

# COMPUTER ENGINEERING - MINOR

The minor in computer engineering provides training in computer engineering beyond the training usually received by science and mathematics majors. It can also broaden the training of students majoring in other engineering and applied science fields to provide more depth in computer engineering. The goal is to introduce students to the fundamentals of computer engineering and introduce them to a more advanced field. Such skills are important to students who expect to participate in real world situations that increasingly involve computer engineering solutions.

## Requirements

The computer engineering minor requires a minimum of 20 credit hours.

A minor in computer engineering can be earned in conjunction with any CU Boulder major, except for BS degrees in electrical engineering, electrical & computer engineering and integrated design engineering-electrical emphasis. The computer engineering minor cannot be completed alongside the following minors: computer science, electrical engineering and signals & systems engineering.

## Prerequisites

Students must complete one of these computing courses with a C- or higher before declaring the minor: ECEN 1310, CSCI 1300, ASEN 1320, APPM 3050, PHYS 2600 or similar.

## Grade Requirements

A minimum cumulative GPA of 2.000 is required in the courses used to satisfy the minor requirements. Each individual course that is counted toward this minor must be passed with a grade of D- or higher (note that a minimum grade of C- is required in all prerequisite courses).

## Residency Requirements

At least 9 credit hours for the minor must be taken on the CU Boulder campus.

## Required Courses and Credits

Code	Title	Credit Hours
<b>Required Courses</b>		
CSCI 2270 or CSCI 2275	Computer Science 2: Data Structures Programming and Data Structures	4
ECEN 2350	Digital Logic	4
ECEN 2360 or CSCI 2400	Programming Digital Systems Computer Systems	3
ECEN 2370	Embedded Software Engineering	3
ECEN/CSCI 3593	Computer Organization	3
<b>Emphasis Area</b>		
Choose one:		3
ECEN 2250	Introduction to Circuits and Electronics	
ECEN 2260	Circuits as Systems	
ECEN 2270	Electronics Design Lab	
ECEN 2410	Renewable Sources and Efficient Electrical Energy Systems	

ECEN 2420	Electronics for Wireless Systems
ECEN 2440	Application of Embedded Systems
ECEN 2450	Electronic and Semiconductor Device Laboratory
ECEN 3250	Microelectronics
ECEN 3300 or ECEN 3301	Linear Systems Biomedical Signals and Systems
ECEN 3303/ CSCI 3302	Introduction to Robotics
ECEN 3320	Semiconductor Devices
ECEN 3400	Electromagnetic Fields and Waves
ECEN 3730	Practical Printed Circuit Board Design and Manufacture
ECEN 3753 or CSCI 3753	Real-Time Operating Systems Design and Analysis of Operating Systems
ECEN 3763	FPGA Design and HDL
ECEN 3915	Foundations of Quantum Engineering
ECEN 4111	Engineering Applications in Biomedicine: Cardiovascular Devices and Systems
ECEN 4133	Fundamentals of Computer Security
ECEN/MCEN 4138	Control Systems Analysis
ECEN 4224	High Speed Digital Design
ECEN 4395	Organic Electronic Materials and Devices
ECEN 4313	Concurrent Programming
ECEN 4322/5322	Data and Network Science
ECEN 4553/ CSCI 4555	Compiler Construction
ECEN 4693/5593/ CSCI 5593	Advanced Computer Architecture
ECEN 4763	Embedded Software Algorithms
ECEN 4925	Foundations of Quantum Hardware
ECEN 4933	Engineering Genetic Circuits
ECEN 5139	Computer-Aided Verification

**Total Credit Hours** **20**