

COMPUTER SCIENCE, MS

Banner Code: VS-MS-CS

Academic Advising

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The Computer Science graduate program prepares students for research and professional practice in computer science and related technologies. The program includes both fundamentals and advanced work in the areas of artificial intelligence and databases, programming languages and software engineering, systems and networks, theoretical computer science, and visual computing. Graduate classes are divided into basic classes, which have no graduate course prerequisite, and advanced classes, which have a graduate class as a prerequisite. Graduate classes are generally offered in the late afternoon and evening. Financial aid in the form of graduate assistantships may be available for full-time degree-seeking students.

Admissions & Policies

Admissions

In addition to fulfilling Mason's admission requirements for graduate study, applicants must meet the following requirements:

- Hold a baccalaureate degree that includes Data Structures and Algorithms (CS 310 Data Structures) Automata Theory and Formal Languages (CS 330 Formal Methods and Models), and Computer Architecture including Assembly Language (CS 367 Computer Systems and Programming and CS 465 Computer Systems Architecture). Students also must have completed Calculus I and II and a substantial course in discrete mathematics (such as MATH 125 Discrete Mathematics I (Mason Core)). Students with some deficiencies in preparation may be admitted provisionally pending completion of foundation courses in mathematics or computer science. Undergraduate credit earned for this purpose may not be applied toward the graduate degree.
- Earned a cumulative GPA of 3.00 for the last two years of undergraduate work, preferably with a major in a technical field such as computer science, mathematics, physical sciences, engineering, or information systems.
- Submit transcripts of all post secondary education, complete the self-evaluation section of the online application, (This information is used by the admissions committee to assess an applicant's academic preparation for the MS program. Students with some deficiencies in preparation may be admitted provisionally pending completion of foundation courses required for the program), a goals statement, resume, two letters of recommendation, and an official GRE score (only required for those who have not earned a Bachelor's degree from a US institution).
- International students must submit their English Proficiency scores.

Requirements

Degree Requirements

Total credits: 30

Required Courses and Plan of Study

In addition to general university requirements, completion of the MS in CS requires 30 credits of graduate courses. Courses are grouped in the following five broad areas: Artificial Intelligence and Databases, Programming Languages and Software Engineering, Systems and Networks, Theoretical Computer Science, and Visual Computing. The list of preapproved courses with their areas follows.

All the following requirements should be satisfied for the MS in CS degree:

- CS 583 Analysis of Algorithms (from the Theoretical Computer Science area) and two additional core courses from two other areas must be successfully completed with a grade of B- or better.
- At least four courses (12 credits) must be chosen from the advanced courses in the list of preapproved courses from at least three different areas.
- At least six courses, including two advanced courses, must be designated CS.
- At least eight courses must be taken from the list of preapproved courses. Up to two computer science-related courses that are not on the list of preapproved courses may be taken with the approval of the Computer Science Department.

Plan of Study

Before the end of the second semester, students must have a plan of study approved by their academic advisor. This plan should be kept up to date by regular consultation with the academic advisor. A final signed version of the plan must be included when the student submits a graduation application.

Core Courses by Area

Artificial Intelligence and Databases

CS 550	Database Systems
CS 580	Introduction to Artificial Intelligence
CS 584	Theory and Applications of Data Mining

Programming Languages and Software Engineering

CS 540	Language Processors
SWE 619	Object-Oriented Software Specification and Construction
SWE 621	Software Modeling and Architectural Design

Systems and Networks

CS 555	Computer Communications and Networking
CS 571	Operating Systems
ISA 562	Information Security Theory and Practice

Theoretical Computer Science

CS 583	Analysis of Algorithms ¹
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Visual Computing

CS 551	Computer Graphics
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¹ Must be successfully completed with a grade of B- or better

Preapproved Basic and Advanced MS CS Courses by Area

Artificial Intelligence and Databases

Basic Courses:

CS 550	Database Systems
CS 580	Introduction to Artificial Intelligence
CS 584	Theory and Applications of Data Mining
INFS 623	Web Search Engines and Recommender Systems

