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 (https://www.abet.org), under the General Criteria and the Computer Science Program Criteria.

Western Colorado University/University of Colorado Boulder Partnership Program (Computer Science)

Western Colorado University (Western) (https://western.edu/school/paul-m-rady-school-of-computer-science-engineering/) and CU Boulder have created a partnership to deliver specific engineering and computer science baccalaureate programs in their entirety in Gunnison, Colorado. The first two years of coursework are taught by Western faculty and the second two years of coursework are taught by CU Boulder faculty located in Gunnison. Students completing the programs will be awarded a Bachelor of Science from CU Boulder.

Degrees are offered in mechanical engineering and computer science, with additional details on the Computer Science (https://western.edu/program/computer-science-university-colorado-partnership/) and Mechanical Engineering (https://western.edu/program/mechanical-engineering-university-colorado-partnership/) partnership websites.

Coursework requirements and plans of study specific to this partnership can be found on the Western Colorado University computer science partnership website (https://western.edu/program/computer-science-university-colorado-partnership/). Learn more about this program on the CU Boulder partnership website (https://www.colorado.edu/academics/western-cu-boulder-bs-computer-science/).

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. Students must meet the graduation requirements of earning the BS degree as laid out by the College of Engineering and Applied Science (https://www.colorado.edu/engineering-advising/get-your-degree/graduation-requirements/).

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 (https://catalog.colorado.edu/undergraduate/colleges-schools/arts-sciences/programs-study/computer-science/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

Code	Title	Credit Hours
Computer Science Foundation		
CSCI 1000	Computer Science as a Field of Work and Study	1
or ASEN 1000	Introduction to Aerospace Engineering Sciences	
or BMEN 1000	Exploring Biomedical Engineering	
or CHEN 1300	Introduction to Chemical Engineering	
or COEN 1500	CEAS Design Lab: Engineering Your Life	
or CSCI 1000	Computer Science as a Field of Work and Study	
or CVEN 1317	Introduction to Civil and Environmental Engineering	
or ECEN 1100	Exploring ECE	
or EVEN 1000	Introduction to Environmental Engineering	
CSCI 1300	Computer Science 1: Starting Computing (ASEN 1320 requires minimum grade of B-)	4
or ASEN 1320	Aerospace Computing and Engineering Applications	
or ECEN 1310	C Programming for ECE	
CSCI 2270	Computer Science 2: Data Structures	4
CSCI 2400	Computer Systems	4
CSCI 3104	Algorithms	4
CSCI 3155	Principles of Programming Languages	4
CSCI 3308	Software Development Methods and Tools	3
Computer Science Core		**15-18**
Select five courses from approved list below; exact number of credit hours earned may vary based on courses selected.		
CSCI 3002	Fundamentals of Human Computer Interaction	
CSCI 3202	Introduction to Artificial Intelligence	

CSCI 3287	Design and Analysis of Database Systems	
CSCI 3302	Introduction to Robotics	
CSCI 3403	Introduction to CyberSecurity for a Converged World	
CSCI 3434	Theory of Computation	
CSCI 3656	Numerical Computation	
or APPM 4600	Numerical Methods and Scientific Computing	
or MCEN 3030	Computational Methods	
CSCI 3753	Design and Analysis of Operating Systems	
CSCI 4022	Advanced Data Science	
CSCI 4273	Network Systems	
CSCI 4448	Object-Oriented Analysis and Design	

Computer Science Electives   **7-12**

Select additional approved coursework to bring total Computer Science credit hours to at least 58. [1]

Senior Capstone

CSCI 4308 & CSCI 4318	Software Engineering Project 1 and Software Engineering Project 2	8
or CSCI 4348 & CSCI 4358	Startup Essentials: Entrepreneurial Projects in Computing and Entrepreneurial Projects II	
or CSCI 4950 & CSCI 3100	Senior Thesis and Software and Society	
or CSCI 4368 & CSCI 4378	Multidisciplinary Design Project 1 and Multidisciplinary Design Project 2	

