

## Department of Computer Science

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Computer science is the systematic study of algorithmic processes that describe and transform information: their theory, analysis, design, efficiency, implementation, and application. It is a broad discipline with an ever-growing array of opportunities. Graduates in this field can find employment in a wide spectrum of public and private enterprises.

The field of computer science encompasses many areas of specialization. One may find a personal niche in software development, systems development and hardware selection, studies of compatibility between hardware and software, programming language development and modification, information assurance, bioinformatics or perhaps a combination of these and any number of other diverse computer-oriented applications and concepts. Because of this diversity in potential application areas, the computer scientist must be familiar with the language of the physical or biological sciences, mathematics, and English. If the computer is to extend its role as a benefit to mankind, the computer scientist must be broadly educated and conversant with the many implications of the powerful tool that he or she is controlling and developing.

The Department of Computer Science was formed in 1981 and is in the College of Engineering. The Bachelor of Science in Computer Science has been offered at UI since 1977. This program consists of a carefully designed computer science core, surrounded by an extensive array of challenging technical elective courses. The core consists of courses in algorithms and data structures, programming languages, computer architecture, operating systems, software engineering, theory of computation, and a senior capstone design experience. All of these courses have important components of theory, abstraction, and design.

The Bachelor of Science program in computer science is accredited by the Computing Accreditation Commission (CAC) of the Accreditation Board for Engineering and Technology (ABET) 111 Market Place, Suite 1050, Baltimore, MD 21202 – 4012 – telephone: (410) 347-7700.. The department has made substantial contributions to achieving the University's designation by the US Department of Homeland Security, as a National Center of Excellence in Information Assurance Education.

The department offers graduate programs leading to the degrees, Master of Science and Doctor of Philosophy. These programs combine a core of advanced work with a complement of elective courses selected to provide a focused plan of study.

Students in computer science have the unique opportunity to draw from the expertise of an outstanding faculty with extensive experience in industry, teaching, and research. Computers currently available to students include an extensive department network of UNIX, Linux, and Windows-based workstations and several campus personal computer laboratories for research focus. All major campus and department computer systems are networked together with Internet connections, providing a state-of-the-art computing environment. The department was instrumental in establishing the Center for Secure and Dependable Systems (CSDS) and the Initiative for Bioinformatics and Evolutionary Studies (IBEST). The importance of these labs can be seen from the range of private and government funding which supports the department's research in computer security, computer reliability, bioinformatics, evolutionary computation and high performance computing.

### Courses

See Part 6 for courses in Computer Science (CS).

### Undergraduate Curricular Requirements

#### COMPUTER SCIENCE (B.S.C.S.)

Required course work includes the university requirements (see regulation J-3) and:

- General Education and Broadening Electives (9 cr):
  - Comm 101 Fundamentals of Public Speaking (2 cr)
  - Engl 317 Technical Writing (3 cr)
  - Broadening Electives (4 cr)
- Computer Science (43 cr):
  - CS 105 Computer Science as a Profession (2 cr)
  - CS 120 Computer Science I (4 cr)
  - CS 121 Computer Science II (4 cr)
  - CS 150 Computer Organization and Architecture (3 cr)
  - CS 210 Computing Languages (3 cr)
  - CS 240 Computer Operating Systems (3 cr)
  - CS 270 System Software (3 cr)

CS 383 Software Engineering I (3 cr)  
CS 384 Software Engineering II (3 cr)  
CS 385 Theory of Computation (3 cr)  
CS 395 Analysis of Algorithms (3 cr)  
CS 401 Contemporary Issues in Computer Science (1 cr)  
CS 445 Compiler and Translator Design (4 cr)  
CS 481 Senior Capstone Design (4 cr)

Mathematics and Statistics (17 cr):

Math 170 Analytic Geometry and Calculus I (4 cr)  
Math 175 Analytic Geometry and Calculus II (4 cr)  
Math 176 Discrete Mathematics (3 cr)  
Math 330 Linear Algebra (3 cr)  
Stat 301 Probability and Statistics (3 cr)