Advanced Courses:

CS 650	Advanced Database Management
CS 657	Mining Massive Datasets with MapReduce
CS 667	Biometrics and Identity Management
CS 674	Data Mining on Multimedia Data
CS 681	Knowledge Engineering
CS 685	Autonomous Robotics
CS 687	Advanced Artificial Intelligence
CS 688	Pattern Recognition
CS 689	Planning Motions of Robots and Molecules
CS 775	Advanced Pattern Recognition
CS 782	Machine Learning
CS 787	Decision Guidance Systems
CS 811	Research Topics in Machine Learning and Inference
CS 880	Research Topics in Artificial Intelligence
CS 884	Advanced Topics in Computer Vision and Robotics
INFS 740	Database Programming for the World Wide Web
INFS 760	Advanced Database Management
INFS 772	Intelligent Agents and the Semantic Web
INFS 774	Enterprise Architecture

Programming Languages and Software Engineering

Basic Courses:

CS 540	Language Processors
SWE 619	Object-Oriented Software Specification and Construction
SWE 620	Software Requirements Analysis and Specification
SWE 621	Software Modeling and Architectural Design
SWE 622	Distributed Software Engineering

Advanced Courses:

CS 640	Advanced Compilers
ISA 681	Secure Software Design
SWE 631	Software Design Patterns
SWE 632	User Interface Design and Development
SWE 637	Software Testing

SWE 642	Software Engineering for the World Wide Web
SWE 645	Component-Based Software Development
SWE 721	Reusable Software Architectures
SWE 727	Quality of Service for Software Architectures
SWE 737	Advanced Software Testing
SWE 760	Software Analysis and Design of Real-Time Systems

Systems and Networks

Basic Courses:

CS 531	Fundamentals of Systems Programming
CS 555	Computer Communications and Networking
CS 571	Operating Systems
ISA 562	Information Security Theory and Practice
ISA 564	Security Laboratory

Advanced Courses:

CS 635	Foundations of Parallel Computation
CS 658	Networked Virtual Environments
CS 672	Computer System Performance Evaluation
CS 673	Multimedia Computing and Systems
CS 675	Distributed Systems
CS 706	Concurrent Software Systems
CS 719	Scalable Internet Services
CS 755	Advanced Computer Networks
CS 756	Performance Analysis of Computer Networks
CS 773	Real-Time Systems Design and Development
CS 779	Topics in Resilient and Secure Computer Systems
CS 788	Autonomic Computing
CS 818	Topics in Computer Systems
ISA 656	Network Security
ISA 673	Operating Systems Security
ISA 674	Intrusion Detection
ISA 697	Topics in Information Security
ISA 763	Security Protocol Analysis
ISA 764	Security Experimentation
ISA 785	Research in Digital Forensics

Theoretical Computer Science

Basic Courses:

CS 530	Mathematical Foundations of Computer Science
CS 583	Analysis of Algorithms

Advanced Courses:

CS 600	Theory of Computation
CS 611	Computational Methods for Genomics
CS 630	Advanced Algorithms
CS 633	Computational Geometry
CS 683	Parallel Algorithms
CS 684	Graph Algorithms

Visual Computing

Basic Courses:	
CS 551	Computer Graphics
Advanced Courses:	
CS 662	Computer Graphics Game Technologies
CS 667	Biometrics and Identity Management
CS 682	Computer Vision
CS 686	Image Processing and Applications
CS 752	Interactive Graphics Software
CS 774	Computational Vision
CS 777	Human-Computer Intelligent Interaction
CS 884	Advanced Topics in Computer Vision and Robotics
Total Credits	0

Project/Thesis (optional)

Three to six credit hours of the advanced classes may be replaced by a project or thesis. The project or thesis must be guided and approved by a committee of three appropriate faculty members and presented at an appropriate forum. The thesis must meet relevant university requirements.

Select one from the following:

CS 798	Project Seminar (3 credits)
CS 799	Thesis (6 credits)

Additional Pre-approved CS Courses

These courses are not classified by area. Note that CS 695 Topics in Computer Science/CS 795 Advanced Topics in CS can be used to satisfy the breadth requirement if the area is listed in the syllabus for the course.

