University of Colorado Denver

Department of Computer Science and Engineering

Computer Science Bachelor of Science Handbook

Rules of the program leading to a Bachelor of Science in Computer Science

These degree requirements are in effect starting from 2019-2020 Admission.

Applying to the College of Engineering and Applied Science:

If students are new and interested in our bachelor's degree program, students must apply directly through the CU Denver Office of Admissions, http://www.ucdenver.edu/admissions .

If you're a pre-engineering student who is already admitted to CU Denver, apply directly to the College of Engineering and Applied Science by submitting an intra-university transfer (IUT) application and a copy of your CU Denver transcript to the Computer Science and Engineering (CSE) Department, Lawrence Street Center, Ste 800.

The IUT application can be picked up from the Computer Science and Engineering Department, Academic Success and Advising Center in Student Commons 1113, or from the Office of Engineering Student Services Center in North Classroom, Room 2605.

Refer to this handbook for complete advising and degree requirements.

If students **have been admitted in Pre-engineering,** contact the Academic Success and Advising Center, for an appointment and initial advising at 303-315-1940.

If students **been admitted into the College of Engineering and Applied Science**, students must meet with a Computer Science advisor. Call the Computer Science and Engineering Office for an appointment at 303-315-1408 or 303-315-1413.

Curriculum

All newly admitted students must follow the curriculum that is in place at the time they are admitted into the computer science program. Under some conditions, it is possible to switch to the requirements of a new curriculum if the revision(s) occurred after your admittance.

Prerequisite requirements are strictly enforced for all computer science (CSCI) courses.

Faculty Advisor

Regular visits with a CSE advisor are mandatory and help to verify satisfactory progress toward the BS in CS degree. Students completing 1000 and 2000 level classes are required to attend a scheduled advising session. Students are assigned a faculty advisor once starting 3000 level courses and must meet with their advisor every semester in order to enroll for the upcoming semester. It is suggested that students get to know additional faculty well enough that they can serve as references in the future for employment or when applying to a graduate school.

30-Hour Senior Checkout

After completing approximately 100 semester hours toward the BS CS degree, students must request a 30-hour senior checkout. Students must have no more than 35 credit hours remaining to graduate before requesting the 30-hour senior checkout.

During this checkout, the courses that students still need to complete are identified. The study program sheet serves as a record of a 30-hour senior checkout. Call the Department of Computer Science and Engineering Office for an appointment.

Graduation Plan

Prior to the last semester before graduation students must meet with their advisor and complete a graduation plan. This identifies the courses that need to be satisfactorily completed during the final semester of your program.

CU Denver students taking courses elsewhere

Students must take all your courses at CU Denver once you're admitted to the College of Engineering and Applied Science. Students must obtain prior departmental approval via an approved petition for any exception regarding courses outside CU Denver. If approved, the credit hours earned are included in your program via requests for formal transfer advising.

- **Formal transfer advising** can be done only after the CU Denver Office of Admissions has issued an Applicant Transfer Credit Evaluation and students have been admitted to the College of Engineering and Applied Science.
- If students wish to receive **transfer advising for credits related to the computer science curriculum**, call the CSE office to make an appointment with an advisor. Please bring the course syllabus and course descriptions for evaluation.
- If students are pre-engineering intending to transfer and major in CS, students must meet with an advisor in the Student Academic Success Office. All your non-CS transfer credits for science, general education, and Math will be evaluated in that office.

Petitions

The CS program requirement are enforced. Any deviations from the published curriculum must be approved via an approved CS department petition. Petitions must be submitted to the CSE department office. Please note that it takes about two weeks to process any petition, especially at the beginning or end of the semester.

Electives

Students must take five courses (15 semester hours) chosen from any CSCI 3000 or 4000-level courses that are not part of the required bachelor of science in computer science (BSCS) curriculum. ***Students may also enroll for graduate courses from a list of approved courses with approval of their advisor.***

Exception: up to two of the following may be taken to satisfy computer science electives before taking any CSCI 3000-level courses: CSCI 2930, CSCI 2940, CSCI 2941, CSCI 2942. Students at advanced stage of their study (CSCI 3000-level courses and above) may not take 2000-level CSCI elective courses to satisfy the program requirements.

Required cumulative GPA

To remain in good standing with the College of Engineering and Applied Science you must maintain at least 2.0 cumulative GPA for all courses.

Required study-program GPA

To graduate with a degree from the College of Engineering and Applied Science students must have at least 2.0 GPA for all courses that are counted as part of the study program.

Required departmental GPA

To graduate with a degree from the CSE department students must have at least 2.0 GPA for all CS courses attempted.

Dual BS / MS Program: CS Scholars

Current full-time Bachelor of Science in Computer Science Students wishing to continue to a Master of Science in Computer Science have an additional option to combine both efforts.

Admission to the Computer Science Scholars program allows the student to take up to four 5000-level MS courses counting as both electives for their BS and towards their MS degree. Students must apply for the CS Scholars Program before their last year of courses to receive dual credit for 5000 level courses.

If accepted, students remain in an Undergraduate status until receiving the BS degree, then move into a Graduate status with an intent of completing the MS in Computer Science within a year.

