

Computer Science

WHAT IS COMPUTER SCIENCE?

Computer science spans the range from theory through programming to cutting-edge development of computing solutions. Computer science offers a foundation that permits graduates to adapt to new technologies and new ideas.

The work of computer scientists falls into three categories:

- 1) Designing and building software
- 2) Developing effective ways to solve computing problems, such as storing information in databases, sending data over networks or providing new approaches to security problems
- 3) Devising new and better ways of using computers and addressing particular challenges in areas such as robotics, computer vision, or digital forensics
(although these specializations are not available in all computer science programs)

Most computer science programs require some mathematical background.

Information from: http://computingcareers.acm.org/?page_id=8

NEEDED SKILLS:

- Computer programming skills, including familiarity with both software and hardware
- Algorithmic thinking
- Problem solving
- Communication and interpersonal skills
- Data analysis
- Mathematical and logical reasoning
- Teamwork**

JOB TITLES

- Computer Scientist
- Software Engineer
- Software Developer
- Artificial Intelligence Specialist
- Computational Linguist
- Information Scientist **

SALARIES

\$110,620.*

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

\$91,151

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
- Software industry
- Scientific research
- Federal Government
- Data processing, hosting, and internet services
- Computer hardware industry
- Business consulting & management
- Financial institutions **

JOB OUTLOOK

Employment of computer scientists is expected to grow 11% from 2014 to 2024, faster than the average for all occupations. Computer scientists are likely to enjoy excellent job prospects, because many companies report difficulties finding these highly skilled workers.

MORE INFORMATION

- www.myplan.com
- stats.bls.gov/ooh
- <http://www.acm.org> (Association for Computing Machinery)
- <http://www.computer.org/portal/siste/ieeecs/> (IEEE Computing Society)
- Engineering Career Resource Center, 230 Chrysler
- See a CS-Engr advisor. Sign up on the EAC website or contact the CSE Undergraduate Advising Office at 2808 Beyster Bldg. or 763-6563
- <http://www.eecs.umich.edu/eecs/undergraduate/index.html>

Computer Science

WHICH CS CLASSES SHOULD YOU START WITH?

To begin the CS major, a good option is to first take EECS 203 and EECS 280, followed by EECS 281, and a choice of EECS 370 or EECS 376. TCHNCLCM 300 or STATS 250 (STATS 412 can also be used for this requirement, and should be taken instead of 250 particularly if you are considering Data Science as an alternative major to CS) are two other additional options. TCHNCLCM 300 is a technical communication course that can be taken independently of any EECS course, but it is a prerequisite for TCHNCLCM 497, which must be taken with a CS Major Design Experience course during your senior year. Read more about the CS major and EECS Department at: <http://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 theory.

EECS 280 – 4 credits

Programming and Introductory Data Structures

Prerequisites: Math 115 and prior programming experience.

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.

EECS 281 – 4 credits

Data Structures and Algorithms

Prerequisites: EECS 203 and EECS 280.

Introduction to algorithm analysis and O -notation; fundamental data structures including lists, stacks, queues, priority queues, hash tables, binary trees, search trees, balanced trees and graphs, searching and sorting algorithms, recursive algorithms, basic graph algorithms, introduction to greedy algorithms and divide and conquer strategy. Several programming assignments.

EECS 370 – 4 credits

Introduction to Computer Organization

Prerequisites: EECS 203 or 270, and EECS 280 or 283.

This course is intended to give you a basic understanding of how computers execute programs. Understanding computers means understanding the hardware/software process of how you and the computer work together to have the computer carry out a concept. In your introductory programming courses, you learned how to express a concept in terms of a high-level programming language such as C/C++. In EECS 370, you will see how a low-level language is executed by the hardware, and you will see how to put together basic, hardware building blocks to form the functional units of a computer. To achieve these goals, you will design and “build” simple computers at various levels of detail. In this course, building will not mean connecting chips and gates. Rather, you will describe the hardware in diagrams, finite-state machines, and hardware simulators (writing in C). To further your understanding of other topics, there will be practice questions that will be discussed in the discussion sections.

EECS 376 – 4 credits

Foundations of Computer Science

Prerequisites: EECS 280 and 203.

An introduction to computation theory: finite automata, regular languages, pushdown automata, context-free languages, Turing machines, recursive languages and functions, and computational complexity.