CS 695	Topics in Computer Science	3
CS 697	Independent Reading and Research	1-3
CS 795	Advanced Topics in CS	3
CS 798	Project Seminar	3
CS 799	Thesis	1-6
CS 895	Research Topics in CS	3

Accelerated Master's**Applied Computer Science, BS/Computer Science, Accelerated MS****Overview**

Highly-qualified students in the Applied Computer Science, BS have the option of obtaining an accelerated Computer Science, MS.

For more detailed information, see AP.6.7 Bachelor's/Accelerated Master's Degrees. For policies governing all graduate degrees, see AP.6 Graduate Policies.

Admission Requirements

Students in the Applied Computer Science, BS program may apply to this option if they have earned 90 undergraduate credits with an overall GPA of at least 3.30. Students must have successfully completed:

Code	Title	Credits
CS 310	Data Structures	3
CS 330	Formal Methods and Models	3
CS 367	Computer Systems and Programming	4
Total Credits		10

Accelerated Option Requirements

Students must complete all requirements for the BS and MS programs, with 6 credits overlap.

Students register for 6 credits of CS 500-level basic courses in place of the corresponding CS 400-level courses required for the undergraduate degree requirements. Specifically, students must register for CS 583 Analysis of Algorithms and one of the following courses in place of the corresponding 400-level course:

Code	Title	Credits
CS 540	Language Processors	3
CS 550	Database Systems	3
CS 551	Computer Graphics	3
CS 555	Computer Communications and Networking	3
CS 571	Operating Systems	3
CS 580	Introduction to Artificial Intelligence	3
CS 584	Theory and Applications of Data Mining	3

Note:

Students are permitted to take additional graduate basic courses in their undergraduate programs. In such cases, those classes cannot be counted toward requirements for the MS.

Degree Conferral

Students must apply the semester before they expect to complete the BS requirements to have the BS degree conferred. In addition, at the beginning of the student's final undergraduate semester, students must complete a Bachelor's/Accelerated Master's Transition form that is submitted to the Office of the University Registrar and the VSE Graduate Admissions Office. At the completion of MS requirements, a master's degree is conferred.

Computer Science, BS/Computer Science, Accelerated MS**Overview**

Highly-qualified students in the Computer Science, BS have the option of obtaining an accelerated Computer Science, MS.

For more detailed information, see AP.6.7 Bachelor's/Accelerated Master's Degrees. For policies governing all graduate degrees, see AP.6 Graduate Policies.

Admission Requirements

Students in the Computer Science, BS program may apply to this option if they have earned 90 undergraduate credits with an overall GPA of at least 3.30. Students must have successfully completed CS 310 Data Structures, CS 330 Formal Methods and Models and CS 367 Computer Systems and Programming.

Accelerated Option Requirements

Students must complete all requirements for the BS and MS programs, with 6 credits overlap.

Students register for 6 credits of CS 500-level basic courses in place of the corresponding CS 400-level courses required for the undergraduate degree requirements. Specifically, students must register for two of the following courses in place of the corresponding 400-level courses:

Code	Title	Credits
CS 540	Language Processors	3
CS 550	Database Systems	3
CS 551	Computer Graphics	3
CS 555	Computer Communications and Networking	3
CS 571	Operating Systems	3
CS 580	Introduction to Artificial Intelligence	3
CS 583	Analysis of Algorithms	3
CS 584	Theory and Applications of Data Mining	3

Note:

Students are permitted to take additional graduate basic courses in their undergraduate programs. In such cases, those classes cannot be counted toward requirements for the MS.

Degree Conferral

Students must apply the semester before they expect to complete the BS requirements to have the BS degree conferred. In addition, at the beginning of the student's final undergraduate semester, students must complete a Bachelor's/Accelerated Master's Transition form that is submitted to the Office of the University Registrar and the VSE Graduate Admissions Office. At the completion of MS requirements, a master's degree is conferred.