COMPUTER SCIENCE, BS

Banner Code: EC-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 Computer Science, BS program relate to the abilities of the graduates several years after graduation. Our graduates are expected within three to five years of graduation to have:

- Established themselves as successful and productive computing professionals or engaged in advanced study such as a graduate degree program.
- Worked effectively both in team environments and as individuals.
- Fulfilled their responsibilities in the areas of ethics, continuing professional development, and effective written and oral communications.

The bachelor's program in Computer Science 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) (http://catalog.gmu.edu/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) (http://catalog.gmu.edu/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 College of Engineering and Computing 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 (http://catalog.gmu.edu/colleges-schools/engineering-computing/#requirementspoliciestext) 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 College of Engineering and Computing 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) (http://catalog.gmu.edu/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.

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) (http://catalog.gmu.edu/mason-core/) and CS 321 Software Engineering (Mason Core) (http://catalog.gmu.edu/mason-core/). Faculty members provide feedback on students' expository writing.

Termination from the Major

No math, science, or College of Engineering and Computing 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 College of Engineering and Computing who do not successfully complete a course required for a College of Engineering and Computing major within three attempts will also be terminated.

In addition, students in the College of Engineering and Computing with evidence of continued failure to make adequate progress toward declaring or completing a College of Engineering and Computing major will be terminated from the school. Adequate progress is determined by the major program. For more information, see AP.5.2.4 Termination from the Major (https://catalog.gmu.edu/policies/academic/undergraduate-policies/#ap-5-2-4).

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. A third attempt of a College of Engineering and Computing course requires support by the student's major

department as well as permission by the department offering the course. This permission is not guaranteed. 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 College of Engineering and Computing major may not register for a College of Engineering and Computing course without permission of the department offering the course. This applies to all undergraduate courses offered by the College of Engineering and Computing except IT 104 Introduction to Computing (Mason Core) (http://catalog.gmu.edu/mason-core/) and STAT 250 Introductory Statistics I (Mason Core) (http://catalog.gmu.edu/mason-core/).

A student may not declare any major in the College of Engineering and Computing 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.

Requirements

Degree Requirements

Total credits: 120

Computer Science Core

Code	Title	Credits
CS 110	Essentials of Computer Science [1]	3
CS 112	Introduction to Computer Programming (Mason Core) (http://catalog.gmu.edu/mason-core/)	4
or CS 108 & CS 109	Intro to Computer Programming, Part A (Mason Core) (http://catalog.gmu.edu/mason-core/) and Intro to Computer Programming, Part B	
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) (http://catalog.gmu.edu/mason-core/)	3
CS 310	Data Structures	3
CS 321	Software Engineering (Mason Core) (http://catalog.gmu.edu/mason-core/)	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

Code	Title	Credits
Select one from the following:		3
CS 455	Computer Communications and Networking	
CS 468	Secure Programming and Systems	
CS 475	Concurrent and Distributed Systems	
CS 487	Introduction to Cryptography	
Select four additional courses from the following:		12
CS 425	Game Programming I	
CS 440	Compilers	
CS 450	Database Concepts	
CS 451	Computer Graphics	
CS 452	Virtual Reality	
CS 455	Computer Communications and Networking	
CS 463	Comparative Programming Languages	
CS 465	Computer Systems Architecture [1]	
CS 468	Secure Programming and Systems	
CS 469	Security Engineering	
CS 475	Concurrent and Distributed Systems	
CS 477	Mobile Application Development	
CS 478	Natural Language Processing	
CS 480	Introduction to Artificial Intelligence	
CS 482	Computer Vision	
CS 484	Data Mining	
CS 485	Autonomous Robotics	
CS 487	Introduction to Cryptography	
CS 490	Design Exhibition [2]	
CS 491	Industry-Sponsored Senior Design Project [2]	
CS 499	Special Topics in Computer Science [3]	
MATH 446	Numerical Analysis I [4]	
or OR 481	Numerical Methods in Engineering	
Total Credits		15

[1]

ECE 445 may be taken as a replacement for CS 465.

[2]

At most 3 credits total of CS 490 Design Exhibition and CS 491 Industry-Sponsored Senior Design Project may be counted toward the senior computer science requirement.

[3]

At most 6 credits total of CS 499 Special Topics in Computer Science may be counted toward the senior computer science requirement.

