

### **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 2012
- Required credits to graduate with this degree: 120
- Required credits within the major: 89 to 94
- Degree: Bachelor of Science

Computer science is a discipline that requires understanding the design of computers and computational processes. The B.S. 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 subdisciplines of computer science, thus enabling them to apply and situate their knowledge of computer science fundamentals. Goals of the learning process include highly developed programming skills, an understanding of the context in which computing activities occur, and an ability to communicate effectively. 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, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: 410-347-7700.

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

### **Program Requirements**

Requirements for the B.S. in computer science include:

\* Senior survey, contact the computer science office for details.

\* A minor or a second major from another department.

### Core Courses (22 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)
- EE 1315 - Digital Logic (4.0 cr)
- CS 1511 - Computer Science I [LE CAT] (5.0 cr)
- or CS 1581 - Honors: Computer Science I [LE CAT] (5.0 cr)

### Advanced Courses (20 cr)

- CS 3111 - Computer Ethics [HUMANITIES] (4.0 cr)
- CS 3512 *{Inactive}* (4.0 cr)
- CS 3541 - Software Engineering (4.0 cr)
- CS 5312 - Operating Systems (4.0 cr)
- CS 5621 *{Inactive}* (4.0 cr)
- or CS 5422 - Computer Networks (4.0 cr)

### Advanced Course Electives (12 cr)

Either CS 5621 or CS 5651 must be taken (under Advanced Courses); if both courses are taken, the second course fulfills the requirement of one Advanced Course Elective.

Take 3 or more course(s) from the following:

- CS 4511 *{Inactive}* (4.0 cr)
- CS 4521 *{Inactive}* (4.0 cr)
- CS 4322 - Database Management Systems (4.0 cr)
- CS 4332 - Computer Security (4.0 cr)
- CS 5222 - Artificial Intelligence (4.0 cr)
- CS 5551 *{Inactive}* (4.0 cr)
- CS 5342 - Compiler Design (4.0 cr)
- CS 5212 - Computer Graphics (4.0 cr)
- CS 5741 *{Inactive}* (4.0 cr)
- CS 5232 - Introduction to Machine Learning and Data Mining (4.0 cr)
- CS 5242 - Natural Language Processing (4.0 cr)

### Courses From Other Programs (23 cr)

- COMM 1112 - Public Speaking [LE CAT, COMM & LAN] (3.0 cr)
- MATH 1296 - Calculus I [LE CAT, LOGIC & QR] (5.0 cr)
- MATH 1297 - Calculus II [LOGIC & QR] (5.0 cr)
- STAT 3611 - Introduction to Probability and Statistics (4.0 cr)
- MATH 2326 *{Inactive}* (3.0 cr)
- or MATH 3326 - Vectors and Matrices (3.0 cr)
- or MATH 4326 - Linear Algebra (3.0 cr)

### Advanced Writing

- WRIT 3130 - Advanced Writing: Engineering (3.0 cr)
- or WRIT 3150 - Advanced Writing: Science (3.0 cr)

### Lab Science Sequences (8-13 cr)

Complete one of the following lab science sequences:

- BIOL 1011 - General Biology I [LE CAT, NAT SCI] (5.0 cr)
- BIOL 1012 - General Biology II [SUSTAIN] (5.0 cr)
- 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 CHEM 1161 *{Inactive}* [LE CAT4, NAT SCI] (5.0 cr)
- CHEM 1162 *{Inactive}* (5.0 cr)
- or EES 1110 - Geology and Earth Systems [LE CAT, NAT SCI, SUSTAIN] (4.0 cr)
- EES 2311 - Mineralogy (4.0 cr)
- EES 2312 - Petrology (4.0 cr)
- or PHYS 2011 *{Inactive}* [LE CAT4, NAT SCI] (4.0 cr)
- PHYS 2012 *{Inactive}* (4.0 cr)

### Electives From Other Programs (4 cr)

Additional approved courses from physics, chemistry, biology, astronomy and geology (4 cr). The total number of credits for the



additional science course and the science sequence must be at least 12 credits.

Additional science course that is either in category 4 of the liberal education program or has a category 4 prerequisite.