

Computer Science & Engineering

Computer science and engineering (CSE) has two faces: technological and philosophical. The practical focus is on solving problems with the aid of computers in order to “turn dreams into reality” in support of improved human health, happiness, and safety. The intellectual focus—which is required to support the practice—is on the study of language and its use in making precise and understandable descriptions of...anything.

Computing has become the key enabler of fabulously rapid advances that have occurred, and that will continue for the foreseeable future, across all disciplines of the academy and throughout all segments of society. This makes CSE a very interdisciplinary field. A computing professional analyzes a situation in an application domain—biology and medicine, business, engineering, law and public policy, science, sociology, whatever—and carefully specifies the problems to be addressed; and then designs, evaluates, implements, and tests computer based solutions to those problems. Fundamentals studied in the CSE curriculum include algorithms and data structures, programming languages, computer architecture, numerical and symbolic computation, computer graphics, operating systems, software engineering, systems analysis, database and information retrieval systems, artificial intelligence and robotics, and human-computer interfaces.

Pursuing Computer Science and Engineering at Ohio State

Students interested in CSE as a major should develop strong oral and written communication skills, should become accustomed to teamwork and understanding people from different cultures, and should seek a strong high school background in math and science with an introductory exposure to computers (not necessarily programming).

CSE combines the technical study of both software and hardware. Other majors suited for students interested in computing careers include Computer and Information Science* in the Colleges of the Arts and Sciences, Electrical and Computer Engineering* in the College of Engineering, and Information Systems specialization* in the Fisher College of Business. The CIS major is virtually identical to the CSE major in its computing courses and technical background in mathematics and science, but has different non-major requirements: a liberal arts orientation rather than an engineering orientation. The computer option in the ECE major shares several computing courses with the CSE major but has a more hardware-oriented bent in its other courses. The IS specialization in Business entails a good deal less computing background.

*Students should refer to these major series sheets for more information.

Applicants to all programs must meet the competitive admission requirements of the respective college. Formal application to the CSE major is required, typically by the end of the freshman year. Acceptance into the CSE major is based on a minimum cumulative point-hour ratio (CPHR) and completion of entry-level courses in computing, mathematics, English composition, and introductory chemistry and/or physics.

Program Educational Objectives

It is the intent of the faculty that CSE graduates, within the first few years after graduation:

- Graduates of the program will be employed in the computing profession, and will be engaged in learning, understanding, and applying new ideas and technologies as the field evolves.
- Graduates with an interest in, and aptitude for, advanced studies in computing will have completed, or be actively pursuing, graduate studies in computing.
- Graduates will be informed and involved members of their communities, and responsible engineering and computing professionals.

Computer Science and Engineering Requirements

The CSE requirements include courses in computing, general engineering, math, statistics, physics, chemistry, and general education. The core technical CSE courses include programming and software design, computer architecture, algorithms and data structures, operating systems, programming languages, databases, and theory of computation. Study of ethical issues in computing, and a capstone design course, are also included. The general engineering requirements include courses from electrical engineering, materials science and engineering, mechanical engineering, and industrial and systems engineering. Math and statistics requirements include courses in calculus and analytic geometry, discrete mathematics, and probability and statistics. All degree programs in the College of Engineering require science courses in general physics and chemistry; biology is highly recommended. Electives in the major may be chosen from one of the following specializations:

- software systems
- hardware/software systems
- information systems
- information and computation assurance
- individualized program

Overall, the CSE program requires a total of 191 quarter hours, which includes 40 hours of general education, 76 hours of math, science, and engineering, and 75 hours in the major (of which 12 may be from an approved non-CS related discipline or minor program under the individualized program option).

For more information, check these web sites:

Computer Science: www.cse.ohio-state.edu

College of Engineering: www.eng.ohio-state.edu

Ohio State: www.osu.edu

Admissions: undergrad.osu.edu

Multicultural Center: multiculturalcenter.osu.edu

First Year Experience: fye.osu.edu

Curriculum Sample

This is a sample list of classes a student may take to pursue a degree in Computer Science and Engineering. Since university students need more than a specific education in a narrow field, they also will take classes to complete the General Education Curriculum (GEC). The GEC will allow students to develop the fundamental skills essential to collegiate success across major programs. Course work options satisfying the GEC often come from a variety of academic areas of study allowing students to tailor their GEC toward their interests. Note: This sample represents one of several possible paths to a degree in CSE. Consult the departmental web site, www.cse.ohio-state.edu, for details on each specific track.

