COMPUTER ENGINEERING

Home Department: Electrical and Computer Engineering

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Program Overview

Computer engineering is a branch of engineering concerned with the design, development, and application of computer systems. The Bachelor of Science in Computer Engineering (CE) program at Kettering University focuses on embedded-computer systems, in which a computer chip, module, or circuit board is built into a larger product or system. Examples of products containing embedded computers include "smart" phones, MP3 players, GPS navigation systems, hybrid and electric vehicle drive systems, unmanned vehicles, medical diagnostic devices, and manufacturing systems. Embedded systems applications span a wide range of industry sectors including consumer electronics, internet technology, computer hardware, automotive systems, and automated manufacturing. Computer engineers today can find employment in all these industries, and many more.

The Computer Engineering program is accredited by the Engineering Accreditation Commission (EAC) of ABET.

Program Educational Objectives

The Computer Engineering Program is designed to provide its graduates a solid educational foundation on which they can build successful and sustainable careers in computer engineering or a related field. In particular, graduates of the Computer Engineering Program will:

- Be employed or pursuing an advanced degree in the field of computer engineering or other related disciplines.
- Be productive members of interdisciplinary teams.
- Assume leadership positions in their industry, their continuing education, or in their communities, as their careers develop.
- Continue their professional development and engage in the life-long learning necessary for a sustainable career.

The Computer Engineering program is designed to meet its objectives through its curriculum, experiential learning including cooperative education, and co-curricular activities sponsored by the department and the university.

The curriculum includes a strong sequence of mathematics and basic science courses that provides the solid foundation in these areas that is common to all engineering programs at Kettering University. Engineering design and basic engineering concepts from a variety of disciplines are introduced in the freshman year in IME-100. Basic and practical computer programming and problem solving are introduced, also in the freshman year, in ECE-101.

The "core" curriculum covers hardware design, software development in both assembly and higher-level languages, computer networking, and embedded computer applications through a combination of computer engineering, electrical engineering, and computer science courses. Every course in the core curriculum includes a strong laboratory experience, a hallmark of the program that both enhances students' learning and hones their abilities to apply technology effectively in the workplace. A flexible selection of electives allow students to deepen their knowledge in specific areas or applications of computer engineering, or to broaden their background through dual majors or minors, or simply well chosen combinations of courses that meet their individual educational goals.

The culminating experience in the curriculum takes place in CE-490, which gives students experience working in a team environment to complete a large engineering project that builds on the knowledge and skills they have gained in their coursework.

The curriculum is supported by modern lab facilities for digital systems, embedded systems, computer networks, virtual reality systems, logic systems, mobile robotics, mobile application development, circuits, and electronics.

BS/MASTERS PATHWAY

Undergraduate students also have an opportunity to get their bachelor's and master's degrees in five years with the BS/MASTERS Pathway.

Computer Engineering Program Curriculum Requirements

Code	Title	Credit Hours
First Year Experience		
CILE-101	First Year Foundations	1
General Education		
COMM-101	Rhetoric & Writing	4
ECON-201	Economic Principles	4
LA-201	Sophomore Seminar: Exploring the Human Condition	4
LA-489	Sr. Seminar:Leadership, Ethics	4
Advanced Humanities Electives [1]		8
Advanced Social Science Electives [1]		8
Total Credit Hours		**33**

[1] Humanities and Social Science advanced electives must be selected from approved 300 and 400 level courses.

Code	Title	Credit Hours
Mathematics and Basic Science		
CS-211	Discrete Mathematics	4
MATH-101	Calculus I	4
or MATH-101X	Calculus I	
MATH-102	Calculus II	4
or MATH-102X	Calculus II	
or MATH-102H	Calculus II - Honors	
MATH-203	Multivariate Calculus	4
or MATH-203X	Multivariate Calculus	
or MATH-203H	Multivariate Calculus - Honors	
MATH-204	Differential Equations & Laplace Transforms	4

