

COMPUTER SCIENCE, BS

Introduction

Please click here (<http://catalog.ucdenver.edu/cu-denver/undergraduate/schools-colleges-departments/college-engineering-design-computing/computer-science-engineering/>) to see computer science department information.

Undergraduate computer science students at CU Denver are able to tailor their degree to their interests and goals. Students are exposed to the breadth of the field including machine learning & data science, computer graphics & game design, programming, software engineering, systems, scientific computing, secure computing, theory and cyber-physical systems.

The computer science bachelor of science program is accredited by the Computing Accreditation Commission of ABET, <http://www.abet.org>.

The educational objectives of the computer science undergraduate program are to produce graduates who:

- Advance professionally as productive, practicing professionals in computer science and related careers through the continued development of their expertise and skills.
- Further develop their knowledge, skill set, and career opportunities through graduate education and/or professional studies.
- Function effectively as part of a team to succeed in their professional careers.

Program Delivery

- This is an on-campus program.

Declaring This Major

- Click here (<http://catalog.ucdenver.edu/cu-denver/undergraduate/records-registration/registration/declare-change-major-minor/>) to go to information about declaring a major.

General Requirements

To earn a degree, students must satisfy all requirements in each of the areas below, in addition to their individual major requirements.

- CU Denver General Graduation Requirements (<http://catalog.ucdenver.edu/cu-denver/undergraduate/graduation/general-graduation-requirements/>)
- CU Denver Core Curriculum (<http://catalog.ucdenver.edu/cu-denver/undergraduate/graduation-undergraduate-core-requirements/>)
- College of Engineering, Design and Computing Graduation Requirements (<http://catalog.ucdenver.edu/cu-denver/undergraduate/schools-colleges-departments/college-engineering-design-computing/#graduationrequirements#text>)
- Click here (<http://catalog.ucdenver.edu/cu-denver/undergraduate/academic-policies-procedures/>) for information about Academic Policies

Program Requirements

1. Students must maintain a minimum 2.0 GPA in all courses applying to major requirements.

2. Students must maintain a minimum 2.0 GPA in all CSCI courses attempted.
3. Undergraduate students in the CSE department are required to have a personal laptop, with the following specifications, before starting 3000-level classes:

| Specifications for: | Minimum | Recommended |
|----------------------|---|---|
| Operating System | Windows 10 1809+ | Windows 10 1809+ |
| CPU | Intel Core i5 dual-core 1.6 GHz or Intel Core i5 quad core 1.4 GHz | Intel Core i5/i7 2.2 GHz or faster |
| RAM | 8GB (upgradable to 16GB) | 12 to 16GB |
| Disk Space | 256GB Hard Disk Drive (HDD) with 100GB free Upgradable to 512GB SSD | 512GB Solid State Drive (SSD) with 100GB free |
| Hard Disk Speed | | Install Windows and Applications on a SSD |
| Graphic Card | Integrated Graphics Card | Dedicated Graphics Card |
| Display | 1280x720 Resolution | 1920x1024 Resolution |
| Network Connectivity | Ethernet + Wifi | Ethernet + Wifi |

The BS computer science degree requires 128 credits including: 24 credits of CU Denver Core Curriculum, 12 credits of mathematics, 10 credits of physical science, 3 credits of engineering design, and 79 credits of computer science.

