Computer Engineering

Website: https://engineering.lehigh.edu/ece **(**https://engineering.lehigh.edu/ece/**)**

Computer Engineering deals with the design and analysis of intelligent systems that have become indispensable in today's world and it requires expertise in both hardware and software areas. The Computer Engineering program is offered by the department of Electrical and Computer Engineering (ECE).

Most courses in the Computer Engineering curriculum are listed in the Computer Science and Engineering (http://catalog.lehigh.edu/coursesprogramsandcurricula/engineeringandappliedscience/computerscienceandengineering/) (CSE) and Electrical and Computer Engineering (http://catalog.lehigh.edu/coursesprogramsandcurricula/engineeringandappliedscience/electricalandcomputerengineering/) (ECE) departments.

UNDERGRADUATE PROGRAMS

Mission Statement

The mission of the computer engineering program is to prepare computer engineers to meet the challenges of the future; to promote a sense of scholarship, leadership and service among our graduates; to instill in the students the desire to create, develop, and disseminate new knowledge; and to provide international leadership to the computer engineering profession.

Program Educational Objectives in Computer Engineering

The objective of the Computer Engineering program is to produce students who within 5-10 years after graduation will:

- be valued as technically proficient computer engineers in related industries or will be able to successfully pursue advanced degrees
- engage in life-long learning and professional development to advance their knowledge and skills
- communicate effectively, perform well both independently and collaboratively, exhibit high levels of professionalism and ethical responsibility, and demonstrate leadership in their chosen profession and communities

BACHELOR OF SCIENCE IN COMPUTER ENGINEERING

The required courses for this degree include the fundamentals of electronic circuits, signal theory, logic design, computer architecture, digital systems, structured programming, data structures, software engineering, operating systems and discrete mathematics. A strong foundation in the physical sciences and in mathematics is required. Approved technical electives, chosen with the advisor's consent, are selected in preparation for graduate study or entry into industry according to individual interests.

The program totals 130 credit hours. The Computer Engineering program is accredited by the Engineering Commission of ABET, www.ABET.org.

The recommended sequence of courses follows:

First Year

First Semester	Credits	Second Semester	Credits
MATH 021	4	MATH 022	4
WRT 001	3	WRT 002	3
ENGR 005	2	ECO 001 or ELE[3]	4
Select one of the following	5-6	Select one of the following	5-6
CHM 030 & ENGR 010[1]	-	CHM 030 & ENGR 010[1]	-
PHY 011 & PHY 012[1]	-	PHY 011 & PHY 012[1]	-
	14-15		**16-17**

Second Year

First Semester	Credits	Second Semester	Credits
ECE 033	4	ECE 108	4
ECE 081	4	ECE 123	3
PHY 021 & PHY 022	5	ECE 201	3
MATH 023	4	CSE 007	4
		ECO 001 or ELE[3]	4
	17		**18**

Third Year

First Semester	Credits	Second Semester	Credits
ECE 128	3	ECE 132	3
ECE 200	1	CSE 109	4
CSE 017	3	CSE 140	3
MATH 205	3	Free Elective	3
MATH 231 or 309	3	HSS Elective[3]	3
Free elective	3		
	16		**16**

Fourth Year

First Semester	Credits	Second Semester	Credits
ECE 257	3	ECE 258	2
CSE 216	3	Approved technical electives[2]	9
CSE 303	3	HSS elective[3]	4
HSS elective[3]	3-4	Free Elective	3
Approved Technical Elective[2]	3		
	15-16		**18**

Total Credits: 130-133

1

Required natural science courses, one taken fall semester and the other taken in spring

2

Approved technical electives (12 credits) are subjects in the area of science and technology. Except for one elective, they are restricted to the offerings in the ECE and CSE departments. One elective must be an engineering science elective from a department other than ECE and CSE. CSE 042 and CSE 252 are not approved technical electives.

3

Distribution of HSS courses must satisfy the college requirements.

MINOR IN COMPUTER ENGINEERING

Required Courses		
ECE 033	Introduction to Computer Engineering	4
ECE 128	FPGA Laboratory	3
ECE 132	Microcontroller Laboratory	3
ECE 201	Computer Architecture	3
Elective Options: Pick One		3
ECE 303	Accelerated Computing for Deep Learning	
ECE 306	Autonomous Driving and Robotic Racing	
ECE 318	INTRODUCTION TO INTERNET OF THINGS	
ECE 319	Digital System Design	
ECE 336	Embedded Systems	
ECE 361	Introduction to VLSI Circuits	
ECE 363	Computer-Aided Design of Digital Systems	
ECE 401	Advanced Computer Architecture	

ECE 416	VLSI Signal Processing	
Other relevant ECE or CSE courses by petition to the Associate Chair of the ECE Department		
Total Credits		**16**

Because of similar course requirements between electrical and computer engineering, electrical engineering students must complete the four required courses plus two courses from the elective options specified in the list above. Electrical engineering technical electives (chosen from the above list) can be used to satisfy the requirements of the minor.

Technical minors must be declared by the end of pre-registration of the student's sixth semester. If course requirements change or a student wishes to vary the list of courses above, a revised minor declaration form must be submitted.

GRADUATE PROGRAMS

Graduate programs of study provide a balance between formal classroom instruction and research and are tailored to the individual student's professional goals. The programs appeal to individuals with backgrounds in computer or information science, in computer engineering, in electrical engineering, in mathematics, or in the physical science. Research is an essential part of the graduate program. The research topics are listed in the departmental descriptions for Computer Science and Engineering (CSE) and Electrical and Computer Engineering (ECE). Individual courses are listed in the catalog descriptions of the CSE and ECE departments.

The Master of Science degree requires the completion of 30 credit hours of work and may include a six credit hour thesis for Computer Engineering degree. A program of study must be submitted in compliance with the graduate school regulations. An oral presentation of the thesis is required.

The Master of Engineering degree requires the completion of 30 credit hours of work, which includes design-orientated courses and an engineering project. A program of study must be submitted in compliance with the college rules. An oral presentation of the project is required.

The Ph.D. degree in computer engineering requires the completion of 42 credit hours of work (including the dissertation) beyond the master's degree (48 hours if the master's degree is not from Lehigh), the passing of a departmental qualifying examination appropriate to each degree within one year after entrance into the degree program, the passing of a general examination in the candidate's area of specialization, the admission into candidacy, and the writing and defense of a dissertation. Competence in a foreign language is not required.

The program has a core curriculum requirement for graduate students. The purpose of this requirement is to guarantee that all students pursuing graduate studies in the program acquire an appropriate breadth of knowledge of their discipline. Please see the ECE department website for degree requirements.

Courses from other universities or undergraduate studies may be used to satisfy these requirements, by petition, at the discretion of the program faculty. Additional graduate program information may be obtained from the program's graduate coordinator.