[4]

MATH 446 and OR 481 are equivalent, and cannot both be counted towards the requirements.

Mathematics

Code	Title	Credits
MATH 113	Analytic Geometry and Calculus I (Mason Core) (http://catalog.gmu.edu/mason-core/)	4
or MATH 123 & MATH 124	Calculus with Algebra/Trigonometry, Part A and Calculus with Algebra/Trigonometry, Part B (Mason Core) (http://catalog.gmu.edu/mason-core/)	
MATH 114	Analytic Geometry and Calculus II	4
MATH 125	Discrete Mathematics I (Mason Core) (http://catalog.gmu.edu/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) (http://catalog.gmu.edu/mason-core/), and courses with an IT designation (and any associated cross-listed courses) cannot be counted toward this degree.

Statistics

Code	Title	Credits
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:

Code	Title	Credits
Select 6 credits from the following:		6
STAT 354	Probability and Statistics for Engineers and Scientists II	
OR 335	Discrete Systems Modeling and Simulation	
OR 441	Deterministic Optimization	
OR 442	Stochastic Models	
ECE 301	Digital Electronics	
or ECE 231 & ECE 232	Digital System Design and Digital System Design Lab	
ECE 350	Embedded Systems and Hardware Interfaces	
ECE 446	Device Driver Development	
ECE 447	Microcontrollers	
ECE 455	GPU Architecture and Programming	
ECE 511	Computer Architecture	
SWE 419	Object-Oriented Software Design and Implementation	

Code	Title	Credits
SWE 432	Web Application Development	
SWE 437	Software Testing and Maintenance	
SWE 443	Software Architectures	
SYST 371	Systems Engineering Management	
SYST 470	Human Factors Engineering	
PHIL 371	Philosophy of the Natural Sciences	
PHIL 376	Symbolic Logic	
ENGH 388	Professional and Technical Writing	
Any MATH or CS course numbered above 300 (except MATH 351) [1,2]		
Any SWE course numbered 300 or above except SWE 301, SWE 401 and SWE 510		
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.

[2]

Neither CS 530, nor CS 531, may be used towards this degree.

Natural Science

Code	Title	Credits
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

The courses must include a two course sequence with laboratories from the list below. The remaining four natural science credits may be another course that uses the chosen sequence as a required prerequisite, or any course from the Mason Core natural science list in a different subject.

Code	Title	Credits
Biology		
Lecture and Lab, selected from the following:		4
BIOL 102	Introductory Biology I-Survey of Biodiversity and Ecology (Mason Core) (http://catalog.gmu.edu/mason-core/)	
BIOL 106	Introductory Biology I Laboratory (Mason Core) (http://catalog.gmu.edu/mason-core/)	
BIOL 107	Intro Biology II Lecture (Mason Core) (http://catalog.gmu.edu/mason-core/)	
Lecture and Lab, selected from the following:		4
BIOL 103	Introductory Biology II-Survey of Cell and Molecular Biology (Mason Core) (http://catalog.gmu.edu/mason-core/)	
BIOL 105	Introductory Biology II Laboratory (Mason Core) (http://catalog.gmu.edu/mason-core/)	
Chemistry		

CHEM 211 & CHEM 213	General Chemistry I (Mason Core) (http://catalog.gmu.edu/mason-core/) and General Chemistry Laboratory I (Mason Core) (http://catalog.gmu.edu/mason-core/)	4
CHEM 212 & CHEM 214	General Chemistry II (Mason Core) (http://catalog.gmu.edu/mason-core/) and General Chemistry Laboratory II (Mason Core) (http://catalog.gmu.edu/mason-core/)	4
Geology		
GEOL 101 & GEOL 103	Physical Geology (Mason Core) (http://catalog.gmu.edu/mason-core/) and Physical Geology Lab (Mason Core) (http://catalog.gmu.edu/mason-core/)	4
GEOL 102 & GEOL 104	Historical Geology (Mason Core) (http://catalog.gmu.edu/mason-core/) and Historical Geology Laboratory (Mason Core) (http://catalog.gmu.edu/mason-core/)	4
Physics		
PHYS 160 & PHYS 161	University Physics I (Mason Core) (http://catalog.gmu.edu/mason-core/) and University Physics I Laboratory (Mason Core) (http://catalog.gmu.edu/mason-core/)	4
PHYS 260 & PHYS 261	University Physics II (Mason Core) (http://catalog.gmu.edu/mason-core/) and University Physics II Laboratory (Mason Core) (http://catalog.gmu.edu/mason-core/)	4

Additional Mason Core

Students must complete all Mason Core (http://catalog.gmu.edu/mason-core/) requirements not fulfilled by major requirements.

