

# Electrical and Computer Engineering- Master of Science

For information, contact:

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## 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.

Students select either the research (thesis) or course intensive (non-thesis) option. Requirements include courses in electrical/computer engineering, elective courses, and a research-based thesis (research option) or a research project (course intensive option). For the thesis and the research project, students work with a faculty adviser on a research problem.

## 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. Students select one of the following two options:

### Option 1- Research Option (Thesis)

The research option 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		12-18
Elective courses		6-12
ECE 610	Graduate Seminars	2
ECE 700	Research for Master's Thesis	6
<b>Total Credit Hours</b>		<b>32</b>

### Option 2 - Course Intensive Option (Non-Thesis)

The course-intensive option requires the completion of a minimum of 34 credit hours 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		15-21
Elective courses		9-15
ECE 704	Non-Thesis Project	3
ECE 610	Graduate Seminars	1
<b>Total Credit Hours</b>		<b>34</b>

### Elective Courses

Students may enter the program with courses that cover some of the material in related disciplines; however, they must complete at least 6-9 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 <sup>2</sup>	3
CSE 556	Bioinformatic Principles <sup>2</sup>	3
CSE 564	Algorithms <sup>2</sup>	3
CSE 565	Comparative Programming Languages	3
CSE 567	Computer and Network Security <sup>2</sup>	3
CSE 573	Automata, Formal Languages, and Computability <sup>2</sup>	3
CSE 584	Algorithms II <sup>2</sup>	3
CSE 586	Introduction to Artificial Intelligence <sup>2</sup>	3
CSE 588	Image Processing & Computer Vision	3
CSE 616	Simulation of Physical Systems	3
CSE 617	Advanced Networks	3
CSE 627	Machine Learning	3

CSE 664	Advanced Algorithms	3
CSE 667	Cryptography	3
MME 595	Introduction to Applied Nonlinear Dynamics <sup>2</sup>	3
MME 612	Engineering Analysis	3
MTH 525	Number Theory <sup>2</sup>	3
MTH 532	Optimization <sup>2</sup>	3
MTH 537	Game Theory and Related Topics <sup>2</sup>	3
MTH 538	Theory and Applications of Graphs <sup>2</sup>	3
MTH 551	Introduction to Complex Variables <sup>2</sup>	4
MTH 553	Numerical Analysis <sup>2</sup>	3
MTH 591	Introduction to Topology <sup>2</sup>	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 <sup>2</sup>	4
PHY 561	Electromagnetic Theory <sup>2</sup>	4
PHY 571	Advanced Electronics <sup>2</sup>	3
PHY 623	Solid State Physics	3
PHY 671	Electromagnetism	4
PHY 691	Modern Quantum Physics	4
PHY 692	Modern Quantum Physics	4
STA 527	Introduction to Bayesian Statistics <sup>2</sup>	3
STA 562	Inferential Statistics <sup>2</sup>	3
STA 563	Regression Analysis <sup>2</sup>	4
STA 567	Statistical Learning <sup>2</sup>	3
STA 583	Analysis of Forecasting Systems <sup>2</sup>	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 <sup>2</sup>	3
ECE 526	Biomedical Signal Analysis and Machine Learning <sup>2</sup>	3
ECE 527	Radar Signal Processing <sup>2</sup>	3
ECE 529	Digital Image Processing <sup>2</sup>	3
ECE 530	Electromagnetics in Sireless Sensing and Communications <sup>2</sup>	3
ECE 536	Control of Dynamic Systems <sup>2</sup>	3
ECE 553	Communication Systems <sup>2</sup>	3
ECE 561	Network Performance Analysis <sup>2</sup>	3
ECE 570	Special Topics <sup>2</sup>	3
ECE 587	Computer Aided Design Tools for Computer Engineering <sup>2</sup>	3
ECE 591	Power Systems Engineering <sup>2</sup>	3
ECE 593	Power Electronics <sup>2</sup>	3
ECE 597	Electric Vehicle Technology	3

ECE 601	State Variables for Engineers	3
ECE 625	Advanced Digital Signal Processing	3
ECE 661	Advanced Optical Network Architectures	3
ECE 670	Advanced Topics in Electrical and Computer Engineering <sup>1</sup>	1-3

<sup>1</sup> Maximum 6

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

### Graduate Seminar Course

Code	Title	Credit Hours
ECE 610	Graduate Seminars	1-3

### Thesis and Project Research Courses

Code	Title	Credit Hours
ECE 704	Non-Thesis Project	0-12
ECE 700	Research for Master's Thesis	0-9