# Computer Science Major, B.S.

Department of Computer Science

This degree provides a solid base of knowledge in the following areas: algorithms; data structures; software design and analysis; programming languages; computer organization and architecture; and theoretical computer science. In addition, students are expected to develop outstanding programming skills. The program provides the necessary foundation for students seeking careers in the computing industry or preparing for graduate study.

Typical Program of Study:

| *Fall Semester* | | *Spring Semester* | |
|---|---|---|---|
| **First Year** | | | |
| CS 1511 Computer Science I | 5 cr | CS 1521 Computer Science II | 5 cr |
| Math 1296 Calculus I[a] | 5 cr | Math 1297 Calculus II | 5 cr |
| Comp 1120 College Writing | 3 cr | Comm 1112 Public Speaking | 3 cr |
| | 13 cr | | 13 cr |
| | | | |
| **Second Year** | | | |
| CS 2511 Software Analysis and Design | 4 cr | CS 2521 Computer Org and Architecture | 4 cr |
| ECE 1315 Digital System Design | 4 cr | Stat 3611 Probability & Statistics | 4 cr |
| Math 3355 Discrete Mathematics | 4 cr | CS 3511 Computer Science Theory | 4 cr |
| Lab science I[b] | 4-5 cr | Lab science II[b] | 4-5 cr |
| | 16-17 cr | | 16-17 cr |
| | | | |
| **Third Year** | | | |
| CS 3111 Computer Ethics *or* | | CS 5621 Computer Architecture[#] *or* | |
|    Phil 3242 Values & Technology | 3-4 cr |    CS 5651 Computer Networks[#] | 4 cr |
| CS 5631 Operating Systems | 4 cr | CS breadth[c] | 4 cr |
| Comp 3130 or 3150 Advanced Writing | 3 cr | Liberal education course | 3 cr |
| Liberal education courses | 6 cr | Approved science elective[d] | 4-5 cr |
| | 16-17 cr | | 15-16 cr |
| | | | |
| **Fourth Year** | | | |
| CS 4993 Seminar | 1 cr | CS breadth/elective[c] | 4 cr |
| CS breadth/elective[c] | 4 cr | Liberal education courses | 6 cr |
| Liberal education courses | 6 cr | Electives or minor[e] field course | 4 cr |
| Electives or minor[e] field courses | 4 cr | | 14 cr |
| | 15 cr | | |

[a]First math course is determined by math placement exam. This schedule presupposes placement into Math 1296.

[b]A science sequence from the list below and one additional science course (4 cr) from liberal education category 4 are required:
      Biol 1011 and 1012
      Chem 1151 and 1152 or Chem 1161 and 1162
      Geol 1110, 2311, and 2312
      Physics 2011 and 2012

[c]Students must complete 3 additional CS breadth/elective courses, with at least 1 chosen from the breadth field. Breadth courses: CS 4511, 4521, 4531, 4611, 5541, 5551, 5621[#], 5631, 5641, 5651[#]. Other electives: CS 4821, 5721, 5741, 5751, 5761, 5831.

[d]Science course from Liberal Education Category 4 or course with a Category 4 course as a prerequisite.

[e]Computer Science majors may NOT minor in Mathematics.

[#]Course may be used to fulfill only one CS MAJOR requirement.

For more information contact:      Department of Computer Science
320 Heller Hall
1114 Kirby Drive
Duluth, MN 55812-2496
218-726-7607
cs@d.umn.edu
http://www.d.umn.edu/cs