| Code | Title | Hours |
|----------------------------------|---|-------|
| CU Denver Core Curriculum | | |
| Select 24 credits | | 24 |
| Engineering Design | | |
| ENGR 1200 | Fundamentals of Engineering Design Innovation | 3 |
| Computer Science | | |
| CSCI 1410 | Fundamentals of Computing | 3 |
| CSCI 1411 | Fundamentals of Computing Laboratory | 1 |
| CSCI 2312 | Object Oriented Programming | 3 |
| CSCI 2421 | Data Structures and Program Design | 3 |
| CSCI 2511 | Discrete Structures | 3 |
| CSCI 3287 | Database System Concepts | 3 |
| CSCI 3412 | Algorithms | 3 |
| CSCI 3508 | Introduction to Software Engineering | 3 |
| CSCI 4034 | Theoretical Foundations of Computer Science | 3 |
| Computer Science Core | | |
| CSCI 1510 | Logic Design | 3 |
| CSCI 2525 | Assembly Language and Computer Organization | 3 |
| CSCI 3415 | Principles of Programming Languages | 3 |
| CSCI 3453 | Operating System Concepts | 3 |
| CSCI 3761 | Introduction to Computer Networks | 3 |
| CSCI 4551 | Parallel & Distributed Computing | 3 |
| CSCI 4591 | Computer Architecture | 3 |
| Capstone Courses | | |
| CSCI 4738 | Senior Design I | 3 |
| CSCI 4739 | Senior Design II | 3 |
| Data Science | | |

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|------------------------------|---|
| Select one of the following: | 3 |
| CSCI 4455 Data Mining | |
| CSCI 4580 Data Science | |
| CSCI 4930 Machine Learning | |
| CSCI 4931 Deep Learning | |
| CSCI 4951 Big Data Systems | |

Computer Science

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| Select one of the following: | 3 |
| CSCI 3560 Probability and Computing | |
| CSCI 4650 Numerical Analysis I | |
| CSCI 4110 Applied Number Theory | |

Secure Computing

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| Select one of the following: | 3 |
| CSCI 4741 Principles of Cybersecurity | |
| CSCI 4742 Cybersecurity Programming and Analysis | |
| CSCI 4743 Cyber and Infrastructure Defense | |

System Software

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| Select two of the following: | 6 |
| CSCI 3511 Hardware-Software Interface | |
| CSCI 4287 Embedded Systems Programming | |
| CSCI 4565 Introduction to Computer Graphics | |

3000-Level or Above Computer Science Course

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| Select four courses of any 3000-level or above Computer Science (CSCI) course that is not applied to the above 67 credits. | 12 |
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Mathematics

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| MATH 1401 Calculus I | 4 |
| MATH 2411 Calculus II | 4 |
| MATH 3195 Linear Algebra and Differential Equations ¹ | 4 |

Science

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| Select a two-course sequence with lab of the following: | 10 |
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Choice 1 ²

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| BIOL 2010 Organisms to Ecosystems (Gen Bio) & BIOL 2011 and Organisms to Ecosystems Lab (Gen Bio) | |
| BIOL 2020 Molecules to Cells (Gen Bio) & BIOL 2021 and Molecules to Cells Lab (Gen Bio) | |

Choice 2 ²

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|---|--|
| CHEM 2031 General Chemistry I & CHEM 2038 and General Chemistry Laboratory I | |
| CHEM 2061 General Chemistry II & CHEM 2068 and General Chemistry Laboratory II | |

Choice 3

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|--|--|
| PHYS 2311 General Physics I: Calculus-Based & PHYS 2321 and Intro Experimental Phys Lab I | |
| PHYS 2331 General Physics II: Calculus-Based & PHYS 2341 and Intro Experimental Phys Lab II | |

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|-------------|-----|
| Total Hours | 128 |
|-------------|-----|

² Additional credits needed to reach 10 may come from an advanced science course beyond CHEM 2061 General Chemistry II or beyond BIOL 2010 Organisms to Ecosystems (Gen Bio), an additional CS elective, math beyond CALC II, or one of the engineering disciplines (not GEN-ED. courses).

Measurable Outcomes

The bachelor of science in computer science program must enable its students to attain, by the time of graduation:

- 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.

To review the Degree Map for this program, please visit our website (<https://www.ucdenver.edu/student/advising/undergraduate/degree-maps/cedc/>).

¹ Students can substitute both MATH 3191 Applied Linear Algebra and MATH 3200 Elementary Differential Equations for MATH 3195 Linear Algebra and Differential Equations