COMPUTER ENGINEERING

Computer Engineers (CPE) are electrical engineers that have additional training in the areas of software design and hardware-software integration. Common CPE tasks include writing embedded software for real-time microcontrollers, designing VLSI chips, working with analog sensors, designing mixed signal circuit boards, and designing operating systems. Computer engineers are also well-suited for research in the field of robotics, which relies on using computers together with other electrical systems. Below is a recommended plan of study for CPE.

Requirements

Computer Engineering Core Courses

Code	Title	Hours
ECE 160	Engineering Practice	2
ECE 180	Introduction to Signal Processing	4
ECE 203	DC Circuits	4
ECE 204	AC Circuits	4
ECE 205	Circuits and Systems	4
ECE 230	Introduction to Embedded Systems	4
ECE 233	Introduction to Digital Systems	4
ECE 250	Electronic Device Modeling	4
ECE 300	Continuous-Time Signals & Systems	4
ECE 312	Communication Networks	4
ECE 332	Computer Architecture II	4
ECE 343	High-Speed Digital Design	4
ECE 362	Principles of Design	3
ECE 380	Discrete-Time Signals and Systems [1]	4
or ECE 320	Linear Control Systems	
ECE 460	Engineering Design I	3
ECE 461	Engineering Design II	4
ECE 462	Engineering Design III	2
CSSE 120	Introduction to Software Development	4
CSSE 220	Object-Oriented Software Development	4
CSSE 230	Data Structures and Algorithm Analysis	4
CSSE 232	Computer Architecture I	4
CSSE 332	Operating Systems	4
PH 111	Physics I	4
PH 112	Physics II	4
PH 113	Physics III	4
MA 111	Calculus I	5
MA 112	Calculus II	5
MA 113	Calculus III	5
MA 221	Matrix Algebra & Differential Equations I	4
MA 222	Matrix Algebra & Differential Equations II	4
MA 381	Introduction to Probability with Applications to Statistics	4
MA 374	Combinatorics	4
HUM H190	First-Year Writing Seminar	4
ENGL H290	Technical & Professional Communication	4
RHIT 100	Foundations for Rose-Hulman Success	1
ECE Area Electives		12
HSSA Elective		28
Math/Sci Elective		4
Restricted Science Elective		4
Technical Elective		4
Free Electives		8
Total Hours		**194**

[1] CPE students who are also earning the robotics minor MUST take ECE 320 Linear Control Systems.

The ECE Department will not allow the following second major combinations:

1. Degree in Electrical Engineering and a Second Major in Computer Engineering.
2. Degree in Computer Engineering and a Second Major in Electrical Engineering.

Areas of Concentration

Enhanced Study in Communication Systems

Communications Certificate
Certificate Advisor: Dr. Yong Jin Kim

Information about Available Certificates (https://www.rose-hulman.edu/academics/course-catalog/current/certificates.html)

Plan of Study

Below is a sample plan of study that illustrates one way to achieve the program requirements. Any given student's plan of study may differ based on a variety of factors (e.g., advanced credit, placement exams, adding a minor). Enrolled students will work with their academic advisor; utilize the degree audit/planner to create a specific plan of study.

Course	Title	Hours
Freshman		
Fall		
PH 111	Physics I	4
MA 111	Calculus I	5
RHIT 100	Foundations for Rose-Hulman Success	1
HUM H190	First-Year Writing Seminar	4
ECE 160	Engineering Practice	2
	Hours	**16**
Winter		
PH 112	Physics II	4
MA 112	Calculus II	5
CSSE 120	Introduction to Software Development	4
Select one of the following:		4
HUM H190	First-Year Writing Seminar	
HSSA Elective		
	Hours	**17**
Spring		
PH 113	Physics III	4
MA 113	Calculus III	5
ECE 203	DC Circuits	4
ECE 180	Introduction to Signal Processing	4
	Hours	**17**
Sophomore		
Fall		
MA 221	Matrix Algebra & Differential Equations I	4
CSSE 220	Object-Oriented Software Development	4
ECE 204	AC Circuits	4