Mathematics

APPM 1350	Calculus 1 for Engineers	4
or MATH 1300	Calculus 1	
or APPM 1345	Calculus 1 with Algebra, Part B	
APPM 1360	Calculus 2 for Engineers	4
or MATH 2300	Calculus 2	
CSCI 2824	Discrete Structures	3
or ECEN 2703	Discrete Mathematics for Computer Engineers	
or APPM 3170	Discrete Applied Mathematics	
or MATH 2001	Introduction to Discrete Mathematics	
CSCI 2820	Linear Algebra with Computer Science Applications	3
or MATH 2130	Introduction to Linear Algebra for Non-Mathematics Majors	
or MATH 2135	Introduction to Linear Algebra for Mathematics Majors	
or MATH 3130	Introduction to Linear Algebra	
or MATH 3135	Honors Introduction to Linear Algebra	
or APPM 3310	Matrix Methods and Applications	
CSCI 3022	Introduction to Data Science with Probability and Statistics	3
or APPM 3570	Applied Probability	
or APPM 4570	Statistical Methods	
or CHEN 3010	Applied Data Analysis	
or CVEN 3227	Probability, Statistics and Decision	
or ECEN 3810	Introduction to Probability Theory	
or ECON 3818	Introduction to Statistics with Computer Applications	
or MATH 3510	Introduction to Probability and Statistics	
or MATH 4510	Introduction to Probability Theory	
or STAT 3100	Applied Probability	
or STAT 4000	Statistical Methods and Application I	

Logic & Ethics

Logic

PHIL 1440	Critical Thinking	3
or PHIL 2440	Symbolic Logic	

Ethics

PHIL 1100	Ethics	3
or PHIL 1160	Introduction to Medical Ethics	
or PHIL 1200	Contemporary Social Problems	
or PHIL 2160	Ethics and Information Technology	
or CSCI 2750	Computing, Ethics and Society	
or INFO 4601	Ethical and Policy Dimensions of Information and Technology	
or ENLP 2000	Leadership, Fame and Failure	
or EHON 1151	Critical Encounters	
or ENES 2020	The Meaning of Information Technology	
or HONR 2250	Ethics of Ambition	

Humanities/Social Sciences/Writing [2]   **18**

Natural Science

PHYS 1110	General Physics 1	4
or PHYS 1115	General Physics 1 for Majors	
PHYS 1120 & PHYS 1140	General Physics 2 and Experimental Physics 1	5
or PHYS 1125 & PHYS 1140	General Physics 2 for Majors and Experimental Physics 1	
or CHEN 1201 & CHEM 1114	General Chemistry for Engineers 1 and Laboratory in General Chemistry 1	
or CHEN 1211 & CHEM 1221	Accelerated Chemistry for Engineers and Engineering General Chemistry Lab	
or CHEM 1113 & CHEM 1114	General Chemistry 1 and Laboratory in General Chemistry 1	
or EBIO 1210 & EBIO 1230	General Biology 1 and General Biology Laboratory 1	
or MCDB 1150 & MCDB 1161	Introduction to Cellular and Molecular Biology and From Dirt to DNA: Phage Genomics Laboratory I	
or MCDB 1150 & MCDB 1171	Introduction to Cellular and Molecular Biology and Antibiotics Discovery Through Hands-on Screens I	

Natural Science Electives   **8-9**

Additional natural science electives to reach 17 credits, number of credits needed may vary based on natural science sequence completed. See department website for list of approved courses.

Free Electives   **16**

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.

Total Credit Hours   **128-137**

1   For list of approved courses, see department website (https://
    www.colorado.edu/cs/academics/undergraduate-programs/
    bachelor-science/bachelor-science-degree-requirements/#Electives).

2   Complete the College's Humanities, Social Sciences and Writing
    (https://www.colorado.edu/engineering-advising/get-your-degree/
    degree-requirements/humanities-social-sciences-and-writing-
    requirements/) requirements (18 credits total) as specified.

Recommended Four-Year Plan of Study

First Year

Fall Semester		Credit Hours
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
Humanities and social sciences elective [1]		3
Natural Science Elective		3
	Credit Hours	**15**
Spring Semester		
APPM 1360	Calculus 2 for Engineers	4
CSCI 2270	Computer Science 2: Data Structures	4
PHYS 1110	General Physics 1	4
Logic		3
	Credit Hours	**15**

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 5)		3
CSCI 2820	Linear Algebra with Computer Science Applications (or other approved course)	3
Natural science elective		3
Humanities and social sciences elective [1]		3
	Credit Hours	**16**

Third Year

Fall Semester		
CSCI 3155	Principles of Programming Languages	4
CS core course from approved core list (2 of 5)		3
CS core course from approved core list (3 of 5)		3
CSCI 3022	Introduction to Data Science with Probability and Statistics (or other approved course)	3
College-approved writing course [2]		3
	Credit Hours	**16**

Spring Semester		
CS core course from approved core list (4 of 5)		4
CS core course from approved core list (5 of 5)		3
Natural science sequence option		5
Humanities and social sciences elective [1]		3
Free Elective		3
	Credit Hours	**18**

Fourth Year

Fall Semester		
CSCI Senior Capstone I		4
Computer Science elective [3]		3
Computer Science elective		3
Humanities and social sciences elective [1]		3
Free elective		3
	Credit Hours	**16**
Spring Semester		
CSCI Senior Capstone II		4
Computer science elective		3
Computer science elective		3
Humanities and social sciences elective [1]		3
Free elective		3
	Credit Hours	**16**
	Total Credit Hours	**128**

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/).