Code	Title	Credits
Oral Communication		3
COMM 100	Public Speaking (Mason Core) (http://catalog.gmu.edu/mason-core/)	
or COMM 101	Fundamentals of Communication (Mason Core) (http://catalog.gmu.edu/mason-core/)	
Written Communication		3
ENGH 100	Composition for Multilingual Writers (Mason Core) (http://catalog.gmu.edu/mason-core/)	
or ENGH 101	Composition (Mason Core) (http://catalog.gmu.edu/mason-core/)	
Advanced Composition [1]		3
ENGH 302	Advanced Composition (Mason Core) (http://catalog.gmu.edu/mason-core/) (Natural Sciences section) [1]	
Literature (http://catalog.gmu.edu/mason-core/#literature)		3
Arts (http://catalog.gmu.edu/mason-core/#arts)		3
Global History (http://catalog.gmu.edu/mason-core/#global-history)		3
Social and Behavioral Sciences (http://catalog.gmu.edu/mason-core/#social-behavioral-science)		3
Global Contexts (http://catalog.gmu.edu/mason-core/#global-contexts)		3
Total Credits		24

[1]

CS majors must take the Natural Sciences section of ENGH 302 Advanced Composition (Mason Core) (http://catalog.gmu.edu/mason-core/).

Electives

Code	Title	Credits
Students must complete 8 elective credits		8
Total Credits		8

4-Year Plan

Bachelor of Science in Computer Science Sample Plan of Study

Detailed four year plans and degree planning checklists can be found at https://advising.gmu.edu/current-student/majors-at-mason/.

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

BS (any)/Statistical Science, Accelerated MS

Overview

Highly-qualified undergraduates may be admitted to the bachelor's/ accelerated master's program (BAM) and obtain an undergraduate BS degree and the Statistical Science, MS (http://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/statistics/statistical-science-ms/) in an accelerated time-frame after satisfactory completion of a minimum of 138 credits.

Admitted students are able to use up to 12 graduate credits in partial satisfaction of requirements for the undergraduate degree. Upon completion and conferral of the bachelor's degree and with satisfactory performance (grade of 'B' or better) in each of the graduate courses, students are given advanced standing in the master's program.

See AP.6.7 Bachelor's/Accelerated Master's Degrees (http://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7) for policies related to this program.

Students in an accelerated degree program must fulfill all university requirements for the master's degree. For policies governing all graduate degrees, see AP.6 Graduate Policies (http://catalog.gmu.edu/policies/academic/graduate-policies/).

BAM Pathway Admission Requirements

No specific undergraduate BS degree is required. Students enrolled in any BS degree may apply to the accelerated Statistical Science, MS (http://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/statistics/statistical-science-ms/) program **if such an accelerated** Statistical Science, MS **(**http://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/statistics/statistical-science-ms/**) pathway is allowable from the student's BS program, which will be determined by the academic advisors of both the BS and MS programs.**

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in Graduate Admissions Policies and Bachelor's/ Accelerated Master's Degree policies.

Students will be considered for admission into the BAM Pathway after completion of a minimum of 60 credits with an overall GPA of 3.0.

Students who are accepted into the BAM Pathway will be allowed to register for graduate level courses after successful completion of a minimum of 75 undergraduate credits and course-specific prerequisites.

Accelerated Master's Admission Requirements

Students already admitted in the BAM Pathway will be admitted to the Statistical Science, MS program, if they have met the following criteria, as verified on the Bachelor's/Accelerated Master's Transition form:

- Completion of Mason's requirements for undergraduate degree conferral (graduation) and completion of application for graduation.
- An overall GPA of 3.00.