Students can take up to four graduate courses while in an Undergraduate status.

Students must meet with a CS Graduate advisor within a semester of acceptance into the CS Scholars Program.

In order to apply for the CS Scholars Program, students must:

a) Complete at least 60 credits toward the BS degree;

b) Complete the following three courses: CSCI: 3412: Algorithms, CSCI 3453: Operating Systems Concepts, and CSCI 3287: Database Systems;

c) Have a minimum cumulative GPA of 3.3 or a 3.5 GPA in CS major coursework.

Students must complete a Computer Science Scholars Program Application, which can be picked up from the Computer Science Department, Lawrence 800. Students should meet with their advisor to discuss possible courses and submit the application. Students may submit an application in the semester that they will meet the requirements, but final decisions will be pending final semester grades.

The Computer Science Graduate committee will review the application, and notify the students of their decision. All graduate program rules apply to graduate courses, including a requirement for a B- or better to count toward the MS degree.

University and college requirements

These rules of the undergraduate program of the CSE department are complementary to the policies, regulations and requirements of the University of Colorado Denver and the College of Engineering and Applied Science. The relevant information about these rules and policies is published annually in the University of Colorado Denver catalog, which is available on the CU Denver website www.ucdenver.edu.

Curriculum for B.S. in Computer Science (CSCI)

The required minimum number of hours is 128. The student must satisfactorily complete all the course work in the curriculum shown below, satisfy all the graduation requirements, and maintain at least a 2.0 grade-point average in all courses. The courses below are listed together with their prerequisites. Prerequisite courses must be completed with a letter grade of C- or better.

REQUIRED COMPUTER SCIENCE & SYSTEMS CORE COURSES (46 SEMESTER HOURS)

COMPUTER SCIENCE COURSES

CSCI 1410-3 Fundamentals of Computing	Pre: Freshman status, Co: CSCI 1411
CSCI 1411-1 Fundamentals of Computing Lab	Pre: Freshman status, Co: CSCI 1410
CSCI 2312-3 Object Oriented Programming	Pre: CSCI 1410 & 1411
CSCI 2421-3 Data Structures & Program Design	Pre: CSCI 1410, 1411 Co: 2312
CSCI 2511-3 Discrete Structures	Pre: MATH 1401
CSCI 3287-3 Database Systems	Pre: ENGL 1020, CSCI 2312 & 2421
CSCI 3412-3 Algorithms	Pre: CSCI 2312, 2421 & 2511
CSCI 3508-3 Introduction to Software Engineering	Pre:CSCI 3412
CSCI 4034-3 Theoretical Foundations of Computer Science	Pre:CSCI 3412

COMPUTER SCIENCE SYSTEMS COURSES

CSCI 1510-3 Logic Design	Pre: Freshman status: MATH 1120 or 1130 or equivalent
CSCI 2525-3 Assembly Language & Computer Organization	Pre: CSCI 1410, 1411 & 1510
CSCI 3415-3 Principles of Programming Languages	Pre: CSCI 2312, 2421 & 2525
CSCI 3453-3 Operating Systems Concepts	Pre: CSCI 3412 & 2525
CSCI 3761: Introduction to Computer Networks	Pre: CSCI 2312 & 2421
CSCI 4551: Parallel & Distributed Systems	Pre: MATH 3195, CSCI 3415 & 3453
CSCI 4591-3 Computer Architecture	Pre: CSCI 2525

CS BREADTH COURSES (21 SEMESTER HOURS)

CAPSTONE PROJECT (take two)

CSCI 4738: Senior Design Project I	Pre: CSCI 3287, 3415, 3453 & 3508
CSCI 4739: Senior Design Project II	Pre: CSCI 4738

DATA SCIENCE (take one)

CSCI 4455: Data Mining	Pre: MATH 3195, CSCI 3287 & 3412,
CSCI 4580: Data Science	Pre: MATH 3195, CSCI 3287 & 3412
CSCI 4930: Machine Learning	Pre: MATH 3195 & CSCI 3412
CSCI 4931: Deep Learning	Pre: MATH 3195 & CSCI 3412
CSCI 4951: Big Data Systems	Pre: MATH 3195, CSCI 3287 & CSCI 3412

SCIENTIFIC COMPUTING (take one)

CSCI 3560: Probability & Computing	Pre: MATH 2411 & CSCI 2511
CSCI 4560: Numerical Analysis I	Pre: MATH 2411, 3191 or 3195
CSCI 4110: Applied Number Theory	Pre: CSCI 2511 or MATH 3000

SECURE COMPUTING (take one)

CSCI 4741: Principles of Cyber Security	Pre: CSCI 3761 & 3287
CSCI 4741: Cybersecurity Programming	Pre: CSCI 3415
CSCI 4742: Cyber and Infrastructure Defense	Pre: CSCI 3761

SYSTEM SOFTWARE (take two)

CSCI 3511: Hardware/Software Interface	Pre: CSCI 2525
CSCI 4287: Embedded Systems Programming	Pre: CSCI 3453
CSCI 4565: Introduction to Computer Graphics	Pre: CSCI 3412 & MATH 3191 or 3195

COMPUTER SCIENCE TECHNICAL ELECTIVES (15 SEMESTER HOURS)

Students must take five courses (15 semester hours) chosen from any CSCI 3000 or 4000-level courses that are not

part of the required bachelor of science in computer science (BSCS) curriculum. Exception: up to two of the following may be taken to satisfy computer science: CSCI 2930, CSCI 2940, CSCI 2941, CSCI 2942 before taking any 3000 level courses. Students at advanced stage of their study (CSCI 3000-level courses and above) may not take 2000-level CSCI elective courses to satisfy the program requirements.