ECE 233	Introduction to Digital Systems	4
	Hours	**16**
Winter		
MA 222	Matrix Algebra & Differential Equations II	4
ECE 230	Introduction to Embedded Systems	4
ECE 205	Circuits and Systems	4
CSSE 230	Data Structures and Algorithm Analysis	4
	Hours	**16**
Spring		
MA 381	Introduction to Probability with Applications to Statistics	4
ECE 250	Electronic Device Modeling	4
ECE 300	Continuous-Time Signals & Systems	4
HSSA Elective		4
	Hours	**16**
Junior		
Fall		
MA 374	Combinatorics	4
CSSE 232	Computer Architecture I	4
Select one of the following:		4
ECE 380	Discrete-Time Signals and Systems	
ECE 320	Linear Control Systems [1]	
ENGL H290	Technical & Professional Communication	4
	Hours	**16**
Winter		
ECE 312	Communication Networks	4
CSSE 332	Operating Systems	4
HSSA Elective		4
Math/Science Elective		4
	Hours	**16**
Spring		
ECE 332	Computer Architecture II	4
ECE 343	High-Speed Digital Design	4
ECE 362	Principles of Design	3
HSSA Elective		4
	Hours	**15**
Senior		
Fall		
ECE 460	Engineering Design I	3
ECE Area Elective		4
Restricted Science Elective		4
HSSA Elective		4
	Hours	**15**
Winter		
ECE 461	Engineering Design II	4
ECE Area Elective		4
Technical Elective		4
HSSA Elective		4
	Hours	**16**
Spring		
ECE 462	Engineering Design III	2
ECE Area Elective		4
HSSA Elective		4
Free Elective		4
Free Elective		4
	Hours	**18**
	Total Hours	**194**

[1] CPE students who are also earning the robotics minor MUST take ECE 320 Linear Control Systems.

Area Electives

A total of 12 credit hours are required in this category. Eight of these credit hours must bear an ECE prefix; the other four can bear either ECE or CSSE prefix. At least eight of these credit hours must be at the 400 level or above; the other four can be at the 300 level or above. No more than 4 credit hours of ECE 498 Undergraduate Projects can be counted towards Area Electives and ECE 398 Undergraduate Projects cannot be counted as Area Elective credit. Area Elective credits cannot be double-counted towards the MSEE or MECE degrees; they may be double-counted for other graduate degrees. Exceptions can be made to these requirements with ECE Department Head and Advisor approval.

Technical Electives

CHEM and BIO 100 level courses or other courses at the 200 level or above NOT bearing an HSSA prefix. Exceptions can be made with Department Head and Advisor approval.

Free Electives

Free electives may be selected from any RHIT courses other than ECE 206 Elements of Electrical Engineering, ES 213 Electrical Systems or ES 213L Electrical Systems Lab.

Restricted Science Elective

(4 credit hours required) Must take one of the following electives including the lab:

Code	Title	Hours
CHEM 111	General Chemistry I	3
PH 255	Foundations of Modern Physics	4
PH 405	Semiconductor Materials & Applications	4
BIO 101	Essential Biology	4
BIO 110	Cell Structure and Function	4
BIO 120	Comparative Anatomy & Physiology	4
BIO 130	Evolution & Diversity	4

Math/Science Elective

MA100-Level and PH100-Level credits cannot be used to satisfy this elective. MA 351-356 Problem Solving Seminar may not be used for these electives. Courses that are cross-listed with any engineering courses will not satisfy these electives.

Program Objectives

CPE Program Educational Objectives

Computer Engineering graduates shall:

1. Leverage a solid foundation in computer engineering in order to practice excellence in their chosen profession within a changing global environment;
2. Function independently, collaboratively, and in leadership positions within multidisciplinary and diverse teams;
3. Acquire and share new knowledge, master emerging technologies, and pursue topics about which they are curious or passionate;
4. Practice innovation, creative problem solving, effective communication, strategic thinking, and networking in professional and community environments;
5. Serve the interests of diverse stakeholders through an understanding of risks, opportunities, ethical challenges, and tradeoffs.

Learning Outcomes
CPE Student Learning Outcomes

At the time of graduation, students will have demonstrated:

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.

The computer engineering program is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the commission's General Criteria and Program Criteria for Electrical, Computer, Communications, Telecommunication(s), and Similarly Named Engineering Programs.