COMPUTER SCIENCE - BACHELOR OF ARTS (BA)

Computer science is an exciting and challenging field that has impact on many parts of our lives. Computer scientists craft the technologies that enable the digital devices we use every day. They develop the large-scale software that powers business and industry, and they advance the computational techniques and write the software that supports scientists in their study of the world around us. They create the software that social scientists use to identify and analyze patterns in the behavior of social groups and human behavior in social networks and the applications that humanists and linguists use to research language development. Many new applications of computing technology remain to be discovered. Indeed, computing will be at the heart of future revolutions in business, science and society. Students who study computer science now will be at the forefront of those important advances.

Computer science is concerned with how computers are constructed, how they store and process data, how they are used in problem solving and how the quality of those solutions is assessed. It is about the science of creating software for a variety of users. It is about understanding how that software interacts with the hardware on which it is run. Computer science goes well beyond the machine to the study of how people interact with the technologies around them. Applications of computer science reach far and wide.

In addition, students completing the degree in computer science are expected to acquire the ability and skills to:

- Apply knowledge of computing and mathematics appropriate to the discipline.
- Identify, formulate and develop solutions to computational challenges.
- Use appropriate techniques, skills and tools necessary for computing practice.
- Design, implement and evaluate a computational system to meet desired needs within realistic constraints.
- Apply mathematical foundations, algorithmic principles and computer science theory in the modeling and design of computational systems in a way that demonstrates comprehension of the trade-offs involved in design choices.
- Apply design and development principles in the construction of software systems of varying complexity.
- Function effectively on teams to accomplish shared computing design, evaluation or implementation goals.
- Understand professional, ethical, legal, security and social issues and responsibilities for the computing profession.
- Communicate and engage effectively with diverse stakeholders.
- Analyze impacts of computing on individuals, organizations and society.
- Engage in continuing professional development.

For more information, visit the department's BA Degree (https://www.colorado.edu/cs/current-students/undergraduate-students/ba-degree) webpage.

Advising

Prospective students with questions about the Bachelor of Arts program in computer science can contact Beth Webb (elizabeth.webb@colorado.edu). Current CU students should use MyCUHub (https://www.colorado.edu/mycuhub) to meet with an advisor for the BA in computer science.

A student may not earn both the BS in computer science from the College of Engineering and Applied Science and the BA in computer science from the College of Arts and Sciences. A student may not earn both a bachelor’s degree in computer science and the minor in computer science from CU Boulder.

Requirements

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

For more information, visit the department's BA Degree (https://www.colorado.edu/cs/current-students/undergraduate-students/ba-degree) webpage

Required Courses and Credits

Students must complete the requirements of the College of Arts and Sciences, including approximately 46 credit hours in the Gen Ed Requirements and the required courses listed below. Through the required course work for the major, students will fulfill the QRMS component of the Gen Ed Skills Requirement.

Students are required to pursue an additional area of study as part of earning the BA in computer science. The additional area can be an Arts and Sciences minor, or certificate, or available minors/certificates from other CU Colleges (Business, EAS, CMCI, Education, Music). Students completing an additional major in A&S or a dual degree (by also completing a major from another college) fulfill the requirement with those plans.

Any additional area of study that is not part of a double major (in A&S) or dual degree must be at least 15 credit hours. Programs that do not meet this requirement will be considered by petition and will be required to add additional coursework.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI 3002</td>
<td>Fundamentals of Human Computer Interaction</td>
<td></td>
</tr>
<tr>
<td>CSCI 3202</td>
<td>Introduction to Artificial Intelligence</td>
<td></td>
</tr>
<tr>
<td>CSCI 3287</td>
<td>Design and Analysis of Data Systems</td>
<td></td>
</tr>
<tr>
<td>CSCI 3302</td>
<td>Introduction to Robotics</td>
<td></td>
</tr>
<tr>
<td>CSCI 3403</td>
<td>Introduction to CyberSecurity for a Converged World</td>
<td></td>
</tr>
<tr>
<td>CSCI 3434</td>
<td>Theory of Computation</td>
<td></td>
</tr>
</tbody>
</table>
Computer Science - Bachelor of Arts (BA)

CSCI 3656  Numerical Computation
CSCI 3753  Design and Analysis of Operating Systems
CSCI 4273  Network Systems
CSCI 4448  Object-Oriented Analysis and Design

CSCI Upper-Division Electives
Choose two to four additional upper-division CSCI courses or approved courses from outside CSCI.

