

COMPUTER SCIENCE, BS

Banner Code: VS-BS-CS

Academic Advising

Phone: 703-993-1530

Email: csug@gmu.edu

Website: <http://cs.gmu.edu/prospective-students/undergraduate-programs/bs-in-computer-science/>

The objectives of the BS in Computer Science Program relate to the abilities of the graduates several years after graduation. The objectives include:

- Foundation for successful careers in industry: Graduates of the program will have a broad understanding of the fundamental concepts, methodologies, tools, and applications of computer science. They will have the educational foundation that leads to successful careers in the computing industry.
- Foundation for graduate study: Graduates of the program will have the academic preparation for successful completion of rigorous graduate programs.
- Professional preparation: Graduates will have effective written and oral communication skills, and be able to work collaboratively in a professional and ethical manner.

This bachelor's degree program is accredited by the Computing Accreditation Commission of ABET (<http://www.abet.org>).

Admissions & Policies

Policies

Advanced Placement, Credit by Exam

A score of 4 on the Advanced Placement (AP) computer science exam qualifies the student for credit in CS 112 Introduction to Computer Programming (Mason Core). A score of 4 on the International Baccalaureate (IB) computer science exam qualifies students for credit in CS 112 Introduction to Computer Programming (Mason Core), and a score of 5 or more qualifies students for credit in CS 211 Object-Oriented Programming.

Change of Major

Students who are considering computer science as their major must meet with the Volgenau School of Engineering Coordinator of Undergraduate Advising, 2500 Nguyen Engineering Building. Students considering a change of major to computer science must have a GPA of at least 2.75 in all computer science and math courses, and successfully completed one of CS 112 (http://catalog.gmu.edu/preview_course_nopop.php?catoid=29&coid=302778) or CS 211 (http://catalog.gmu.edu/preview_course_nopop.php?catoid=29&coid=302780), and one of MATH 113 (http://catalog.gmu.edu/preview_course_nopop.php?catoid=29&coid=305052), MATH 114 (http://catalog.gmu.edu/preview_course_nopop.php?catoid=29&coid=305053) or MATH 125 (http://catalog.gmu.edu/preview_course_nopop.php?catoid=29&coid=305056), with a grade of B or better. See Change of Major for more information.

Computer Science, Computer Engineering Double Major

Computer Science majors can earn a double major in Computer Science and Computer Engineering if they complete additional credits beyond the 120 credits required for the Computer Science degree. The additional credits must be part of an approved plan of study. For more information, visit the department website.

Cooperative Education

Students may participate in the Mason cooperative education program or a work-study program in the Washington, D.C. area.

Grades

Students must earn a C or better in any course intended to satisfy a prerequisite for a computer science course. Computer science majors may not use more than one course with grade of C- or lower toward department requirements.

Repeating Courses

Students may attempt an undergraduate course taught by the Volgenau School of Engineering twice. A third attempt requires approval of the department offering the course. This policy does not apply to STAT 250 Introductory Statistics I (Mason Core), which follows the normal university policy for repeating undergraduate courses.

The CS Department may not allow students to retake certain high-demand CS courses in which they have already earned a grade of C or better simply to improve their GPA.

Termination from the Major

No math, science, or Volgenau School of Engineering course that is required for the major may be attempted more than three times. Those students who do not successfully complete such a course within three attempts will be terminated from the major. Undeclared students in the Volgenau School who do not successfully complete a course required for a Volgenau School major within three attempts will also be terminated. For more information, see AP.5.2.4 Termination from the Major.

Once a student has attempted one of these courses twice unsuccessfully, the third attempt must be no later than the next semester of enrollment, excluding summers. Failure to take the course at that time will result in termination from the major. If the student is unable to take the course when required, the student may request an extension to a future semester; extensions require approval of the student's advisor, their department, and the Associate Dean for Undergraduate Programs. The deadline for extension requests is the add deadline for the semester in which the course is required.

Students who have been terminated from a Volgenau School of Engineering major may not register for a Volgenau School course without permission of the department offering the course. This applies to all undergraduate courses offered by the Volgenau School except IT 104 Introduction to Computing (Mason Core) and STAT 250 Introductory Statistics I (Mason Core).