# Computer Science Major, B.S.

| Major Course Requirements | Credits | Prerequisites | Semester to be Completed | Grade when Completed |
|---|---|---|---|---|
| **Year 1** | | | | |
| CS 1511 Computer Science I | 5 | 3.5 years high school math | | |
| CS 1521 Computer Science II | 5 | CS 1511 | | |
| Math 1296 Calculus I | 5 | Math placement test | | |
| Math 1297 Calculus II | 5 | Math 1296 | | |
| Comm 1112 Public Speaking | 3 | | | |
| Comp 1120 College Writing | 3 | | | |
| **Year 2** | | | | |
| CS 2511 Software Analysis and Design | 4 | CS 1521 | | |
| CS 2521 Computer Org and Architecture | 4 | CS 1521; ECE 1315; Math 1296 | | |
| CS 3511 Computer Science Theory | 4 | Math 3355 | | |
| ECE 1315 Digital System Design | 4 | | | |
| Math 3355 Discrete Mathematics | 4 | Math 1296; CS 1511; Math 1297 or CS 1521 | | |
| Stat 3611 Intro Probability/Statistics | 4 | Math 1296 | | |
| Lab Science I* | | | | |
| Lab Science II* | | | | |
| **Years 3 and 4** | | | | |
| CS 4993 Seminar | 1 | CS 2511; Comm 1112; Comp 3130 or 3150 | | |
| CS 5631 Operating Systems | 4 | CS 2511, CS 2521 | | |
| CS 5621 Computer Architecture# *OR* | | CS 2521 | | |
| CS 5651 Computer Networks# | 4 | CS 2511, CS 2521 | | |
| Comp 3130 or 3150 Advanced Writing | 3 | 60 credits | | |
| Phil 3242 Values and Technology | 3 | 60 credits | | |
| OR CS 3111 Computer Ethics | 4 | CS 2511 | | |
| Approved science elective (category 4) | 4 | | | |
| **Advanced computer science courses: 3 courses required with at least 1 chosen from "breadth" list:** | | | | |
| *Breadth:* | | | | |
| CS 4511 Automata, Comp, Formal Lang | 4 | CS 1521, CS 3511; Math 3355 | | |
| CS 4521 Adv Data Structures/Algorithms | 4 | CS 2511, CS 3511; Math 3355 | | |
| CS 4531 Software Engineering | 4 | CS 2511, CS 3511; Math 3355 | | |
| CS 4611 Database Management Systems | 4 | CS 2511, CS 2521 | | |
| CS 5541 Artificial Intelligence | 4 | CS 2511, CS 3511; Math 3355 | | |
| CS 5551 User Interface Design | 4 | CS 2511; Math 1297 | | |
| CS 5621 Computer Architecture# | 4 | CS 2521 | | |
| CS 5631 Operating Systems | 4 | CS 2511, CS 2521 | | |
| CS 5641 Compiler Design | 4 | CS 2511, CS 2521, CS 3511; Math 3355 | | |
| CS 5651 Computer Networks# | 4 | CS 2511, CS 2521 | | |
| *Electives:* | | | | |
| CS 4821 Computer Security | 4 | CS 2511; CS 2521 or 3011, CS 3511; Math 3355 | | |
| CS 5721 Computer Graphics | 4 | CS 2511; Math 1297 | | |
| CS 5741 Object-oriented Software Design | 4 | CS 2511, CS 3511; Math 3355 | | |
| CS 5751 Machine Learning | 4 | CS 2511, CS 3511; Stat 3611 | | |
| CS 5761 Intro Natural Lang Processing | 4 | CS 2511, CS 3511; Math 3355 | | |
| CS 5831 Information and Text Processing | 4 | CS 2511, CS 2521, CS 3511; Math 3355 | | |
| CS 5994 Advanced Topics in CS | 4 | CS 2511, CS 2521; Stat 3611 | | |
| **18 credits of electives in humanities, social sciences, and arts (see department for approved list):** | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**\*Complete one of the following lab science sequences:**

Biol 1011-1012 General Biology I and II (10 cr)

Chem 1151-1152 General Chemistry I and II (10 cr) or Chem 1161-1162 Honors General Chemistry I and II (10 cr)

Geol 1110 Introductory Geology and Geol 2311 Mineralogy and Geol 2312 Petrology (12 cr)

Phys 2011-2012 General Physics I and II (8 cr)

**#Course may be used to fulfill only ONE Computer Science major requirement.**

NOTE: In addition to the above, students must complete UMD's liberal education program and a minor to earn a B.S. degree.

**Computer Science majors may not minor in mathematics.**