Computer & Information Science

Computer and information science (CIS) 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 CIS 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 CIS 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 and Information Science at Ohio State

Students interested in CIS 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).

CIS combines the technical study of both software and hardware, with an emphasis on the former. The BS in CIS involves a more substantial computing component and more of a science focus than the BA in CIS. Both the BS and BA majors in CIS are offered through the Department of Computer Science and Engineering (CSE), which also offers a major in Computer Science and Engineering* in the College of Engineering. Other majors suited for students interested in computing careers include Electrical and Computer Engineering* in the College of Engineering, and Information Systems specialization* in the Fisher College of Business. The CSE major is virtually identical to the BS in CIS major in its computing courses and technical background in mathematics and science, but has different non-major requirements: an engineering orientation rather than a liberal arts orientation. The computer option in the ECE major shares several computing courses with the CIS majors but is far more hardware-oriented and is an engineering degree. The IS specialization in Business entails a good deal less computing background.

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

Computer and Information Science Requirements

The BS in CIS requirements include courses in computing, math, statistics, physics, and general education. The core technical CIS 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. Math and statistics requirements include courses in calculus and analytic geometry, discrete mathematics, and probability and statistics. Electives in the major may be chosen from one of the following specializations:

- software systems
- advanced studies
- information systems
- information and computation assurance
- individualized program

Overall, the BS in CIS program requires a total of 181 quarter hours, which includes 60 hours of general education, 47 hours of math and science, and 74 hours in the major (of which 10 may be from an approved non-CS related discipline or minor program, under the individualized program option).

The BA in CIS program also requires a total of 181 quarter hours, but there are somewhat fewer hours required in the major and in mathematics and science, and somewhat more in general education, depending on the student's interests. Among the 181 quarter hours, a *minimum* of 15 hours in an approved related field are required for this degree.

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

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

For more information, check these web sites:

Computer Science: www.cse.ohio-state.edu
College of Arts and Sciences: artsandsciences.osu.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 BS degree in Computer and Information Science. 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 CIS. Consult the departmental web site, www.cse.ohio-state.edu/ugrad, for details on each specific track.

Freshman Year	
Software Development Using Components	4
Development of Software Components	4
Calculus and Analytic Geometry	15
GEC English Composition	5
GEC Foreign Language	10
GEC Physics	5
MPS Survey	1
Total hours	**44**

Sophomore Year	
Case Studies in Component-Based Software	4
Introduction to Computer Systems	4
Elementary Numerical Methods	3
System Software Design and Documentation	5
Discrete Mathematical Structures I and II	6
GEC Foreign Language	10
GEC Social Science/Historical Study	5
GEC Physics	5
GEC Second Writing Course	5
Total hours	**47**

Junior Year	
Social and Ethical Issues in Computing	1
Programming Languages for Programmers	1
Automata and Formal Languages	3
Operating Systems	3
Computer Architecture	4
Analysis of Algorithms and Data Structures	3
CIS technical electives	6
Probability and Statistics	6
GEC Arts and Humanities	10
GEC Natural Science	10
Total hours	**47**

Senior Year	
Database Systems	3
Principles of Programming Languages	4
CIS technical electives and capstone	22
GEC Social Science/Historical Study	15
Total hours	**44**

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 and Information Science

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 CIS 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 CIS 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 CIS 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 CIS graduates have averaged about $52,000 but vary depending on the candidates' skills, work experience, type of industry, and current needs of employers.

Revised September 2008. For the most up-to-date information on the computer science and engineering program, please visit www.cse.ohio-state.edu.

Contact information:

Computer Science and Engineering | 395 Dreese Laboratories
2015 Neil Avenue Mall | Columbus, Ohio 43210-1277
(614) 292-5813 | ugadvising@cse.ohio-state.edu