Total Credit Hours 7-10

Required Ancillary Coursework from Outside Computer Science

Mathematics
Calculus Sequence
Select one of the following calculus sequences: 8-12
Sequence 1 (preferred)
MATH 1300  Calculus 1
& MATH 2300  and Calculus 2
Sequence 2
APPM 1350  Calculus 1 for Engineers
& APPM 1360  and Calculus 2 for Engineers
Sequence 3
APPM 1340  Calculus 1 with Algebra, Part A
APPM 1345  Calculus 1 with Algebra, Part B
APPM 1360  Calculus 2 for Engineers

Discrete Mathematics
Select one of the following courses:
CSCI 2824  Discrete Structures
or APPM 3170  Discrete Applied Mathematics

Linear Algebra or Probability/Statistics
Select one of the following courses: 3-4
Linear Algebra
CSCI 2820  Linear Algebra with Computer Science Applications
or MATH 211: Introduction to Linear Algebra for Non-Mathematics Majors
or APPM 331: Matrix Methods and Applications

Probability/Statistics
CSCI 3022  Introduction to Data Science with Probability and Statistics
or MATH 351: Introduction to Probability and Statistics
or MATH 451: Introduction to Probability Theory
or APPM 351: Applied Probability
or STAT 310: Applied Probability
or ECON 381: Introduction to Statistics with Computer Applications
or STAT 400: Statistical Methods and Application I

Logic & Ethics
Upper Division PHIL Logic or Ethics courses can be substituted if pre-requisites are met.

Logic
Select one of the following logic courses: 3
PHIL 1440  Critical Thinking
or PHIL 2440: Symbolic Logic

Ethics
Select one of the following ethics courses: 3
PHIL 1100  Ethics
or PHIL 1200: Contemporary Social Problems
or INFO 460: Mastery in Information Science: Ethical and Policy Dimensions of Information and Technology

Outside Area of Study (N/A if completing Double Major (A&S) or Dual Degree)
Approved Minor or Certificate Program from any CU Boulder College 15

Total Credit Hours 35-40

Graduating in Four Years
Consult the four-year guarantee requirements for information on eligibility. The concept of "adequate progress" as it is used here only refers to maintaining eligibility for the four-year guarantee; it is not a requirement for the major. To maintain adequate progress toward a BA in computer science, students should meet the following requirements:

- Declare the computer science BA major and have taken Calculus 1 and CSCI 1300 by the end of their second semester.
- Consult with a major advisor to determine adequate progress toward completion of the major and meeting upper-division Arts and Sciences requirements.

Recommended Four-Year Plan of Study
This four-year plan of study is based on students starting at the Calculus 1 level. This plan is flexible and CSCI course substitutions in year two based on starting MATH or other requirements should be discussed with an academic advisor.

Gen. Ed. Distribution and Diversity requirements can be met with courses for the Additional Area of Study from A&S Departments, leaving more options for General Electives. Students pursuing Additional Areas outside of A&S should expect to exceed 120 total credit hours.

For more information on required courses included all options for Calculus, additional MATH, PHIL and CSCI-BA Core, see the Requirements tab.

Course  Title  Credit Hours

Year One
Fall Semester
CSCI 1300  Computer Science 1: Starting Computing 4
MATH 1300  Calculus 1 5
Gen. Ed. Skills course (example: Lower-division Written Communication) 3
Gen Ed Distribution Course (example: Social Science) or Additional Area of Study Course 3

Spring Semester
CSCI 2270  Computer Science 2: Data Structures 4
MATH 2300  Calculus 2 5
Gen. Ed. Distribution course (example: Natural Sciences with Lab) 4
Logic or Ethics course 3

Total Credit Hours 16
### Year Two

#### Fall Semester
- **CSCI 2400**  Computer Systems  4
- **CSCI 2824**  Discrete Structures  3
- Logic or Ethics Course  3
- Additional Area of Study Course  3
- Gen. Ed. Distribution course (example: Arts & Humanities)  3

| Credit Hours | 16 |

#### Spring Semester
- **CSCI 3104**  Algorithms  4
- **CSCI 3308**  Software Development Methods and Tools  3
- Linear Algebra, Probability or Statistics course  3-4
- Additional Area of Study  3
- Additional Area of Study  3

| Credit Hours | 16-17 |

### Year Three

#### Fall Semester
- **CSCI 3155**  Principles of Programming Languages  4
- CSCI core course or CSCI Upper-division Elective  3-4
- Additional Area of Study  3
- Upper-divison Gen. Ed. Skills course (example: Upper-division Written Communication)  3
- Upper-divison Gen. Ed. Distribution course (example: Natural Sciences)  3

| Credit Hours | 16-17 |

#### Spring Semester
- CSCI core course or CSCI Upper-division Elective  3-4
- CSCI core course or CSCI Upper-division Elective  3-4
- Additional Area of Study  3
- Upper-divison Gen. Ed. Distribution/Diversity course (example: Social Sciences/Global Perspective)  3
- General Elective  3

| Credit Hours | 15-17 |

### Year Four

#### Fall Semester
- CSCI core course or CSCI Upper-division Elective  3-4
- CSCI Upper-division Elective or Capstone-1  3-4
- Additional Area of Study or Upper-Division Gen Ed Distribution course or General Elective  3
- Additional Area of Study or Upper-Division Gen Ed Distribution course or General Elective  3
- Upper-Division Gen Ed Distribution course or General Elective  3

| Credit Hours | 15-17 |

#### Spring Semester
- CSCI Upper-division Elective  3-4
- CSCI Upper-division Elective or Capstone-2  3-4
- Additional Area of Study or Upper-Division Gen Ed Distribution course  3
- Additional Area of Study or Upper-Division Gen Ed Distribution course  3

| Credit Hours | 12-14 |

| Total Credit Hours | 121-129 |