

# Computer Engineering

Accredited by the Engineering Accreditation Commission of ABET, [www.abet.org](http://www.abet.org)

## 1. University Requirements: (23-24)

Writing, Rhetoric and American Cultures (WRA)	4
Integrative Studies in Humanities (IAH)	8
IAH 201-210 and IAH 211 or >	
Integrative Studies in Social Sciences (ISS)	8
ISS 2XX and ISS 3XX	
Bioscience (one of the following):	
BS 161, ENT 205, IBIO 150, MMG 141,	
MMG 201, PLB 105, PSL 250	3-4

## 2. College Requirements: (32)

*CEM 141	General Chemistry	4
*CSE 231	Introduction to Programming I	4
*EGR 100	Introduction to Engineering Design	2
*MTH 132	Calculus I	3
*MTH 133	Calculus II	4
MTH 234	Multivariable Calculus	4
MTH 235	Differential Equations	3
*PHY 183	Physics for Scientists & Engineers I	4
PHY 184	Physics for Scientists & Engineers II	4

\*College Admission Requirement

## 3. Major Requirements: (65)

### a. Complete one of the following courses: (1)

CEM 161	Chemistry Laboratory I	1
PHY 191	Physics Laboratory for Scientists I	1

### b. All of the following courses: (40)

CSE 232	Introduction to Programming II	4
CSE 260	Discrete Structures in Computer Sci	4
CSE 331	Algorithms and Data Structures	3
CSE 410	Operating Systems	3
ECE 201	Circuits and Systems I	3
ECE 202	Circuits and Systems II	3
ECE 203	Electronic Circuits and Systems Lab	1
ECE 230	Digital Logic Fundamentals	3
ECE 280	Electrical Engineering Analysis	3
ECE 302	Electronic Circuits	3
ECE 303	Electronics Laboratory	1
ECE 331	Microprocessors & Digital Systems	4
ECE 390	Ethics, Professionalism and Contemporary Issues	1
ECE 480	Senior Design (W)	4

## c. Electives: (24)

Complete 24 credits of electives as specified below. At least 18 credits must be from core and focus track electives combined, with at least one course with a laboratory. Additional credits to meet the 24 credit requirement may be taken from other courses listed below, any 400-level Computer Science and Engineering (CSE) or Electrical and Computer Engineering (ECE) courses, or by completing an approved 3 or 4 credit experiential, out-of-classroom education experience obtained through engineering cooperative education or independent study.

### 1. Core: (6)

#### At least 6 credits from the following:

CSE 420	Computer Architecture	3
CSE 422	Computer Networks	3
	or	
ECE 442	Introduction to Communication Networks	3
ECE 410	VLSI Design (L)	4

*Both CSE 422 and ECE 442 may not be used to fulfill this requirement*

### 2. At least 3 credits from the following: (3)

ECE 305	Electromagnetic Fields and Waves I	4
ECE 313	Control Systems	3
ECE 366	Introduction to Signal Processing	3

### Focus Track: (9)

At least 9 credits from the following:

#### Hardware

ECE 402	App of Analog Integrated Circuits (L)	4
ECE 411	Electronic Design Automation (L)	4
ECE 412	Intro to Mixed-Signal Circuits Design (L)	4
ECE 445	Biomedical Instrumentation	3

#### Software

CSE 335	Object-oriented Software Design	4
CSE 450	Translation of Programming Languages	3
CSE 471	Media Processing & Multimedia Computing	3
ECE 366	Introduction to Signal Processing	3

#### Recommended Electives:

ECE 305	Electromagnetic Fields & Waves I	4
ECE 313	Control Systems	3
ECE 404	Radio Frequency Electronic Circuits	4
ECE 415	Computer Aided Manufacturing	3
ECE 416	Digital Control	3
ECE 456	Intro to Communication & Network Security	3
ECE 457	Communication Systems	3
ECE 458	Communication Systems Laboratory	1
ECE 466	Digital Signal Processing & Filter Design	3
ECE 474	Principles of Electronics Devices	3

#### Other Electives (Variable)

**Total Credits Required for Degree**

**128**

**Last revised May 2017**



**Biomedical Engineering Concentration: (15)**

The department offers a concentration for students who plan to pursue graduate work in biomedical areas or seek employment in selected medical-related areas. The concentration is available to, but not required of, any student enrolled in the Bachelor of Science degree program in Computer Engineering. Courses completed to satisfy requirement 3. above may also be used to satisfy the requirements of the concentration. The concentration will be noted on the student's transcript.