or MATH-204H	Differential Equations and Laplace Transforms - Honors	
MATH-258	Probability and Statistics	4
PHYS-114 & PHYS-115	Newtonian Mechanics and Newtonian Mechanics Laboratory	4
PHYS-224 & PHYS-225	Electricity and Magnetism and Electricity and Magnetism Laboratory	4
Math/Science Electives		8
	Credit Hours Subtotal:	*40*
Engineering Topics		
CE-210	Intro to Digital Systems Design	4
CE-320	Intro to Microcomputers	4
CE-420	Microcomputer Systems	4
CE-422	Computer Architecture and Organization	4
CE-426	Real-Time Embedded Systems	4
CE-480	Computer Networks	4
CE-490	Senior CE Design Project	4
ECE-101	MATLAB and C Programming	4
EE-210 & EE-211	Circuits I and Circuits I Lab	4
EE-320 & EE-321	Electronics I and Electronics I Laboratory	4
IME-100	Interdisciplinary Design and Manufacturing	4
Computer Engineering Electives		8
Electrical Engineering Elective		4
Computer Science		
CS-101	Computing & Algorithms I	4
CS-102	Computing & Algorithms II	4
Computer Science Elective		4
	Credit Hours Subtotal:	*68*
Electives		
Free Electives		8
Technical Elective		8
	Credit Hours Subtotal:	*16*
Culminating Undergraduate Experience		
CILE-400 & CILE-401	Undergraduate Thesis Initiation and Undergraduate Thesis Completion [2]	4
	Credit Hours Subtotal:	*4*
Total Credit Hours		**128**

(Minimum) Total Credits Required for Program: 161

[2] Students are automatically registered for CILE-400 in a co-op term when they reach Junior II status.

Electives

Computer Engineering Electives

A computer engineering elective may be any course with a CE prefix.

Computer Science Electives

A computer science elective may be any course with a CS prefix.

Electrical Engineering Elective

The electrical engineering elective may be any course with an EE prefix, *except* EE-212.

Free Elective

COMM-435 and MATH-100 are **not** accepted for free elective credit.

Math/Science Electives

A math/science elective may be any course with a BIOL, CHEM, EP, MATH or PHYS prefix, *except* MATH-100 and EP-235.

Technical Electives

The technical electives may be any course with a BIOL, CE, CHEM, CHME, CS, EE, EP, IME, MATH, MECH, or PHYS prefix, BUSN-303, BUSN-304, and MGMT-419, except EE-212, EP-235, and MATH-100.

Representative Program

Course	Title	Credit Hours
Freshman I		
CILE-101	First Year Foundations	1
COMM-101	Rhetoric & Writing	4
ECE-101	MATLAB and C Programming	4
MATH-101	Calculus I	4
Math/Science Elective		4
	Credit Hours	**17**
Freshman II		
ECON-201	Economic Principles	4
IME-100	Interdisciplinary Design and Manufacturing	4
MATH-102	Calculus II	4
PHYS-114	Newtonian Mechanics	3
PHYS-115	Newtonian Mechanics Laboratory	1
	Credit Hours	**16**
Sophomore I		
CE-210	Intro to Digital Systems Design	4
LA-201	Sophomore Seminar: Exploring the Human Condition	4
MATH-203	Multivariate Calculus	4
PHYS-224	Electricity and Magnetism	3
PHYS-225	Electricity and Magnetism Laboratory	1
	Credit Hours	**16**
Sophomore II		
CE-320	Intro to Microcomputers	4
EE-210	Circuits I	3
EE-211	Circuits I Lab	1
MATH-204	Differential Equations & Laplace Transforms	4
Advanced Humanities or Social Science Elective		4
	Credit Hours	**16**
Junior I		
CE-420	Microcomputer Systems	4

CS-101	Computing & Algorithms I	4
EE-320	Electronics I	3
EE-321	Electronics I Laboratory	1
MATH-258	Probability and Statistics	4
Advanced Humanities or Social Science Elective		4
	Credit Hours	**20**
Junior II		
CE-422	Computer Architecture and Organization	4
CE-426	Real-Time Embedded Systems	4
CS-102	Computing & Algorithms II	4
CS-211	Discrete Mathematics	4
Advanced Humanities or Social Science Elective		4
	Credit Hours	**20**
Senior I		
CE-480	Computer Networks	4
LA-489	Sr. Seminar:Leadership, Ethics	4
Computer Science Elective		4
Electrical Engineering Elective		4
Math/Science Elective		4
	Credit Hours	**20**
Senior II		
CE-490	Senior CE Design Project	4
Computer Engineering Elective		4
Free Elective		4
Technical Elective		4
	Credit Hours	**16**
Senior III		
Advanced Humanities or Social Science Elective		4
Computer Engineering Elective		4
Free Elective		4
Technical Elective		4
	Credit Hours	**16**
Any Term		
CILE-400 & CILE-401	Undergraduate Thesis Initiation and Undergraduate Thesis Completion	4
	Credit Hours	**4**
	Total Credit Hours	**161**

(Minimum) Total Credits Required for Program: 161