

MASTER'S DEGREE PROGRAM IN

# Computer Science

College of Engineering  
University of Colorado Denver

*These degree requirements are in effect starting from 2009-10 Admission.*

The Department of Computer Science and Engineering offers a Master of Science degree in Computer Science.

**Research areas of emphasis include:** algorithms, automata theory, artificial intelligence, communication networks, combinatorial geometry, computational geometry, computer graphics, distributed computing, graph theory, information theory, internet, parallel processing, simulation, and software engineering.

## Admission Requirements

Applicants should hold a bachelor's degree from an institution comparable to the University of Colorado. They need to have sufficient programming experience and mathematical maturity to understand advanced courses.

### Prerequisites

Applicants should have had the equivalent of the following University of Colorado courses:

CSC 1410-3 Fundamentals of Computing  
CSC 2421-3 Data Structures and Program Design  
CSC 2511-3 Discrete Structures

In addition, applicants should have had at least three upper-division computer science courses, such as the following courses:

CSC 3412-3 Algorithms  
CSC 3415-3 Principles of Programming Languages  
CSC 3453-3 Operating System Concepts  
CSC 4034-3 Theoretical Foundations of Computer Science  
CSC 4508-3 Introduction to Software Engineering  
CSC 4591-3 Computer Architecture

Additional requirements include:

- (1) 10 credit hours, on the semester basis, of university- level Calculus; and
- (2) at least one math course beyond Calculus, such as Advanced Calculus, Differential Equations, Linear Algebra, Probability, Statistics, or Combinatorial Analysis.

Students lacking some of these courses, whose background is otherwise satisfactory, might be admitted with the understanding that the courses would have to be completed after admission.

### **Grade Point Average (GPA):**

Applicants are expected to have grade point average (GPA) of at least 3.0.

### **Provisional Admission:**

Applicants may be accepted as “provisional degree students.” This status is indicated in the acceptance letter along with the conditions that need to be satisfied by a specified deadline in order for the student to obtain regular status.

### **International Students:**

Applicants whose native language is not English must take either the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) exam and must score above 525 (paper) or 197 (computer) or 71 (internet based) or 6.0 on the IELTS. Applicants whose native language is not English are not required to take the TOEFL test if they have completed a baccalaureate or graduate-level degree program at an English-speaking college or university or have completed at least 2 semesters at a college or university in the United States as a full-time student and obtained a “B” average (3.0 GPA) or higher.

### **Admission Decision:**

Candidates applying for the MS study will be evaluated by the Department’s Graduate Committee. A letter with a decision will be sent to the applicant by the CSE Chair.

## **MS in Computer Science Degree Requirements**

Master’s degree candidates are required to complete a program of study consisting of at least 30 semester hours of graduate level computer science courses while maintaining a grade point average of at least 3.0. According to the Graduate school rules graduate courses with grades below B- cannot be applied toward the completion of the graduate degree. With prior approval by the Graduate Committee a student may substitute up to nine semester hours by graduate mathematics or other engineering courses.

Students need to submit an approved Plan of Study to the Department during the first semester of their admission. An academic advisor will consult students to develop a Plan of Study.

Students may choose either **Plan I** (thesis) or **Plan II** (MS project), and both require successful defense.

**Plan I – Thesis:**

Students take 24 hours of graduate course work, and additionally write and defend a thesis, which counts for 6 hours of graduate thesis work.

**Plan II – MS Project:**

Students take 27 hours of graduate course work, and additionally write and defend a MS project report, which counts for 3 hours of graduate MS project work.

Students are allowed a maximum of 3 credit hours of CS Independent Study.

Students may only take graduate Engineering or graduate Mathematics courses that are offered towards an MS degree in a degree granting department, while at least 21 hours must be CS. It is advisable that students get prior approval of a graduate CS advisor before taking any course that does not have a C SC prefix. For example, courses offered through Continuing Education are not counted toward an MS degree in Computer Science.

The only exception for a student to take a graduate course from any other department is when the course satisfies all of the following conditions:

1. It appears in a graduate program.
2. It is taken instead of 3 hours of CS Independent Study.
3. It is approved by the CS Graduate Committee.

No more than 6 hours may be in the form of on-line courses.

**Notes:**

- A student will need to choose a CSE full time faculty member with a graduate faculty appointment as a permanent Thesis/MS Project Advisor. The Thesis/MS Project Advisor will chair the Thesis/MS Project Committee. The Thesis/MS Project Committee will consist of at least three members, two of whom must be CSE graduate faculty members.
- Thesis/MS Project and Independent Study supervision:
  1. Tenured/tenure-track CSE faculty who are members of UCD Graduate School may supervise thesis, MS Project, and graduate independent studies.
  2. Tenured/tenure-track faculty from outside of CSE department may co-advise MS thesis, MS Project, and graduate independent studies, along with the approval of the designated CSE faculty advisor.
  3. Part-time CSE faculty, e.g., lecturers, honoraria, graduate students, may not supervise thesis and MS Project. They may, however, serve as informal supervisors of graduate independent studies, sponsored by a full-time tenured/tenure-track CSE faculty who is a member of the UCD Graduate School faculty serves as the supervisor- of-record.
- Students in thesis plan have priority in obtaining departmental assistantships.

