COMPUTER SCIENCE - BACHELOR OF SCIENCE (BSCS)

The goal of the Department of Computer Science is to prepare students for an intriguing and satisfying career in computer science in industry, research, or academia. The huge number of technical jobs and the continuing shortage of people to fill them mean that opportunities are great for today’s computer science graduates when seeking career options or to continue on to graduate school.

The BS degree program in computer science emphasizes knowledge and awareness of computing at all levels, from circuits and computer architecture through operating systems and programming languages to large application systems; the theoretical and mathematical aspects of computing; the interdependence of hardware and software; and the challenge of large-scale software production and the engineering principles used to meet that challenge. Students may choose to take classes that touch on a wide variety of computing topics, or may select classes that focus on a particular specialization.

For more information, visit the department’s BS Degree (http://www.colorado.edu/cs/current-students/undergraduate-students/bs-degree) webpage.

Accreditation

The Bachelor of Science degree in computer science is accredited by the Computing Accreditation Commission of ABET (http://www.abet.org).

Program Educational Objectives

Our program educational objectives for students 3–5 years after graduating with a Bachelor of Science degree in computer science are that they will be:

- **Broadly Educated and Versatile.** Able to draw upon foundational knowledge, learn, adapt and successfully bring to bear analytical and computational approaches on changing societal and technological challenges

- **Inspiring and Collaborative.** Is a leader and a responsible citizen whose strengths come from an ability to draw on and contribute to diverse teams, expertise and experiences.

- **Innovative.** Drives scientific and societal advancement through technological innovation and entrepreneurship.

- **Engaged.** Is and remains engaged with the University of Colorado, the state of Colorado and technical and scientific professional communities.

Requirements

Requirements for the BS degree in computer science include coursework in computer science, mathematics, natural science, and the humanities and social sciences, as well as free elective coursework.

The degree provides considerable freedom in the selection of specific courses to fulfill these requirements, allowing students to tailor the degree to their individual needs and interests.

A student may not earn both a BS degree in computer science and a BA degree in computer science (catalog.colorado.edu/undergraduate/.../computer-science-bachelor-arts-ba) from CU Boulder. A student may not earn a bachelor’s degree in computer science and a minor in computer science from CU Boulder.

For more information, visit the department’s BS Degree (http://www.colorado.edu/cs/current-students/undergraduate-students/bs-degree) webpage.

### Course Requirements

#### Computer Science Foundation

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI 1000</td>
<td>Computer Science as a Field of Work and Study</td>
<td>1</td>
</tr>
<tr>
<td>CSCI 1300</td>
<td>Computer Science 1: Starting Computing</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 2270</td>
<td>Computer Science 2: Data Structures</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 2400</td>
<td>Computer Systems</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 3104</td>
<td>Algorithms</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 3155</td>
<td>Principles of Programming Languages</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 3308</td>
<td>Software Development Methods and Tools</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Computer Science Core

Select six classes from approved list; see department website for list of approved classes

#### Computer Science Electives

Select additional courses to bring total Computer Science credit hours to at least 58; see department website for list of approved classes

#### Senior Capstone

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI 4308 &amp; CSCI 4318</td>
<td>Software Engineering Project 1 and Software Engineering Project 2</td>
<td>8</td>
</tr>
<tr>
<td>or CSCI 4348 &amp; CSCI 4358</td>
<td>Startup Essentials: Entrepreneurial Projects in Computing and Entrepreneurial Projects II</td>
<td>8</td>
</tr>
</tbody>
</table>

