Electrical Engineering- Bachelor of Science in Engineering

For information, contact the Department of Electrical and Computer Engineering, 260 Garland Hall, 513-529-0740.

This program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

Electrical engineering is the process of applying electric and magnetic phenomena in an innovative way to create useful products and services. Progress in electrical engineering led society from the electricity age through communication and computer ages to the current information age. The profession encompasses a broad range of concentration areas such as electronic circuits, instrumentation and control, integrated circuits, electromagnetics, power and energy, communications, computers and networks, and signal processing. Products and services like electricity, broadcasting, computers, cellular phones, navigation equipment, and the internet affect and influence every aspect of modern civilization. The widespread utilization of electrical means of measurement and control, computers, and communications has resulted in the need for electrical engineers in all types of industries. Excellent employment opportunities exist for well-prepared graduates.

Miami's electrical engineering curriculum provides students with a sound foundation in basic science, mathematics, the humanities, communication skills, and technical subjects. Design, project management, and teamwork, as well as ethics and professionalism, are emphasized throughout the curriculum.

Program Educational Objectives

Program educational objectives describe the career and professional accomplishments that the program prepares graduates to attain within a few years of graduation. The objectives of the electrical engineering program are for graduates to achieve:

- Success in being employed in an area related to electrical engineering or enrolled in an advanced program.
- Advancement in professional skills and knowledge with an understanding of the impact on societal, economic, global, and environmental issues.
- Progression in responsibilities by exercising effective communication, leadership, and teamwork skills.
- Commitment to professionalism, ethical, inclusive and equitable practices, continuous improvement, and lifelong learning.

Student Outcomes

These student outcomes prepare our graduates to attain the program educational objectives listed above.

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.

Credit/No Credit Policy

All courses in chemistry, physics, biology, mathematics, statistics and those in the College of Engineering and Computing (CPB, CSE, ECE, EGM, MME, CEC) that are used to fulfill requirements of the major, must be taken for a grade.

Divisional Policy

Multiple Majors: Students with two or more majors in the College of Engineering and Computing must take a minimum of 15 unique, additional credit hours in each major.

Program Requirements

(104 semester hours minimum)

Code	Title	Credit Hours
Core Requirements		
CHM 141	College Chemistry	3
ECO 201	Principles of Microeconomics	3
ECE 345	Introduction to Probability, Statistics, and Random Processes	3
ENG 313	Technical Writing	3
MTH 151	Calculus I	4
MTH 251	Calculus II	4-5
or MTH 249	Calculus II	
MTH 246	Linear Algebra and Differential Equations for Engineers	4
MTH 252	Calculus III	4
PHY 181	General Physics I	4
PHY 182	General Physics II	4
PHY 183	General Physics Laboratory I	1
PHY 184	General Physics Laboratory II	1
Computer Science		
CSE 174	Fundamentals of Problem Solving and Programming	3
General Engineering		
CEC 111	Imagination, Ingenuity and Impact I	2
CEC 112	Imagination, Ingenuity, and Impact II	2
ECE 448	Senior Design Project	2
ECE 449	Senior Design Project	2
Required Electrical and Computer Engineering		

ECE 205	Electric Circuit Analysis I	4
ECE 287	Digital Systems Design	4
ECE 301	Advanced Circuits and Fundamentals of Renewable Energy	3
ECE/MME 303	Computer-Aided Experimentation	3
or ECE 314	Elements of Robotics	
ECE 304	Electronics	3
ECE 306	Signals and Systems	3
ECE 325	Applied Electromagnetics	3
ECE 425	Digital Signal Processing	3
ECE/MME 436	Control of Dynamic Systems	3
ECE 484	Embedded Systems Design	3
Professional EE Electives		
Select 12 hours of the following:		12
ECE 388	Introduction to Smartphone Technologies	
ECE 411	Sensors and Data Fusion with Robotics Applications	
ECE 414	Design and Modeling of Robotic Systems	
ECE 426	Biomedical Signal Analysis and Machine Learning	
ECE 427	Radar Signal Processing	
ECE 429	Digital Image Processing	
ECE 430	Electromagnetics in Wireless Sensing and Communications	
ECE 453	Communication Systems	
ECE 461	Network Performance Analysis	
ECE 487	Computer Aided Design Tools for Computer Engineering	
ECE 491	Power Systems Engineering	
ECE 493	Power Electronics	
ECE 497	Electric Vehicle Technology	
General Technical Electives [1]		
Select 11 hours of the following:		11
Additional courses from the Professional EE Elective list		
ECE 289	Computer Organization	
ECE 291	Energy Systems Engineering	
ECE 302	MATLAB and its engineering applications	
ECE 317	Industrial Robotics	
ECE 395	Undergraduate Research Immersion Project	
MTH 231	Elements of Discrete Mathematics	
MTH 331	Proof: Introduction to Higher Mathematics	
MTH 432	Optimization	
MTH 438	Theory and Applications of Graphs	
MTH 441	Real Analysis	
MTH 451	Introduction to Complex Variables	
MTH 453	Numerical Analysis	
PHY 281	Contemporary Physics I: Foundations	
PHY 282 & PHY 293	Contemporary Physics II: Frontiers and Contemporary Physics Laboratory	
PHY 286	Introduction to Computational Physics	
PHY 421	Molecular and Cellular Biophysics	
PHY 441	Optics and Laser Physics	
CSE 271	Object-Oriented Programming	
CSE 274	Data Abstraction and Data Structures	
CSE 283		
MME 211	Static Modeling of Mechanical Systems (not both)	
or CPB 219	Statics and Mechanics of Materials	
CPB/MME 314	Engineering Thermodynamics	
Total Credit Hours		**104-105**

[1] General Technical Electives are subject to the following rules:

- At least 3 credits of General Technical Electives must be 300-level or above.
- At least 6 credits must be from ECE.
- Courses cannot be double-counted as both Professional EE Electives and General Technical Electives.
- CHM 141/CHM 144 may be used if they are not double-counted for Miami Plan requirement.