- Completion of the following Mason courses each with a grade of C or better:

Code	Title	Credits
MATH 213	Analytic Geometry and Calculus III	3
MATH 203	Linear Algebra	3
or MATH 321	Abstract Algebra	
STAT 250	Introductory Statistics I (Mason Core) (http://catalog.gmu.edu/mason-core/)	3
or STAT 344	Probability and Statistics for Engineers and Scientists I	
STAT 346	Probability for Engineers	3
or MATH 351	Probability	
STAT 362	Introduction to Computer Statistical Packages	3

Accelerated Pathway Requirements

To maintain the integrity and quality of both the undergraduate and graduate degree programs, students complete all credits satisfying degree requirements for the BS and MS programs, with up to twelve credits overlap chosen from the following graduate courses:

Code	Title	Credits
STAT 544	Applied Probability	3
STAT 554	Applied Statistics I	3
STAT 560	Biostatistical Methods	3
STAT 574	Survey Sampling I	3
STAT 663	Statistical Graphics and Data Visualization	3

All graduate course prerequisites must be completed prior to enrollment. Each graduate course must be completed with a grade of B or better to apply toward the MS degree.

While still in undergraduate status, a maximum of 6 additional graduate credits may be taken as reserve graduate credit and applied to the master's program. Reserve graduate credits do not apply to the undergraduate degree.

For more detailed information on coursework and timeline requirements, see AP.6.7 Bachelor's/Accelerated Master's Degrees (http://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7) policies.

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 Graduate Recruitment and Enrollment Services. At the completion of MS requirements, a master's degree is conferred.

Computer Science, BS/Computer Engineering, Accelerated MS
Overview

Highly-qualified undergraduates may be admitted to the bachelor's/ accelerated master's program and obtain a BS in Computer Science

and an MS in Computer Engineering in an accelerated time-frame after satisfactory completion of a minimum of 138 credits.

See
AP.6.7 Bachelor's/Accelerated Master's Degrees for policies related to this program.

This accelerated option is offered jointly by the Computer Science Department and the Electrical and Computer Engineering Department.

Students in an accelerated degree program must fulfill all university requirements for the master's degree. For policies governing all graduate degrees, see
AP.6 Graduate Policies.

BAM Pathway Admission Requirements

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in Graduate Admissions Policies and Bachelor's/Accelerated Master's Degree policies.

Students will be considered for admission into the BAM Pathway after completion of a minimum of 60 credits with an overall GPA of 3.0.

Students who are accepted into the BAM Pathway will be allowed to register for graduate level courses after successful completion of a minimum of 75 undergraduate credits and course-specific prerequisites.

Accelerated Master's Admission Requirements

Students already admitted in the BAM Pathway will be admitted to the MS program, if they have met the following criteria, as verified on the Bachelor's/Accelerated Master's Transition form: 3.0 overall GPA, successfully meeting Mason's requirements for undergraduate degree conferral (graduation), at least 3 credits of approved advanced standing graduate coursework, and completing the application for graduation.

Accelerated Pathway Requirements

To maintain the integrity and quality of both the undergraduate and graduate degree programs, undergraduate students interested in taking graduate courses must choose from the following:

Advanced standing courses: Students may take up to 12 credits of graduate-level courses that will count as advanced standing (i.e., overlap between the BS/MS program) from the list below:

Code	Title	Credits
CS 571	Operating Systems (to replace CS 471)	3
CS 580	Introduction to Artificial Intelligence	3
CS 583	Analysis of Algorithms	3
CS 584	Theory and Applications of Data Mining	3
ECE 508	Internet of Things	3
ECE 511	Computer Architecture	3
ECE 512	Computer Architecture Security	3
ECE 516	Mobile Systems and Applications	3
ECE 527	Learning From Data	3
ECE 542	Computer Network Architectures and Protocols	3

Reserve credit courses: Additional courses (up to 6 credits) may be selected from the above list as credits to be put on reserve to be later applied to the graduate program. Students can take these courses

while undergraduates but these reserve courses will only count for the graduate degree program.

For more detailed information on coursework and timeline requirements, see AP.6.7 Bachelor's/Accelerated Master's Degrees.

Computer Science, BS/Computer Science, Accelerated MS
Overview

Highly-qualified students in the Computer Science, BS can complete both a BS-CS and a Computer Science, MS (http://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/computer-science-ms/) in five years through the BS-CS accelerated (BAM) program.

General BAM policies are in the catalog under AP.6.7 Bachelor's/Accelerated Master's Degrees (http://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7). Policies governing all graduate degrees are in the catalog under AP.6 Graduate Policies (http://catalog.gmu.edu/policies/academic/graduate-policies/).

Admission Requirements

Students in the Computer Science, BS program are encouraged to apply to the BAM program after earning 60 undergraduate credits with an overall GPA of at least 3.30. Students must also have successfully completed CS 310 Data Structures and CS 330 Formal Methods and Models.