## CSE Graduate Course Areas in Computer Science

MS students will take graduate CS courses in three categories. Only courses passed with at least a B are counted towards satisfying the mandatory requirement of at least three courses in the “core” category.

### Category A ("core")

Take at least three of the following five courses:

CSC 5446 Theory of Automata  
CSC 5451 Algorithms  
CSC 5582/CSC 7582 Artificial Intelligence  
CSC 5593 Advanced Computer Architectures  
CSC 5573 Operating Systems (Prerequisite: CSC 3412 & CSC 3415)                    **or**  
CSC 5574/CSC 7574 Advanced Topics in Operating Systems (Prerequisite: CSC3453 or CSC 5573)

**Note** students may take and apply only one of CSC 5573 or CSC5574/CSC7574 toward satisfying Category A. The second operating systems course may be applied toward satisfying Category B.

Courses taken in this category, in excess of the required three, may be counted in category below.

### Category B ("breadth")

Take at least three additional graduate CS courses, taught by regular full-time CSE faculty members. The courses available may vary from semester to semester, but currently will be a subset of:

CSC 5408 Applied Graph Theory  
CSC 5409 Graph Theory and Algorithms  
CSC 5411 Computational Geometry  
CSC 5551 Parallel and Distributed Systems  
CSC 5552 Advanced Topics in Parallel Processing  
CSC 5565 Introduction to Computer Graphics  
CSC 5585 Advanced Computer Graphics  
CSC 5559 Databases  
CSC 5619 Complex Intelligent Systems  
CSC 5630 Linguistic Geometry  
CSC 5640 Universal Compiler: Theory and Construction  
CSC 5690 Knowledge Representation for Intelligent Systems  
CSC 5728 Software Engineering  
CSC 5765 Computer Networks  
CSC 5780 Theory of Distributed Computing  
CSC 5799 High Performance Network-Based Computing  
CSC 58xx Special Topics Courses (taught by full-time CSE graduate faculty)  
CSC 7002 Computer Security  
CSC 7551 Parallel and Distributed Systems  
CSC 7552 Advanced Topics in Parallel Processing  
CSC 7574 Advanced Topics in Operating Systems  
CSC 7582 Artificial Intelligence  
CSC 7654 Algorithms for Communication Networks

Note that courses taught by other than regular full-time CSE faculty, possibly including some courses listed here, are explicitly excluded from this category but may fall in category C below.

### Category C

- Students must select either MS thesis (6 credit hours maximum) or MS project (3 credit hours maximum).
- Graduate Independent study is optional and allows up to 3 credit hours maximum.

Remaining courses may be any other graduate courses consistent with CSE, College of Engineering, and Graduate School rules. Examples include, but are not limited to:

- CSC 6950 MS Thesis, CSC 6960 MS Project, CSC 6840 Independent study, and appropriate graduate Mathematics and Engineering courses.

### Transfer of Credit:

A maximum of nine semester hours of graduate course work may be transferred into the program based on department approval. In principle, core courses must be taken from the CSE department at UCD.

## Students' Responsibilities and Steps to Follow

Failure to follow these steps may prolong or stop your graduation. All students are responsible to adhere to the Academic Calendar, and Graduate School dates and deadlines published every semester.

1. All new students must attend an orientation that is held the Thursday of the week before start of every semester
2. New students must prepare a plan of study and receive approval from an advisor, within the first month of their first semester. Forms will be available on the CSE web-site.
3. Students must receive a graduate advisor's approval for any change to their initial plan of study.
4. **Graduation check** (required for all students intending to graduate):
  - a. Students must submit a Diploma Card online.
  - b. Students apply for admission to candidacy by completing the required forms. The form is on-line located on the Computer Science web-site. The form must be completed at the beginning of the semester the student intends to graduate (deadlines are published by the Graduate School every semester). Students must make an appointment and meet with a graduate advisor to have their application for candidacy approved.

**For answers to frequently asked questions, please refer to:**

<http://carbon.cudenver.edu/~galaghba/GradFAQs.html>

## Adequate Progress toward MS in Computer Science Degree

- Students are expected to finish the MS degree program within 5 years. Candidates for the MS degree may not get credit for a course taken longer than five years before the date on which the degree is to be granted.
- Students who do not enroll for any course work in the graduate program in a Fall or Spring semester need to notify the Computer Science and Engineering Department in writing. Students who are not enrolled for three consecutive Fall or Spring semesters might be removed from the program.

### Contact Information:

Please contact Ms. Frances Moore the CSE Department program assistant for information, appointments, and inquiries:

**Mailing Address:**

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**Email:** send to Frances Moore at [Frances.Moore@ucdenver.edu](mailto:Frances.Moore@ucdenver.edu)

Petitions are submitted online and then need to be printed and signed in the Department's Office. Advising may be scheduled either online or directly through the Department's Office.

## Faculty

### **Alaghband, Gita**

Ph.D. University of Colorado Boulder

Research areas: parallel and distributed systems, operating systems, computer architecture, simulation

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### **Altman, Tom**

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### **Choi, Min-Hyung**

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### **Gethner, Ellen**

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### **Osborne, Richard, Senior Instructor**

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