective Courses

While not required, students may select up to 12 credit hours in related disciplines. In addition, students may petition the ECE Graduate Committee to approve courses outside of the list below.

Code	Title	Credit Hours
CPB 612	Engineering Analysis	3
CSE 532	Machine Learning	3
CSE 543	High Performance Computing & Parallel Programming	3
CSE 556	Bioinformatic Principles	3
CSE 565	Comparative Programming Languages	3
CSE 573	Automata, Formal Languages, and Computability	3
CSE 584	Algorithms II	3
CSE 586	Introduction to Artificial Intelligence	3
CSE 588	Image Processing & Computer Vision	3
CSE 616	Simulation of Physical Systems	3
CSE 617	Advanced Networks	3
MME 595	Introduction to Applied Nonlinear Dynamics	3
MME 612	Engineering Analysis	3
MTH 525	Number Theory	3
MTH 532	Optimization	3
MTH 537	Game Theory and Related Topics	3
MTH 538	Theory and Applications of Graphs	3

MTH 551	Introduction to Complex Variables	4
MTH 553	Numerical Analysis	3
MTH 591	Introduction to Topology	3
MTH 632	Advanced Optimization	3
MTH 638	Advanced Graph Theory	3
MTH 641	Functions of a Real Variable	4
MTH 651	Functions of a Complex Variable	4
PHY 541	Optics and Laser Physics	4
PHY 561	Electromagnetic Theory	4
PHY 691	Modern Quantum Physics	4
PHY 692	Modern Quantum Physics	4
STA 527	Introduction to Bayesian Statistics	3
STA 562	Inferential Statistics	3
STA 563	Regression Analysis	4
STA 567	Statistical Learning	3
STA 583	Analysis of Forecasting Systems	3

Electrical and Computer Engineering - Master of Science Introduction

The Master of Science in Electrical and Computer Engineering is designed to graduate electrical and computer engineers who are well-qualified in advanced electrical and computer engineering technologies. This unique professional education prepares students for future interdisciplinary engineering practice that requires engineers to master both electrical/computer engineering and another discipline of choice. The degree includes electrical/computer engineering and elective courses in other disciplines. Students will conduct a research project with an electrical/computer engineering professor.

Requirements include courses in electrical/computer engineering, elective courses, and a research-based thesis. The students work with a faculty adviser on a research problem of mutual interest.

Admission and Application Requirements

New students are generally admitted to begin in the fall semester. Entry into the program requires completion of a bachelor's degree in electrical or computer engineering, or a closely related field.

Prospective students will be ranked and considered for admission based on the following information:

1. Requirements of the Graduate School, including: undergraduate transcripts, and TOEFL scores (if required)
2. GRE scores (waived for Miami graduates)
3. Three letters of recommendation
4. The applicant's essay describing the purpose of his/her study.

Combined Bachelor/Master's Program

Undergraduate Miami University students may apply to participate in the combined bachelors/master's program. This program allows you to pursue a master's degree in an accelerated manner while

completing your bachelor's degree. It is a great opportunity to deepen your knowledge and research skills. Please contact the Department of Electrical and Computer Engineering for more information.

Program Requirements

The degree requires electrical and computer engineering courses, elective courses, and a thesis or research project.

The curriculum requires completion of a minimum of 32 credit hours of graduate study and any additional hours needed to satisfy prerequisites. The distribution of hours is summarized as follows:

Code	Title	Credit Hours
Electrical and Computer Engineering courses		9-15
Elective courses		3-9
ECE 610	Graduate Seminars	2
ECE 700	Research for Master's Thesis	12
Total Credit Hours		32

Elective Courses

Students may enter the program with courses that cover some of the material in related disciplines; however, they must complete 3-9 credit hours of elective courses selected in consultation with their faculty adviser.

Code	Title	Credit Hours
CPB/MME 612	Engineering Analysis	3
CSE 532	Machine Learning	3
CSE 543	High Performance Computing & Parallel Programming ²	3
CSE 556	Bioinformatic Principles ²	3
CSE 565	Comparative Programming Languages	3
CSE 573	Automata, Formal Languages, and Computability ²	3
CSE 584	Algorithms II ²	3
CSE 586	Introduction to Artificial Intelligence ²	3
CSE 588	Image Processing & Computer Vision	3
CSE 616	Simulation of Physical Systems	3
CSE 617	Advanced Networks	3
CSE 627	Advanced Machine Learning	3
CSE 664	Advanced Algorithms	3
CSE 667	Cryptography	3
MME 595	Introduction to Applied Nonlinear Dynamics ²	3
MME 612	Engineering Analysis	3
MTH 525	Number Theory ²	3
MTH 532	Optimization ²	3
MTH 537	Game Theory and Related Topics ²	3
MTH 538	Theory and Applications of Graphs ²	3
MTH 551	Introduction to Complex Variables ²	4
MTH 553	Numerical Analysis ²	3
MTH 591	Introduction to Topology ²	3
MTH 632	Advanced Optimization	3
MTH 638	Advanced Graph Theory	3

MTH 641	Functions of a Real Variable	4
MTH 651	Functions of a Complex Variable	4
PHY 541	Optics and Laser Physics ²	4
PHY 561	Electromagnetic Theory ²	4
PHY 671	Electromagnetism	4
PHY 691	Modern Quantum Physics	4
PHY 692	Modern Quantum Physics	4
STA 527	Introduction to Bayesian Statistics ²	3
STA 562	Inferential Statistics ²	3
STA 563	Regression Analysis ²	4
STA 567	Statistical Learning ²	3
STA 583	Analysis of Forecasting Systems ²	3

Electrical and Computer Engineering Courses

Students design a program of study in consultation with their faculty advisor. Courses are selected from the following:

Code	Title	Credit Hours
ECE 511	Sensors and Data Fusion with Robotics Applications	3
ECE 514	Design and Modeling of Robotic Systems	3
ECE 525	Digital Signal Processing ²	3
ECE 526	Biomedical Signal Analysis and Machine Learning ²	3
ECE 527	Radar Signal Processing ²	3
ECE 529	Digital Image Processing ²	3
ECE 530	Electromagnetics in Wireless Sensing and Communications ²	3
ECE 536	Control of Dynamic Systems ²	3
ECE 553	Communication Systems ²	3
ECE 561	Network Performance Analysis ²	3
ECE 570	Special Topics ²	3
ECE 587	Computer Aided Design Tools for Computer Engineering ²	3
ECE 591	Power Systems Engineering ²	3
ECE 593	Power Electronics ²	3
ECE 597	Electric Vehicle Technology ²	3
ECE 601	State Variables for Engineers	3
ECE 661	Advanced Optical Network Architectures	3
ECE 670	Advanced Topics in Electrical and Computer Engineering ¹	1-3

¹ Maximum 6

² Students who have taken the 400-level of this course or its equivalent must substitute another course.

Thesis and Project Research Courses

Code	Title	Credit Hours
ECE 700	Research for Master's Thesis	12

Graduate Seminar Course

Code	Title	Credit Hours
ECE 610	Graduate Seminars	2