Duluth Campus

Computer Science B.S.

Computer Science

Swenson College of Science and Engineering

- Program Type: Baccalaureate
- Requirements for this program are current for Spring 2020
- Required credits to graduate with this degree: 120
- Required credits within the major: 81 to 86
- Degree: Bachelor of Science

Computer science is a discipline that requires understanding the design of computers and computational processes. The BS in computer science is an accredited, four-year program that provides a solid foundation in mathematics and statistics, computational problem solving, software design and analysis, programming languages, algorithms, data structures, and computer organization and architecture. The program also requires that students acquire significant knowledge in several sub-disciplines of computer science, thus enabling them to apply and situate their knowledge of computer science fundamentals.

Graduates of the program will have an ability to:
1 - Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2 - Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the programs discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the programs discipline.
6. Apply computer science theory and software development fundamentals to produce computing-based solutions.

The program provides the necessary foundational studies for students preparing for graduate school, as well as those seeking careers in industry.

The program is accredited by the Computing Accreditation Commission of ABET, http://www.abet.org.

Honors requirement: Program candidates submit an application to the department honors committee. Participants must maintain a 3.00 cumulative GPA and a 3.30 GPA in the major and complete an honors research project supervised by a faculty member; credit for the project can be earned in CS 4994 - Honors Project.

Program Delivery

This program is available:
- via classroom (the majority of instruction is face-to-face)

Admission Requirements

For information about University of Minnesota admission requirements, visit the Office of Admissions website.

General Requirements

The Board of Regents, on recommendation of the faculty, grants degrees from the University of Minnesota. Requirements for an undergraduate degree from University of Minnesota Duluth include the following:

1. Students must meet all course and credit requirements of the departments and colleges or schools in which they are enrolled including an advanced writing course. Students seeking two degrees must fulfill the requirements of both degrees. However, two degrees cannot be awarded for the same major.
2. Students must complete all requirements of the Liberal Education Program.
3. Students must complete a minimum of 120 semester credits.
4. At least 30 of the last 60 degree credits earned immediately before graduation must be awarded by UMD.
5. Students must complete at least half of their courses at the 3xxx-level and higher at UMD. Study-abroad credits earned through courses taught by UM faculty and at institutions with which UMD has international exchange programs may be used to fulfill this requirement.
6. If a minor is required, students must take at least three upper division credits in their minor field from UMD.
7. The minimum cumulative UM GPA required for graduation will be 2.00 and will include only University of Minnesota coursework. A minimum UM GPA of 2.00 is required in each UMD undergraduate major and minor. No academic unit may impose higher grade point standards to graduate.

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8. Diploma, transcripts, and certification will be withheld until all financial obligations to the University have been met.

Program Requirements

1. A minor or a second major from another department; the computer engineering minor may not be used to satisfy this requirement.

2. A grade of C- or better is required in all prerequisites courses for computer science classes.

3. Senior survey; contact the computer science office for details.

Core Courses (22 cr)
CS 1511 - Computer Science I [LE CAT] (5.0 cr)
or CS 1581 - Honors: Computer Science I [LE CAT] (5.0 cr)
CS 1521 - Computer Science II (5.0 cr)
CS 2511 - Software Analysis and Design (4.0 cr)
CS 2521 - Computer Organization and Architecture (4.0 cr)
CS 2531 - Discrete Structures for Computer Science (4.0 cr)
or MATH 3355 - Discrete Mathematics (4.0 cr)

Advanced Courses (20 cr)
CS 3111 - Computer Ethics [HUMANITIES] (4.0 cr)
CS 3531 - Automata and Formal Languages (4.0 cr)
CS 3541 - Software Engineering (4.0 cr)
CS 4312 - Operating Systems (4.0 cr)
CS 4332 - Computer Security (4.0 cr)

Advanced Course Electives (12 cr)
Take 3 or more course(s) totaling 12 or more credit(s) from the following:
Take 1 or more course(s) from the following:
- CS 4112 - Advanced Theory of Computation (4.0 cr)
- CS 4122 - Advanced Algorithms and Data Structures (4.0 cr)
- CS 4212 - Computer Graphics (4.0 cr)
- CS 4232 - Machine Learning & Data Mining (4.0 cr)
- CS 4242 - Natural Language Processing (4.0 cr)
- CS 4322 - Database Management Systems (4.0 cr)
- CS 4412 - Computer Architecture (4.0 cr)
- CS 4422 - Computer Networks (4.0 cr)

- Take 0 or more course(s) from the following:
  - CS 4222 - Artificial Intelligence (4.0 cr)
  - CS 4342 - Compiler Design (4.0 cr)

Courses From Other Programs (17 - 19 cr)
Advanced Writing
WRIT 3130 - Advanced Writing: Engineering (3.0 cr)
or WRIT 3150 - Advanced Writing: Science (3.0 cr)
Communications
COMM 1112 - Public Speaking [LE CAT, COMM & LAN] (3.0 cr)
Mathematics and Stats
MATH 1296 - Calculus I [LE CAT, LOGIC & QR] (5.0 cr)
MATH 3326 - Vectors and Matrices (3.0 cr)
or MATH 3280 - Differential Equations with Linear Algebra (4.0 cr)
STAT 3411 - Engineering Statistics (3.0 cr)
or STAT 3611 - Introduction to Probability and Statistics (4.0 cr)

Lab Science Sequences (10-13 cr)
Complete one of the following lab science sequences:
Biology
BIOL 1011 - General Biology I [LE CAT, NAT SCI] (5.0 cr)
BIOL 1012 - General Biology II [SUSTAIN] (5.0 cr)
or **Chemistry**
CHEM 1153 - General Chemistry I [LE CAT, NAT SCI] (4.0 cr)
CHEM 1154 - General Chemistry Lab I [LE CAT, NAT SCI] (1.0 cr)
CHEM 1155 - General Chemistry II (4.0 cr)
CHEM 1156 - General Chemistry Lab II (1.0 cr)
or **Geology**

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EES 1110 - Geology and Earth Systems [LE CAT, NAT SCI, SUSTAIN] (4.0 cr)
Take 2 or more course(s) from the following:
- EES 2010 - Surface Processes (4.0 cr)
- EES 2110 - Reconstructing Earth's Climate History (4.0 cr)
- EES 2120 - The Earth's Dynamic Interior (3.0 cr)
- EES 2311 - Mineralogy (4.0 cr)
- EES 2312 - Petrology (4.0 cr)
- EES 3420 - Sedimentology and Stratigraphy (4.0 cr)

or **Physics**
PHYS 2013 - General Physics I [LE CAT, NAT SCI] (4.0 cr)
or PHYS 2017 - Honors: General Physics I [NAT SCI] (4.0 cr)
PHYS 2014 - General Physics Lab I [NAT SCI] (1.0 cr)
PHYS 2015 - General Physics II (4.0 cr)
or PHYS 2018 - Honors General Physics II (4.0 cr)
PHYS 2016 - General Physics Lab II (1.0 cr)

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