Accelerated Option Requirements

Students accepted to the BAM program may earn up to 12 credits of graduate coursework that count towards both the BS and MS degrees. They may begin taking graduate courses after completing 75 undergraduate credits and successfully completing CS 367 Computer Systems and Programming.

The following graduate courses can replace the corresponding undergraduate courses.

Code	Title	Credits
CS 540	Compilers (to replace CS 440)	3
CS 550	Database Systems (to replace CS 450)	3
CS 551	Computer Graphics (to replace CS 451)	3
CS 555	Computer Communications and Networking (to replace CS 455)	3
CS 571	Operating Systems (to replace CS 471)	3
CS 580	Introduction to Artificial Intelligence (to replace CS 480)	3
CS 583	Analysis of Algorithms (to replace CS 483)	3
CS 584	Theory and Applications of Data Mining (to replace CS 484)	3
CS 587	Introduction to Cryptography (to replace CS 487)	3
SWE 619	Object-Oriented Software Specification and Construction (to replace SWE 419)	3
SWE 637	Software Testing (to replace SWE 437)	3
SWE 642	Software Engineering for the World Wide Web (to replace SWE 432)	3

Notes:

- Students may not use both the graduate course and the undergraduate alternative for their BS degree.
- Students must satisfy all recommended and required prerequisites for the graduate courses they take.
- Students also have the option to take up to 6 additional credits of graduate coursework, on reserve, which can be used for the MS degree only.

Degree Conferral

Students must apply for degree conferral the semester before they expect to complete their BS requirements. At the beginning of their final undergraduate semester, students must submit a completed Bachelor's-Accelerated Master's Transition form to the CS department office. The master's degree will be conferred after the student completes the MS requirements.

Computer Science, BS/Curriculum and Instruction, Accelerated MEd (Secondary Education Computer Science Concentration)

Overview

Highly-qualified undergraduates may be admitted to the bachelor's/accelerated master's program and obtain a BS in Computer Science (degree without concentration) and an MEd in Curriculum and Instruction (Secondary Education Computer Science concentration) (https://catalog.gmu.edu/colleges-schools/education-human-development/school-education/curriculum-instruction-med/)in an accelerated time-frame after satisfactory completion of a minimum of 143 credits.

See AP.6.7 Bachelor's/Accelerated Master's Degree (http://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7) for policies related to this program.

This accelerated option is offered jointly by the Department of Computer Science (http://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/) and the School of Education (https://catalog.gmu.edu/colleges-schools/education-human-development/school-education/).

Students in an accelerated degree program must fulfill all university requirements for the master's degree. For policies governing all graduate degrees, see AP.6 Graduate Policies (http://catalog.gmu.edu/policies/academic/graduate-policies/#text).

BAM Pathway Admission Requirements

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in Graduate Admissions Policies (https://catalog.gmu.edu/admissions/graduate-policies/) and Bachelor's/Accelerated Master's Degree (https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7) policies. For information specific to this accelerated master's program, see Application Requirements and Deadlines (https://cehd.gmu.edu/bachelors-accelerated-masters-program/).

Students will be considered for admission into the BAM Pathway after completion of a minimum of 60 credits, and additional unit-specific criteria.

Students who are accepted into the BAM Pathway will be allowed to register for graduate level courses after successful completion of a minimum of 75 undergraduate credits and course-specific pre-requisites.

Accelerated Master's Admission Requirements

Students already admitted in the BAM Pathway will be admitted to the MEd program, if they have met the following criteria, as verified on the Bachelor's/Accelerated Master's Transition form:

- 3.0 overall GPA
- Completion of specific undergraduate coursework
- Successfully meeting Mason's requirements for undergraduate degree conferral (graduation) and completing the application for graduation.

Accelerated Pathway Requirements

To maintain the integrity and quality of both the undergraduate and graduate degree programs, undergraduate students interested in taking graduate courses must choose from the following which can be taken as Advanced Standing or Reserve Graduate credit (https://catalog.gmu.edu/policies/academic/graduate-policies/#text) (to be determined by the student and their advisor):

Code	Title	Credits
EDRD 619	Disciplinary Literacy	3
SEED 522	Foundations of Secondary Education	3
SEED 540	Human Development and Learning: Secondary Education	3
SEED 566	Teaching Computer Science in the Secondary School	3
SEED 676	Advanced Methods of Teaching Computer Science in the Secondary School	3
SEED approved elective (http://catalog.gmu.edu/courses/seed/)		

For more detailed information on coursework and timeline requirements, see AP.6.7 Bachelor's/Accelerated Master's Degree (https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7) policies.