Freshman Year

Software Development Using Components	4
Development of Software Components	4
Calculus and Analytic Geometry	15
Introduction to Engineering I and II	6
Chemistry and Physics	10
GEC English Composition	5
Engineering Survey	1
Total hours	45

Sophomore Year

Case Studies in Component-Based Software	4
Introduction to Computer Systems	4
Elementary Numerical Methods	3
System Software Design and Documentation	5
Differential Equations	5
Discrete Mathematical Structures I and II	6
Electrical Engineering	3
Biology, Chemistry, and/or Physics	4
Economics	5
Public Speaking	5
GEC Second Writing Course	5
Total hours	49

Junior Year

Automata and Formal Languages	3
Operating Systems	3
Computer Architecture	3
Analysis of Algorithms and Data Structures	3
Social and Ethical Issues in Computing	1
Programming Languages for Programmers	1
CSE technical electives	6
Probability and Statistics	6
Electrical and other Engineering	8
Biology, Chemistry, and/or Physics	5
GEC Social Sciences, Arts, Humanities, History	10
Total hours	49

Senior Year

Database Systems	3
Principles of Programming Languages	4
CSE technical electives and capstone	24
Electrical and other Engineering	8
GEC Social Sciences, Arts, Humanities, History	10
Total hours	49

Co-Curricular Opportunities

The CSE Department values the development of a diverse and highly-regarded community of scholars. It therefore offers a supportive infrastructure for women and minorities through diversity programs that include intentional role modeling and peer support to complement an innovative curriculum with many interdisciplinary options. Students are encouraged to become active in student chapters of the three main professional societies in computing: the Association for Computing Machinery (ACM), the Association for Systems Management (ASM), and the Computer Society of the Institute of Electrical and Electronics Engineers (IEEE). Other student organizations include ACM-W (an ACM group especially for women in computing), Upsilon Pi Epsilon (an honorary society for computer science students), and the OSU Open Source Club.

Honors & Scholars Opportunities

Ohio State offers the Honors & Scholars programs to create an environment of intellectual support and stimulation within a close-knit community of high-ability undergraduate students. Through these programs, students have access to smaller classes (all computing courses are limited to 40 students, but honors sections are further limited to 25), as well as enhanced undergraduate research opportunities, close working relationships with faculty, priority scheduling, and unique housing options. Good candidates for these programs will receive additional information after admission to the university. Learn more about the Honors & Scholars program at honors-scholars.osu.edu.

Career Prospects in Computer Science and Engineering

The demand for people who are skilled in the computing field continues to explode. The reason is that computing is essential in all areas of society. Contrary to popular misconception, offshoring of (lower-level) IT jobs is a secondary factor in job growth for the computing profession. Recent (November 2006) Bureau of Labor Statistics projections for U.S. job growth in the next decade show computing jobs, of the sort CSE graduates might take, comprising the top two—and half of the top ten—positions in the rankings for jobs requiring an undergraduate degree. This is after accounting for the impact of offshoring. Computer hardware and software vendors hire CSE graduates in areas such as hardware and software product development, quality assurance, customer support, sales and marketing, documentation, and training. But even more often, organizations that use these products (such as hospitals, pharmaceutical companies, banks, insurance companies, and manufacturing firms) hire CSE graduates as software engineers building system foundations as well as end-user applications, and as systems analysts, database administrators, and network administrators, as well as for other types of positions. Most large companies have internal computing departments that develop custom products for use by other departments within the same company. Beginning salaries for recent CSE graduates have averaged over \$55,000 but vary depending on the candidates' skills, work experience, type of industry, and current needs of employers.

Revised March 2009. For the most up-to-date information on the computer science and engineering program, please visit www.cse.ohio-state.edu.

Contact information:

Ohio State's CSE program is accredited by the Engineering Accreditation Commission (EAC) and by the Computing Accreditation Commission (CAC), both of ABET, Inc.

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