3   See department website (https://www.colorado.edu/cs/academics/
    undergraduate-programs/bachelor-science/bachelor-science-degree-
    requirements/#Electives) for Computer Science Electives

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.

Program Educational Objectives

Within 3–5 years after graduating with a Bachelor of Science degree in computer science, our graduates 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*. Are leaders and responsible citizens whose strengths come from an ability to draw on and contribute to diverse teams, expertise and experiences.
- *Innovative*. Drive scientific and societal advancement through technological innovation and entrepreneurship.
- *Engaged*. Are engaged with the University of Colorado, the state of Colorado and technical and scientific professional communities.

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 Computational Linguistics, Analytics, Search and Informatics
- BS in Computer Science, MS in Data Science
- BS in Computer Science, MS in Network Engineering
- BS in Computer Science, MS in Technology, Cybersecurity and Policy

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 3.50 or higher.
- Have completed all prerequisite courses with grades of B or better:

Code	Title	Credit Hours
CSCI 1300	Computer Science 1: Starting Computing	4
CSCI 2270	Computer Science 2: Data Structures	4
CSCI 2400	Computer Systems	4
CSCI 3104	Algorithms	4
or CSCI 3434	Theory of Computation	

CSCI 3155	Principles of Programming Languages	4
or CSCI 3753	Design and Analysis of Operating Systems	

- Students who do not meet the first two criteria, must have one letter of reference from a faculty member or their undergraduate academic advisor outlining why they should be considered. The letter-writer should send their letter directly to gradadms@cs.colorado.edu.
- Have at least junior status within the bachelor's degree program.

BS in Computer Science, MS in Computational Linguistics, Analytics, Search and Informatics

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

- Have a cumulative GPA of 3.50 or higher.
- Have completed all prerequisites with grades of B or better:

Code	Title	Credit Hours
CSCI 1300	Computer Science 1: Starting Computing	4
CSCI 2270	Computer Science 2: Data Structures	4
CSCI 3104	Algorithms	4
or CSCI 3022	Introduction to Data Science with Probability and Statistics	
LING 2000	Introduction to Linguistics	3
CSCI 3832/5832	Natural Language Processing	3
or CSCI 3202/4622	Introduction to Artificial Intelligence	
One of the following during the semester the student applies:		
LING 5430	Semantics and Pragmatics	
LING 5420	Morphology and Syntax	
LING 5030	Linguistic Phonetics	

- Have at least junior status within the bachelor's degree program.
- Provide two letters of reference, one from the instructor of the LING 5XXX course they are taking during the semester they apply, the other from an instructor from an upper-division course in Computer Science. Letters should be sent directly to the CLASIC Program Coordinator.

BS in Computer Science, MS in Data Science

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

- Have a cumulative GPA of 3.250 or higher.
- Have completed all prerequisite courses with grades of B or better:

Code	Title	Credit Hours
CSCI 1300	Computer Science 1: Starting Computing	4
CSCI 2270	Computer Science 2: Data Structures	4
CSCI 2400	Computer Systems	4
CSCI 3022	Introduction to Data Science with Probability and Statistics	3
CSCI 3308	Software Development Methods and Tools	3

- Have at least junior status within the bachelor's degree program.
- Students may submit their intent to apply during the term they are completing their final class from the list of prerequisites.

BS in Computer Science, MS in Network Engineering

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

- Have a cumulative GPA of 3.300 or higher
- Have completed the following prerequisite courses with a B or better. (If a student has transfer credit for one of the following courses, or has taken a commonly accepted course substitution for one of the above courses, their grade in that alternate course can be used to determine their eligibility for this BAM program.)

Code	Title	Credit Hours
CSCI 1300	Computer Science 1: Starting Computing	4
CSCI 2270	Computer Science 2: Data Structures	4
CSCI 2400	Computer Systems	4
CSCI 3403	Introduction to CyberSecurity for a Converged World	4
CSCI 3753	Design and Analysis of Operating Systems	4

- Have at least junior status within the bachelor's degree program.
- Students may submit their intent to apply during the term they are completing their final class from the list of prerequisites.
- If a student not have at least a 3.3 cumulative GPA or required prerequisite courses, they must have one letter of reference from a faculty member or their academic advisor outlining why they should be considered. The letter-writer should send their letter directly to nteng@colorado.edu.

Program Requirements

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 maintain a 3.000 GPA while in the BAM program.

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.

Please see the computer science accelerated master's webpage (https://www.colorado.edu/cs/academics/undergraduate-programs/accelerated-masters-programs/computer-science-accelerated-masters/) for more information.