To earn a Bachelor of Science degree in Computer Engineering with a biomedical engineering concentration, students must complete requirements 1., 2., and 3. above and the following:

**1. Complete 6 credits from the following courses:**

ANTR 350	Human Gross Anatomy for Pre-Health Professionals	3
BS 161	Cell and Molecular Biology	3
PSL 250	Introductory Physiology	4
PSL 310	Physiology for Pre-Health Professionals	4

**2. Complete 6 credits from the following courses:**

ECE 445	Biomedical Instrumentation	3
ECE 446	Biomedical Signal Processing	3
ECE 447	Introduction to Biomedical Imaging	3
ECE 448	Modeling and Analysis of Bioelectrical Systems	3
ECE 449	Fundamentals of Acoustics	3

**3. Complete 3 credits from the following courses:**

BE 444	Biosensors for Medical Diagnostics	3
ME 494	Biofluid Mechanics and Heat Transfer	3
ME 495	Tissue Mechanics	3
MSE 425	Biomaterials and Biocompatibility	3

A 400-level listed above or other approved Electrical and Computer Engineering (ECE) courses with biomedical engineering content as approved by the student's advisor. The course used to fulfill this requirement may not be used to fulfill concentration requirement 1. or 2.

**NOTES:**

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The requirements listed apply to students admitted to the major of Computer Engineering beginning Fall, 2017. The Department of Electrical and Computer Engineering (ECE) constantly reviews program requirements and reserves the right to make changes as necessary. Students are encouraged to consult with their advisor to obtain assistance in planning an appropriate schedule. Students who have questions about Computer Engineering should contact the Electrical and Computer Engineering Department Advising Office, 2212 Engineering Building, phone (517) 355-5242.

## Computer Engineering Sample Program

Freshman Year				Sophomore Year			
Fall	Credits	Spring	Credits	Fall	Credits	Spring	Credits
Bioscience	3/4	CSE 231	4	CSE 232	4	CSE 260	4
CEM 141	4	MTH 133	4	CEM 161	1	ECE 230	3
EGR 100	2	PHY 183	4	ECE 201	3	ECE 202 & 203	4
MTH 132	3	ISS 2XX	4	MTH 234	4	ECE 280	3
WRA 101	4			PHY 184	4	MTH 235	3
<b>Total</b>	<b>16/17</b>	<b>Total</b>	<b>16</b>	<b>Total</b>	<b>16</b>	<b>Total</b>	<b>17</b>
Junior Year				Senior Year			
Fall	Credits	Spring	Credits	Fall	Credits	Spring	Credits
ECE 331	4	CSE 410	3	Core Elect	3	Elective	3
ECE 302 & 303	4	CSE 331	3	ECE 390	1	ECE 480	4
Major Elective	4	Core Elective	3	Major Elective	4	Major Elective	4
IAH 201-210	4	Major Elect	3	Major Elective	4	Major Elective	4
		ISS 3XX	4	IAH 211 or higher	4		
<b>Total</b>	<b>16</b>	<b>Total</b>	<b>16</b>	<b>Total</b>	<b>16</b>	<b>Total</b>	<b>15</b>

Last Revised June 2017

## Program Educational Objectives

The bachelor's degree in electrical/computer engineering provides its graduates with a solid foundation on which they can build successful and sustainable careers in the ever-changing global work environment. The program prepares its graduates for a variety of career paths including engineering positions directly after program completion, entry to engineering graduate school, and entry to other professional graduate-level schools, and eventual leadership in technical, organizational, and entrepreneurial arenas.

Specifically, the electrical/computer engineering program prepares its graduates to become successful in:

- maintaining and increasing their technical and/or broad expertise through lifelong learning;
- using/applying their continual improving expertise in the practice of electrical/computer engineering or a related career; and
- sharing their expertise to the benefit of the larger community.

Last revised April 2011