Computer Science, BS/Data Analytics Engineering, Accelerated MS

Overview

Highly-qualified students in the Computer Science, BS can complete both a BS-CS and a Data Analytics Engineering, MS (http://catalog.gmu.edu/colleges-schools/engineering-computing/data-analytics-engineering-ms/) in five years through the BS-MS accelerated (BAM) program.

General BAM policies are in the catalog under AP.6.7 Bachelor's/Accelerated Master's Degrees (http://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7). Policies governing all graduate degrees are in the catalog under AP.6 Graduate Policies (http://catalog.gmu.edu/policies/academic/graduate-policies/).

Admission Requirements

Students in the Computer Science, BS program are encouraged to apply to the BAM program after earning 60 undergraduate credits

with an overall GPA of at least 3.30. Students must have successfully completed CS 310 Data Structures and CS 330 Formal Methods and Models .

Accelerated Option Requirements

Students accepted to the BAM program may earn up to 9 credits of graduate coursework that count towards both the BS and MS degrees. They may begin taking graduate courses after completing 75 undergraduate credits and successfully completing CS 367 Computer Systems and Programming.

The following graduate courses can replace the corresponding undergraduate courses.

Code	Title	Credits
CS 584	Theory and Applications of Data Mining (to replace CS 484)	3
CS 550	Database Systems (to replace CS 450)	3
CS 580	Introduction to Artificial Intelligence (to replace CS 480)	3

Notes:

- Students may not use both the graduate course and the undergraduate alternative for their BS degree.
- Students must satisfy all recommended and required prerequisites for the graduate courses they take.
- Students must still take the DAEN core courses (AIT 580 Analytics Big Data to Information, OR 531 Analytics and Decision Analysis, and STAT 515 Applied Statistics and Visualization for Analytics).
- Students also have the option to take up to 6 additional credits of graduate coursework *on reserve*, which can be used for the MS degree only.

Degree Conferral

Students must apply for degree conferral the semester before they expect to complete their BS requirements. At the beginning of their final undergraduate semester, students must submit a completed Bachelor's-Accelerated Master's Transition form to the CS department office. The master's degree will be conferred after the student completes the MS requirements.

Computer Science, BS/Information Systems, Accelerated MS
Overview

Highly-qualified students in the Computer Science, BS can complete both a BS-CS and an Information Systems, MS (http://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/information-systems-ms/) in five years through the BS-MS accelerated (BAM) program.

General BAM policies are in the catalog under AP.6.7 Bachelor's/Accelerated Master's Degrees (http://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7). Policies governing all graduate degrees are in the catalog under AP.6 Graduate Policies (http://catalog.gmu.edu/policies/academic/graduate-policies/).

Admission Requirements

Students in the Computer Science, BS program are encouraged to apply to the BAM program after earning 60 undergraduate credits

Accelerated Option Requirements

Students accepted to the BAM program may earn up to 12 credits of graduate coursework that count towards both the BS and MS degrees. They may begin taking graduate courses after completing 75 undergraduate credits and successfully completing CS 367 Computer Systems and Programming.

The following graduate courses can replace the corresponding undergraduate courses.

Code	Title	Credits
CS 540	Compilers (to replace CS 440)	3
CS 550	Database Systems (to replace CS 450)	3
CS 551	Computer Graphics (to replace CS 451)	3
CS 555	Computer Communications and Networking (to replace CS 455)	3
CS 571	Operating Systems (to replace CS 471)	3
CS 580	Introduction to Artificial Intelligence (to replace CS 480)	3
CS 583	Analysis of Algorithms (to replace CS 483)	3
CS 584	Theory and Applications of Data Mining (to replace CS 484)	3
CS 587	Introduction to Cryptography (to replace CS 487)	3
SWE 619	Object-Oriented Software Specification and Construction (to replace SWE 419)	3
SWE 637	Software Testing (to replace SWE 437)	3
SWE 642	Software Engineering for the World Wide Web (to replace SWE 432)	3

Note:

- Students may not use both the graduate course and the undergraduate alternative for their BS degree.
- Students must satisfy all recommended and required prerequisites for the graduate courses they take.
- Students also have the option to take up to 6 additional credits of graduate coursework *on reserve*, which can be used for the MS degree only.