#### Mathematics

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPM 1350</td>
<td>Calculus 1 for Engineers</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 1300</td>
<td>Calculus 1</td>
<td>4</td>
</tr>
<tr>
<td>or APPM 1340 &amp; MATH 1300</td>
<td>Calculus 1 with Algebra, Part A and Calculus 1 with Algebra, Part B</td>
<td>4</td>
</tr>
<tr>
<td>APPM 1360</td>
<td>Calculus 2 for Engineers</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 2300</td>
<td>Calculus 2</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 2824</td>
<td>Discrete Structures</td>
<td>3</td>
</tr>
<tr>
<td>or ECEN 2703</td>
<td>Discrete Mathematics for Computer Engineers</td>
<td>3</td>
</tr>
<tr>
<td>or APPM 3170</td>
<td>Discrete Applied Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 2820</td>
<td>Linear Algebra with Computer Science Applications</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 2130</td>
<td>Introduction to Linear Algebra for Non-Mathematics Majors</td>
<td>3</td>
</tr>
<tr>
<td>or APPM 3310</td>
<td>Matrix Methods and Applications</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 3022</td>
<td>Introduction to Data Science with Probability and Statistics</td>
<td>3</td>
</tr>
<tr>
<td>or APPM 3570</td>
<td>Applied Probability</td>
<td>3</td>
</tr>
<tr>
<td>or APPM 4570</td>
<td>Statistical Methods</td>
<td>3</td>
</tr>
<tr>
<td>or CHEN 3010</td>
<td>Applied Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>or CVEN 3227</td>
<td>Probability, Statistics and Decision</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 3510</td>
<td>Introduction to Probability and Statistics</td>
<td>3</td>
</tr>
</tbody>
</table>
or MATH 4510 Introduction to Probability Theory  
or ECEN 3810 Introduction to Probability Theory  
or ECON 3818 Introduction to Statistics with Computer Applications

Logic & Ethics

Logic
PHIL 1440 Critical Thinking  3
or PHIL 2440 Symbolic Logic  3

Ethics
INFO 4601 Mastery in Information Science: Ethical and Policy Dimensions of Information and Technology  3
or PHIL 1100 Ethics  3
or PHIL 1200 Contemporary Social Problems  3

Humanities/Social Sciences/Writing

Writing
HUEN 1010 Engineering, Ethics and Society  3
or HUEN 3100 Seminar in Engineering, Ethics & Society  3
or WRTG 3030 Writing on Science and Society  3
or WRTG 3035 Technical Communication and Design  3
or PHYS 3050 Writing in Physics: Problem-Solving and Rhetoric  3

Upper-Division Humanities/Social Sciences  6
At least 6 credits of approved upper-division coursework  6

Remaining Humanities/Social Sciences/Writing  9
At least 9 credits of approved coursework, any level  9

Natural Science

PHYS 1110 General Physics 1  4
PHYS 1120 General Physics 2  5
& PHYS 1140 and Experimental Physics 1  5
or CHEN 1211 General Chemistry for Engineers  5
& CHEM 1221 and Engineering General Chemistry Lab  5
or CHEM 1113 General Chemistry 1  5
& CHEM 1114 and Laboratory in General Chemistry 1  5
or EBIO 1210 General Biology 1  5
& EBIO 1230 and General Biology Laboratory 1  5
or MCDB 1150 Introduction to Cellular and Molecular Biology  5
& MCDB 1151  5

Natural Science Electives  8
Additional natural science electives to reach 17 credits, number of credits needed may vary based on natural science sequence completed  8

Free Electives  12
Additional coursework to bring cumulative total credit hours to at least 128, number of credits needed may vary based on options selected to complete other requirements  12

Total Credit Hours  128

Students beginning the degree prior to Fall 2018 should see an academic advisor for information regarding curriculum requirements.

### Recommended Four-Year Plan of Study

#### Course  
#### Title  
#### Credit Hours

**First Year**

**Fall Semester**

- APPM 1350 Calculus 1 for Engineers  4
- CSCI 1000 Computer Science as a Field of Work and Study  1
- CSCI 1300 Computer Science 1: Starting Computing  4
- PHYS 1110 General Physics 1  4
- Humanities and social sciences elective  3

**Credit Hours**  16

**Spring Semester**

- APPM 1360 Calculus 2 for Engineers  4
- CSCI 2270 Computer Science 2: Data Structures  4
- Natural science sequence option  5
- Logic  3