One of the following laboratory science sequences (8-9 cr):

Biol 115 Cells and the Evolution of Life and Biol 116 Organisms and Environments (8 cr)  
Chem 111 Principles of Chemistry I and Chem 112 Principles of Chemistry II (9 cr)  
Phys 211 Engineering Physics I and Phys 212 Engineering Physics II (8 cr)  
Phys 211 Engineering Physics I and Phys 213 Engineering Physics III (8 cr)

Science electives (4 cr)

Upper-division technical electives selected to satisfy the credit distribution in these categories (15 cr):

Computer Science (12 cr) – any upper-division CS course except 499.

Mathematics (3 cr) – Math 275 or any upper-division Math or Stat course except Math 400, 404, 499, and 513-519.

The minimum number of credits for the degree is 128, not counting Engl 101, Math 143, and other courses that might be required to remove deficiencies.

Students majoring in computer science must earn a grade of C or better in CS 120, 121, and 150 and a C or better in Math 176 before registration is permitted in 200 level CS courses. Students majoring in computer science must earn a grade of C or better in CS 210, 240, 270, and Math 170 and 175 before registration is permitted in upper-division CS courses.

Students must consult with their advisors when selecting electives within the curriculum to insure that their career objectives are met.

## Academic Minor Requirements

### COMPUTER SCIENCE MINOR

CS 120 Computer Science I (4 cr)  
CS 121 Computer Science II (4 cr)  
CS 150 Computer Organization and Architecture (3 cr)  
Math 176 Discrete Mathematics (3 cr)

Elective courses (6 cr):

CS 210 Computing Languages (3 cr)  
CS 240 Computer Operating Systems (3 cr)  
CS 270 System Software (3 cr)

## Graduate Academic Certificates Requirements

### SECURE AND DEPENDABLE COMPUTING SYSTEMS ACADEMIC CERTIFICATE

Note: A grade of 'B' or higher is required in all coursework for this academic certificate.

One of the following (3 cr):

CS 436 Advanced Information Assurance Concepts (3 cr)  
CS 536 Advanced Information Assurance Concepts (3 cr)

One of the following (3 cr):

CS 438 Network Security (3 cr)  
CS 538 Network Security (3 cr)

Electives (6 cr):

CS 441 Advanced Operating Systems (3 cr)  
CS 448 Survivable Systems and Networks (3 cr)  
CS 449 Fault-Tolerant Systems (3 cr)  
CS 484 Software Quality Assurance (3 cr)  
CS 504 Special Topics (3 cr)  
CS 541 Advanced Operating Systems (3 cr)  
CS 548 Survivable Systems and Networks (3 cr)  
CS 549 Fault-Tolerant Systems (3 cr)

## Graduate Degree Programs

Candidates must fulfill the requirements of the College of Graduate Studies and the Department of Computer Science. See the College of Graduate Studies section of Part 4 for the general requirements applicable to each degree. No 300-level course that is required in the B.S.C.S. curriculum may be used to satisfy the requirements of the graduate degree.

A graduate degree in computer science from UI prepares a student for a lifetime of discovery. It enables the graduate to advance the state of the art in computing, not merely to keep up with it. The graduate program develops the student's critical thinking, investigatory, and expository skills. The student will learn the foundations of computer science theory and application, and the interaction between the two. By understanding the extent and limitation of current knowledge in computer science, the graduate will learn to understand what issues are important and why. He or she will acquire the methodological skills to resolve important open problems and tackle challenging new projects. The student will learn to present problems and solutions, both orally and in writing. For examples of active research areas please visit the department's website <http://www.cs.uidaho.edu>.