A student may not declare any major in the Volgenau School of Engineering if the student has previously met the termination criteria for that major at any time, regardless of what the student's major was at the time the courses were taken.

Writing-Intensive Requirement

Computer science majors complete the writing-intensive requirement through a sequence of projects and reports in CS 306 Synthesis of Ethics and Law for the Computing Professional (Mason Core) and CS 321 Software Engineering. Faculty members provide feedback on students' expository writing.

Requirements

Degree Requirements

Total credits: 120

Computer Science Core

CS 110	Essentials of Computer Science ¹	3
CS 112	Introduction to Computer Programming (Mason Core)	4
CS 211	Object-Oriented Programming	3
CS 262	Introduction to Low-Level Programming	3
CS 306	Synthesis of Ethics and Law for the Computing Professional (Mason Core) ¹	3
CS 310	Data Structures	3
CS 321	Software Engineering	3
CS 330	Formal Methods and Models	3
CS 367	Computer Systems and Programming	4
CS 471	Operating Systems	3
CS 483	Analysis of Algorithms	3
Total Credits		35

¹ Must be taken within the first year as an Applied Computer Science or Computer Science major.

Senior Computer Science

Select one from the following: 3

CS 455	Computer Communications and Networking
CS 468	Secure Programming and Systems
CS 475	Concurrent and Distributed Systems

Select four additional courses from the following: 12

CS 425	Game Programming I
CS 440	Language Processors and Programming Environments
CS 450	Database Concepts
CS 451	Computer Graphics
CS 455	Computer Communications and Networking
CS 463	Comparative Programming Languages
CS 465	Computer Systems Architecture
CS 468	Secure Programming and Systems
CS 469	Security Engineering
CS 475	Concurrent and Distributed Systems
CS 477	Mobile Application Development
CS 480	Introduction to Artificial Intelligence
CS 482	Computer Vision
CS 484	Data Mining

CS 485	Autonomous Robotics	
CS 490	Design Exhibition	
CS 491	Industry-Sponsored Senior Design Project ¹	
CS 499	Special Topics in Computer Science ¹	
MATH 446 or OR 481	Numerical Analysis I Numerical Methods in Engineering	
Total Credits		15

¹ Only three credits of CS 491 and only three credits of CS 499 Special Topics in Computer Science can be used toward the senior computer science requirement.

Mathematics

MATH 113	Analytic Geometry and Calculus I (Mason Core)	4
MATH 114	Analytic Geometry and Calculus II	4
MATH 125	Discrete Mathematics I (Mason Core)	3
MATH 203	Linear Algebra	3
MATH 213	Analytic Geometry and Calculus III	3
Total Credits		17

Note:

MATH 104 Trigonometry and Transcendental Functions, MATH 105 Precalculus Mathematics, MATH 108 Introductory Calculus with Business Applications (Mason Core), and courses with an IT designation (and any associated cross-listed courses) cannot be counted toward this degree.

Statistics

STAT 344	Probability and Statistics for Engineers and Scientists I ¹	3
Total Credits		3

¹ Those planning to take MATH 352 Statistics may replace STAT 344 Probability and Statistics for Engineers and Scientists I with MATH 351 Probability.

Computer Science-Related Courses

Students may need to choose electives to satisfy prerequisites for the following courses:

Select two courses from the following: 6

STAT 354	Probability and Statistics for Engineers and Scientists II
OR 335	Discrete Systems Modeling and Simulation
OR 441	Deterministic Operations Research
OR 442	Stochastic Operations Research
ECE 301	Digital Electronics
ECE 431	Digital Circuit Design
ECE 447	Single-Chip Microcomputers
ECE 450	Introduction to Robotics
ECE 511	Microprocessors
SWE 432	Design and Implementation of Software for the Web

SWE 437	Software Testing and Maintenance	
SWE 443	Software Architectures	
SYST 371	Systems Engineering Management	
SYST 470	Human Factors Engineering	
PHIL 371	Philosophy of Natural Sciences	
PHIL 376	Symbolic Logic	
ENGH 388	Professional and Technical Writing	
Any MATH or CS course numbered above 300 (except MATH 351) ¹		
Total Credits		6

¹ Those planning to take MATH 352 Statistics may replace STAT 344 Probability and Statistics for Engineers and Scientists I with MATH 351 Probability.