MATHEMATICS (12 SEMESTER HOURS)

MATH 1401-4 Calculus I	Pre: (MATH 1120 or 1130) and placement exam
MATH 2411-4 Calculus II	Pre: MATH 1401
MATH 3195-4 Linear Algebra and Differential Equations	Pre: MATH 2411

SCIENCE (10 SEMESTER HOURS)

Students must choose between 3 science tracks: BIOL 2051 & 2071, 2061 & 2081, CHEM 2031 & 2038, 2061 & 2068 or PHYS 2311 & 2321, PHYS 2331 & 2341. Students who choose Biology or Chemistry: additional credits needed to reach 10 may come from an advanced science course beyond CHEM 2061 or BIOL 2061, an additional CS elective, or Math (beyond CALC II), or one of the engineering disciplines (not GEN-Ed. courses).

UNDERGRADUATE CORE CURRICULUM IN ENGINEERING: SOCIAL SCIENCES, HUMANITIES, ARTS, ETC. (24 SEMESTER HOURS)

The undergraduate core curriculum for engineering includes: social sciences 3 hrs, humanities 3 hrs, arts 3 hrs, international perspectives 3 hrs, cultural diversity 3 hrs, behavioral sciences 3 hrs, and intellectual competencies (English 1020 and English 2030), for a total of 24 hours. Refer to the current UC-Denver catalog for available courses and their prerequisite requirements.

Sample Academic Plan consistent with the prerequisite requirements

FIRST YEAR

fall semester			spring semester	
class	hrs		class	hrs
CSCI 1410 FUNDAMENTALS OF	3		**CSCI 2312** OBJECT ORIENTED	3
CSCI 1411 FUNDAMENTALS OF	1		**CSCI 2421** DATA STRUCTURES & PROGRAM	3
CSCI 1510 LOGIC DESIGN	3		**MATH 2411** CALCULUS II	4
MATH 1401 CALCULUS I	4		**ENGL 2030** CORE COMPOSITION II	3
ENGL 1020 CORE COMPOSITION I	3		**CORE CURRICULUM ELECTIVE**	3
CORE CURRICULUM ELECTIVE	3			
TOTAL	17		**TOTAL**	16

SECOND YEAR

fall semester			spring semester	
class	hrs		class	hrs
CSCI 2525 ASSEMBLY LANGUAGE &	3		**CSCI 3287** DATABASE SYSTEMS	3
CSCI 2511 DISCRETE STRUCTURES	3		**CSCI 3412** ALGORITHMS	3
SCIENCE CHOICE	3-4		**CSCI 3761:** INTRO TO COMP NETWORKS	3
SCIENCE CHOICE LAB	1		**CS ELECTIVE**	3
CORE CURRICULUM ELECTIVE	3		**SCIENCE** CHOICE	3-4
CORE CURRICULUM ELECTIVE	3		**SCIENCE** CHOICE LAB	1
TOTAL	16-17		**TOTAL**	16-17

THIRD YEAR

fall semester			spring semester	
class	hrs		class	hrs
CSCI 3415 PRIN PROGRAMMING LANG	3		**CSCI 3508** SOFTWARE ENGINEERING	3
CSCI 3453 OPERATING SYSTEMS	3		**CS BREADTH**	3
CS BREADTH	3		**CS ELECTIVE**	3
CS BREADTH	3		**MATH 3195** LINEAR ALGEBRA/DIFF EQU	4
CS ELECTIVE	3		**CORE CURRICULUM ELECTIVE**	3

	TOTAL	15			**TOTAL**	16

FOURTH YEAR

	fall semester				**spring semester**	
	class	**hrs**			**class**	**hrs**
	CSCI 4034 THEORETICAL FOUND OF CS	3			**CSCI 4591** COMPUTER ARCHITECTURE	3
	CS BREADTH: SENIOR DESIGN 1	3			**CSCI 4739** SENIOR DESIGN PROJECT II	3
	CSCI 4551 PARALLEL & DIST SYSTEMS	3			**CS BREADTH**	3
	CS BREADTH	3			**CS ELECTIVE**	3
	CS ELECTIVE	3			**CORE CURRICULUM ELECTIVE**	3
	TOTAL	15			**TOTAL**	15

CORE CURRICULUM ELECTIVE is to be selected from the undergraduate General Education core.

ENGL 1020 and ENGL 2030 are the only approved composition courses for the UC Denver Core Curriculum. ENGL 1020 should be taken the first semester a student is enrolled at UC Denver.