The study of computer science at the graduate level requires mathematical maturity, skill in the use of high-level and machine-level programming languages, and basic knowledge of computer hardware. Admission to this program is highly competitive. An undergraduate degree in Computer Science is not a requirement. Students with a bachelor's degree from other closely allied undergraduate programs will be considered. Students who wish to enter the graduate program must ultimately demonstrate competence in specific areas equivalent to the material covered in several of the undergraduate computer science core courses. Normally a 3.0 undergraduate GPA and a Graduate Record Examination general (aptitude) score in the 60<sup>th</sup> percentile are the minimum admission requirements. Actual admission is based on a combination of undergraduate GPA and Graduate Record Examination scores. International students for whom English is a second language must have a TOEFL score of 550 or higher for the written test, 213 or higher for the computer based test, or 79 or higher for the internet-based test.

As a prerequisite to graduate program admission, competence in the following areas must be demonstrated: knowledge of a structured, high-level language; algorithms and data structures; and a full year of calculus.

If prerequisite requirements are met, a student who does not have an adequate coursework background in computer science may be admitted with deficiencies. He or she must then demonstrate knowledge of this material early on in their graduate studies by either taking the GRE Computer Science Subject Test and receiving a score in the 60<sup>th</sup> percentile or higher or by completing those courses in which he or she is deficient. Deficiency areas for graduate work in computer science are: computer organization and architecture; computer languages; computer operating systems; software engineering; analysis of algorithms; and theory of computation. Credit for deficiency courses cannot be counted toward the total credits required for the graduate degree.

**Master of Science.** The following are requirements for receiving an M.S. degree in computer science from UI. There is both a thesis and a non-thesis option, though in both options the student must complete courses in the graduate CS core and in a focused plan of study. In both options, the student must successfully complete at least 18 credit hours of 500-level courses and at least 18 credit hours of CS courses.

A graduate degree represents mastery of the theory underlying one's discipline, a graduate breadth requirement. This is the foundation on which further study should be based. The M.S. graduate candidate must successfully complete one class from at least three of the following categories: software architecture, hardware architecture, development processes, research foundations, and computer science theory. Check with the department for further details.

The student must acquire depth in at least one major area by developing a focused plan of study in consultation with the major advisor. This should be a program that investigates some aspect of computer science in depth, consistent with the goals of the graduate program in computer science.

The thesis option requires at least 30 credit hours of study. Specific requirements are: graduate breadth requirement (9 cr); at least one semester of CS Graduate Seminar, CS 501 (1 cr); focused plan of study (at least 14 cr); and research and thesis (at least 6 cr). The thesis must be in the approved format and must represent significant scholarly achievement. The thesis must be presented at a public colloquium.

The non-thesis option requires at least 36 credit hours of study. Specific requirements are: graduate breadth requirement (9 cr); at least one semester of CS Graduate Seminar, CS 501 (1 cr); and a focused plan of study (at least 26 cr), up to 6 credits of which can be CS 580. At the end of the program, non-thesis students must pass a comprehensive examination that covers their graduate studies.

**Doctor of Philosophy.** The PhD degree represents a continuation in the mastery of the theory underlying computer science. A doctoral student develops a graduate program of at least 78 semester hours in consultation with his or her major professor and supervisory committee. The PhD graduate candidate must successfully complete one class from at least four of the following categories: software architecture, hardware architecture, development processes, research foundations, and computer science theory. As a part of the program the student is required to include at least two semesters of CS 501 (graduate seminar). The student must have at least one full semester of teaching experience, with the teaching assignment determined by the student's supervisory committee. There is no foreign language requirement. The student must satisfy the residency requirement by spending

at least two terms at the Moscow campus or a UI Residence Center. The purpose of the residency requirement is to provide the student with access to facilities, faculty, and colleagues.

The qualifying examination is a written and/or oral examination, administered by the student's graduate committee, which covers fundamental areas of computer science. The preliminary examination is an examination of a student's proposed dissertation research, including both a written proposal and an oral public presentation covering related research, preliminary results, and a research plan. The student must produce a dissertation, presenting an original, significant contribution to computer science. The dissertation should be publishable, in whole or in part, and should demonstrate the ability of the candidate to successfully initiate and pursue a significant, original research project. A public presentation and defense of the final dissertation is required. It is expected that all PhD students will publish the results of their research before completion of their degree.