Natural Science

Select 12 credits of natural science	12
Total Credits	12

The courses should be intended for science and engineering students and must include a two course sequence with laboratories. Some approved combinations have a total of more than 12 hours.

Approved Two-Course Sequences with Laboratories

Biology

BIOL 103 & BIOL 104	Introductory Biology I (Mason Core) and Introductory Biology II (Mason Core)	8
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Chemistry

CHEM 211 & CHEM 213	General Chemistry I (Mason Core) and General Chemistry Laboratory I (Mason Core)	4
CHEM 212 & CHEM 214	General Chemistry II (Mason Core) and General Chemistry Laboratory II (Mason Core)	4

Geology

GEOL 101 & GEOL 102	Introductory Geology I (Mason Core) and Introductory Geology II (Mason Core)	8
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Physics

PHYS 160 & PHYS 161	University Physics I (Mason Core) and University Physics I Laboratory (Mason Core)	4
PHYS 260 & PHYS 261	University Physics II (Mason Core) and University Physics II Laboratory (Mason Core)	4

Communication

COMM 100	Public Speaking (Mason Core) ¹	3
Total Credits		3

¹ Computer Science students must make a technical presentation.

Additional Mason Core

Students must complete all Mason Core requirements not fulfilled by major requirements.

Written Communication ¹	6
Literature	3

Arts	3	
Western Civilization/World History	3	
Social and Behavioral Sciences	3	
Global Understanding	3	
Total Credits		21

¹ CS majors must take the Natural Sciences section of ENGH 302 Advanced Composition (Mason Core).

Electives

Students must complete 8 elective credits	8
Total Credits	8

Honors

Honors in the Major

The Department of Computer Science offers a CS Honors Program for students with strong computational foundations and the drive to delve deeper into computing. The program is based on the bachelor of science in computer science and applied computer science curriculum and is distinct from the University Honors College curriculum.

Entry Requirements

Students must be seeking a Bachelor of Science in Computer Science or a Bachelor of Science in Applied Computer Science and must apply for entry into the CS Honors Program after completing 12 credits of CS courses. Applicants must meet the GPA requirements outlined below to enter into the CS Honors Program.

Honors Requirements

CS Honors Program students must fulfill all standard courses required by the Bachelor of Science in Computer Science or Applied Computer Science degree as well as the following additional requirements:

- **GPA Requirement:** Students must maintain an overall GPA of at least 3.50 and a GPA of at least 3.50 for courses which count towards the BS/CS or BS/ACS major including math, natural sciences, and all CS/SWE courses.
- **Research Project Requirement:** Students must complete a significant research project prior to graduation. Students should seek out a CS faculty member willing to serve as their research advisor for the project. The project should comprise original work by the student and be demonstrated via two channels:
 - a. a written project report that is approved by the student's research advisor and submitted to the department;
 - b. a presentation of the project to an audience of students and/or faculty.
- **Advanced Course Requirement:** At least two Advanced Courses must be completed. A complete list of acceptable advanced courses is maintained by the CS department and is available on the department web site.

Accelerated Master's

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.

Computer Science, BS/Data Analytics Engineering, Accelerated MS

Overview

Highly-qualified students in the Computer Science, BS have the option of obtaining an accelerated Data Analytics Engineering, 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:

Code	Title	Credits
CS 584	Theory and Applications of Data Mining	3
Select one of the following courses in place of the corresponding 400-level courses:		3
CS 550	Database Systems	
CS 580	Introduction to Artificial Intelligence	
Total Credits		6

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/Information Security and Assurance, Accelerated MS

Overview

Highly-qualified students in the Computer Science, BS have the option of obtaining an accelerated Information Security and Assurance, 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 for 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 complete all MS in Information Security and Assurance core courses and apply the two courses from the above list toward the requirements.

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/Information Systems, Accelerated MS

Overview

Highly-qualified students in the Computer Science, BS have the option of obtaining an accelerated Information Systems, 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 complete all MS in Information Systems core courses and apply the two courses from above toward the elective requirements.

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/Software Engineering, Accelerated MS

Overview

Highly-qualified students in the Computer Science, BS have the option of obtaining an accelerated Software Engineering, 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 complete all MS in Software Engineering core courses and apply the two courses from the above list toward the elective requirements.

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.