**Credit Hours**  16

**Second Year**

**Fall Semester**

- CSCI 2400 Computer Systems  4
- CSCI 2824 Discrete Structures (or other approved course)  3
- CSCI 3308 Software Development Methods and Tools  3
- Natural science elective  3
- Ethics  3

**Credit Hours**  16

**Spring Semester**

- CSCI 3104 Algorithms  4
- CS core course from approved core list (1 of 6)  3
- CSCI 2820 Linear Algebra with Computer Science Applications (or other approved course)  3
- Natural science elective  3
- Humanities and social sciences elective  3

**Credit Hours**  16

**Third Year**

**Fall Semester**

- CSCI 3155 Principles of Programming Languages  4
- CS core course from approved core list (2 of 6)  3
- CS core course from approved core list (3 of 6)  3
- CSCI 3022 Introduction to Data Science with Probability and Statistics (or other approved course)  3

**College-approved writing course**  2

**Credit Hours**  16

**Spring Semester**

- CS core course from approved core list (4 of 6)  4
- CS core course from approved core list (5 of 6)  3
- Natural science elective  3
- Humanities and social sciences elective  3
- Free elective  3

**Credit Hours**  16
Fourth Year

Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI Senior Capstone I</td>
<td>4</td>
</tr>
<tr>
<td>CS core course from approved core list (6 of 6)</td>
<td>3</td>
</tr>
<tr>
<td>Computer science elective</td>
<td>3</td>
</tr>
<tr>
<td>Humanities and social sciences elective</td>
<td>3</td>
</tr>
<tr>
<td>Free elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

Spring Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI Senior Capstone II</td>
<td>4</td>
</tr>
<tr>
<td>Computer science elective</td>
<td>3</td>
</tr>
<tr>
<td>Computer science elective</td>
<td>3</td>
</tr>
<tr>
<td>Humanities and social sciences elective</td>
<td>3</td>
</tr>
<tr>
<td>Free elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

**Total Credit Hours**

1 Students may choose courses from the list of college-approved humanities and social sciences (HSS) electives (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements).

2 Students may choose a course from the list of college-approved writing courses (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements).

**Learning Outcomes**

Upon graduation, students are expected to be able to:

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

**Bachelor’s–Accelerated Master’s Degree Program(s)**

The Bachelor’s–Accelerated Master’s (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor’s and master’s degree in a shorter period of time. Students receive the bachelor’s degree first, but begin taking graduate coursework as undergraduates (typically in their senior year). Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor’s–accelerated master's program enables students to continue working with their established faculty mentors.

The following BAM programs are available with the BS in Computer Science:

- BS and MS in Computer Science
- BS in Computer Science, MS in Interdisciplinary Telecommunications

**Admissions Requirements**

**BS and MS in Computer Science**

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.75 or higher
- Have at least junior class standing
- Have completed the following five prerequisite courses with grades of B or better:
  - CSCI 1300
  - CSCI 2270
  - CSCI 2400
  - CSCI 3104 or CSCI 3434
  - CSCI 3155 or CSCI 3753

Students may submit their intent to apply during the term they are completing their final class from the list above.

**BS in Computer Science, MS in Interdisciplinary Telecommunications**

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- Have a cumulative GPA of 3.25 or higher
- Have a major GPA of 3.25 or higher
- Have at least junior class standing

**Program Requirements (for both programs above)**

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master’s degree. However, only 6 credits may be double counted toward the bachelor’s degree and the master’s degree. Students must apply to graduate with the bachelor’s degree, and apply to continue with the master’s degree, early in the semester in which the undergraduate requirements will be completed.1

Please see the Computer Science/Computer Science BAM degree program (https://www.colorado.edu/cs/current-students/undergraduate-students/concurrent-bsms) or Computer Science/Telecommunications BAM degree program (https://www.colorado.edu/itp/current-students/undergraduate-bsms-degree) for more information.

1 Students who were admitted prior to July 2019 follow a concurrent Bachelor’s/Master’s structure, and the two degrees are awarded simultaneously when requirements for both degrees are met.