

Computer Engineering

WHAT IS COMPUTER ENGINEERING?

Computer engineers research, design, develop, test and oversee the installation and supervise the manufacture of computer hardware. Hardware refers to computer chips, circuit boards, computer systems, and related equipment such as keyboards, modems, and printers. The work of computer engineers is very similar to that of electronics engineers, but, unlike electronics engineers, computer engineers work exclusively with computers and computer-related equipment. The rapid advances in computer technology are largely a result of the research, development, and design efforts of computer engineers.*

NEEDED SKILLS:

- Computer skills, including familiarity with both software and hardware
- Complex problem solving
- Listening and communication skills
- Active learning - always seeking information about new technologies/techniques
- Reading comprehension
- Mathematical and logical reasoning**

JOB TITLES

- Computer Architect
- Automation Engineer
- Hardware Engineer
- Computer Designer
- Systems Integration Engineer
- Microchip Specialist
- Information Technology Consultant
- Configuration Manager
- Network Engineer
- Computer Layout Specialist
- Computer Installation Engineer
- Telecommunications Engineer **

SALARIES

\$111,730. *

The nationwide average salary for employees with a bachelor's degree in Computer Engineering

\$82,277

UM graduates average starting salaries

Courtesy of the Engineering Career Resource Center

**Information from <http://www.bls.gov/ooh/>*

***Information from: www.myplan.com*

INDUSTRIES AND OCCUPATIONS

- Computer systems design
- Computer equipment manufacturing
- Navigational, measuring, electromedical, and control instruments manufacturing
- Scientific research
- Federal Government
- Data processing & software industries
- Wireless telecommunications industry
- Business management & consulting**

JOB OUTLOOK

Employment of computer engineers is expected to grow 3% from 2014 to 2024, slower than the average for all occupations. A limited number of engineers will be needed to meet the demand for new computer hardware because more innovation takes place with software than with hardware. Although declining employment in manufacturing industries that employ many of these workers will negatively affect the growth of this occupation, computer hardware engineers should be less affected than production occupations because firms are less likely to outsource their type of work.*

MORE INFORMATION

- www.myplan.com
- stats.bls.gov/ooh
- <http://www.acm.org/> (Association for Computing Machinery)
- <http://www.computer.org/web/guest> (IEEE Computing Society)
- Engineering Career Resource Center, 230 Chrysler
- See a CE advisor. Sign up on the EAC website or contact the CE Department at 734-763-2305; 3415 EECS.

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WHICH CE CLASSES SHOULD YOU START WITH?

To begin the CE major, a good option is to first take EECS 203 and EECS 270, followed by EECS 215 and EECS 280. Note that it is recommended you finish your Chemistry and Physics requirements by the end of your first semester, sophomore year. Read more about the CE major and EECS Department at: <https://www.eecs.umich.edu/>

COURSE DESCRIPTIONS

EECS 203 – 4 credits **Discrete Math**

Prerequisite: Math 115.

Introduction to the mathematical foundations of computer science. Topics covered include: propositional and predicate logic, set theory, function and relations, growth of functions and asymptotic notation, introduction to algorithms, elementary combinatorics and graph theory, and discrete probability.

EECS 270 – 4 credits **Introduction to Logic Design**

Prerequisite: EECS 183 or Engr 101.

Introduction to Logic Design Binary and non-binary systems, Boolean algebra digital design techniques, logic gates, logic minimization, standard combinational circuits, sequential circuits, flip-flops, synthesis of synchronous sequential circuits, PLA's, ROM's, RAM's, arithmetic circuits, computer-aided design. Laboratory includes hardware design and CAD experiments.

EECS 215 – 4 credits **Introduction to Electronic Circuits**

Prerequisites: Engr 101 and Math 116.

Introduction to electronic circuits. Basic concepts of voltage and current; Kirchhoff's voltage and current laws, Ohm's law, voltage and current sources, Thevenin and Norton equivalent circuits, DC and low frequency active circuits using operational amplifiers, diodes and transistors, small signal analysis, energy and power. Time- and frequency-domain analysis of RLC circuits. Basic passive and active electronic filters. Laboratory experience with electrical signals and circuits.

EECS 280 – 4 credits **Programming and Introductory Data Structures**

Prerequisites: Math 115, EECS 183 or Engr 101 or equivalent.

Techniques and algorithm development and effective programming, top-down analysis, structured programming, testing and program correctness. Program language syntax and static and runtime semantics. Scope, procedure instantiation, recursion, abstract data types, and parameter passing methods. Structured data types, pointers, linked data structures, stacks, queues, arrays, records, and trees.