Computer 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.

Computer engineering combines elements of electrical engineering and computer science to design and operate devices and/or systems incorporating computers as components. It seeks to interface appropriate software to digital hardware in creating computer-centric products and services. The field of computer engineering requires the ability to understand and apply mathematics, science, and software development techniques, to research concepts and apply modeling methods, to simulate and test working conditions and their impact on the designed systems, and to synthesize different elements in order to obtain the optimum design of a specific product.

The increasing sophistication in products and systems requires industry to hire academically qualified computer engineers who can apply modern techniques and methods of engineering. Examples include computer-aided design, computer assisted engineering, computer-vision embedded systems, intelligent control and power systems, and robotics.

The computer engineer of the 21st century must be able to think critically in broader contexts because problems in contemporary society are not only technical but also social and economic in nature. This program provides the student with a broad computer engineering education enhanced by courses in manufacturing engineering, electrical engineering, computer science, mechanical engineering, economics, humanities, social science, global perspectives, and liberal arts.

Graduates have the opportunity to work in a diverse spectrum of professional fields. These vary from research to design, development to manufacturing, and technical sales to production. Many computer engineers work in manufacturing-related areas such as in the analysis and design of various products as well as in non-technical sectors of the economy such as business, law, and management. Graduates are also prepared to continue their education at the graduate level.

The computer engineering curriculum provides students with a sound foundation in basic science, mathematics, humanities, communication skills and technical subjects. Design projects and teamwork, as well as ethics and professional responsibilities of an engineer, 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 computer engineering program are for graduates to achieve:

- Success in being employed in an area related to computer 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 (CEC, CPB, CSE, CYB, ECE, EGM, MME) 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

(105 semester hours minimum)

Code	Title	Credit Hours
Core requirements		
CHM 141	College Chemistry	3
ECE 345	Introduction to Probability, Statistics, and Random Processes	3
ECO 201	Principles of Microeconomics	3
ENG 313	Technical Writing	3
MTH 151	Calculus I	4
MTH 231	Elements of Discrete Mathematics	3

MTH 246	Linear Algebra and Differential Equations for Engineers	4
MTH 251	Calculus II	4
or MTH 249	Calculus II	
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
CSE 271	Object-Oriented Programming	3
CSE 274	Data Abstraction and Data Structures	3
CSE 278	Systems I: Introduction to Systems Programming	3
CSE 381	Systems 2: OS, Concurrency, Virtualization, and Security	3
General Engineering		
CEC 111	Imagination, Ingenuity and Impact I	2
CEC 112	Imagination, Ingenuity, and Impact II	2
ECE/MME 448	Senior Design Project	2
ECE/MME 449	Senior Design Project	2
Required Electrical and Computer Engineering		
ECE 205	Electric Circuit Analysis I	4
ECE 287	Digital Systems Design	4
ECE 289	Computer Organization	3
ECE 304	Electronics	3
ECE 306	Signals and Systems	3
ECE 314	Elements of Robotics	3
ECE 388	Introduction to Smartphone Technologies	3
ECE 425	Digital Signal Processing	3
ECE 461	Network Performance Analysis	3
ECE 484	Embedded Systems Design	3
Professional Computer Engineering Electives		
Select six hours of the following: [1]		6
ECE 325	Applied Electromagnetics	
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 429	Digital Image Processing	
ECE/MME 436	Control of Dynamic Systems	
ECE 453	Communication Systems	
ECE 487	Computer Aided Design Tools for Computer Engineering	
ECE 497	Electric Vehicle Technology	
CSE 374	Algorithms I	
CSE 383	Web Application Programming	
CSE 443	High Performance Computing & Parallel Programming	
CSE 467	Computer and Network Security	
CSE 474	Compiler Design	
CSE 486	Introduction to Artificial Intelligence	
General Technical Electives [2]		
Select three credits from the following:		3
Any additional course from the Professional Computer Engineering Professional Electives list		
ECE 291	Energy Systems Engineering	
ECE 301	Advanced Circuits and Fundamentals of Renewable Energy	
ECE 302	MATLAB and its engineering applications	
ECE 317	Industrial Robotics	
ECE 395	Undergraduate Research Immersion Project	
Any 400-level ECE course not already taken		
CSE 201	Introduction to Software Engineering	
CSE 273	Optimization Modeling	
CSE 385	Database Systems	
MTH 331	Proof: Introduction to Higher Mathematics	
MTH 432	Optimization	
MTH 438	Theory and Applications of Graphs	
MTH 453	Numerical Analysis	
Total Credit Hours		**105**

1 At least one Professional Computer Engineering Elective course must be an ECE course.

2 Courses cannot double-count as both General Technical Electives and Professional Computer Engineering Electives.