Degree Conferral

Students must apply for degree conferral the semester before they expect to complete their BS requirements. At the beginning of their final undergraduate semester, students must submit a completed Bachelor's-Accelerated Master's Transition form to the CS department office. The master's degree will be conferred after the student completes the MS requirements.

Computer Science, BS/Operations Research, Accelerated MS
Overview

Highly-qualified undergraduates may be admitted to the bachelor's/accelerated master's program and obtain a Computer Science, BS and

an Operations Research, MS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/systems-operations-research/operations-research-ms/) in an accelerated time-frame after satisfactory completion of a minimum of 138 credits.

Admitted students are able to use up to 12 graduate credits in partial satisfaction of requirements for the undergraduate degree. Upon completion and conferral of the bachelor's degree and with satisfactory performance (grade of 'B' or better) in each of the graduate courses, students are given advanced standing in the master's program.

See AP.6.7 Bachelor's/Accelerated Master's Degrees (https://catalog.gmu.edu/policies/academic/graduate-policies/#text) for policies related to this program.

Students in an accelerated degree program must fulfill all university requirements for the master's degree. For policies governing all graduate degrees, see AP.6 Graduate Policies (https://catalog.gmu.edu/policies/academic/graduate-policies/).

BAM Pathway Admission Requirements

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in Graduate Admissions Policies and Bachelor's/Accelerated Master's Degree policies.

Computer Science, BS students will be considered for admission into the BAM Pathway after completion of a minimum of 60 credits with an overall GPA of at least 3.3, and completion of all MATH and Science requirements. Students must additionally complete MATH 203 Linear Algebra prior to applying for the graduate program.

Students who are accepted into the BAM Pathway will be allowed to register for graduate level courses after successful completion of a minimum of 75 undergraduate credits and course-specific pre-requisites.

Accelerated Master's Admission Requirements

The criteria for admission are identical to criteria for admission to the Operations Research, MS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/systems-operations-research/operations-research-ms/) program. Students already admitted in the BAM Pathway will be admitted to the Operations Research, MS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/systems-operations-research/operations-research-ms/) program, if they have met the following criteria, as verified on the Bachelor's/Accelerated Master's Transition form:

- An overall GPA of at least 3.3

- Successfully meeting Mason's requirements for undergraduate degree conferral (graduation) and completing the application for graduation.

Accelerated Pathway Requirements

To maintain the integrity and quality of both the undergraduate and graduate degree programs, undergraduate students interested in taking graduate courses must choose from the following:

Advanced Standing course: Students must complete all credits that satisfy requirements for both the BS and MS programs. Up to four courses (12 credits) of approved master's level courses taken as part of the undergraduate degree may be applied to the graduate degree. The courses selected for this purpose must be approved by the academic advisors of both the BS and MS programs and by the SEOR department chair. For the BS programs that allow undergraduate electives from the department of system engineering and operations research, the students may choose the graduate version of such elective courses to replace the corresponding undergraduate courses.

- Students selecting up to two courses (6 credits) of approved master's level courses may select from the combined Computer Science course list and Systems Engineering and Operations Research course list given below.

- Students selecting up to three or four courses (9 or 12 credits) of approved master's level courses may select at most two courses from the Computer Science course list and select the remaining courses from the Systems Engineering and Operations Research course list given below. Students are highly recommended to select courses marked as core courses because it applies to the master's degree regardless of the graduate-level concentration chosen in the Operations Research, MS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/systems-operations-research/operations-research-ms/). The undergraduate version of these courses, if any, may *not* be applied toward the Operations Research, MS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/systems-operations-research/operations-research-ms/). Credit may not be received for both the undergraduate and graduate version of these courses.

- Students must pay attention to the prerequisites required for a course, and the master's degree concentration that the course may satisfy.

Select at most two from the following Computer Science courses:

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

Select the remaining from the following Systems Engineering and Operations Research courses:

Code	Title	Credits
OR 541	Operations Research: Deterministic Optimization (Core)	
OR 542	Operations Research: Stochastic Models (Core)	

While still in undergraduate status, a maximum of 6 additional graduate credits may be taken as reserve graduate credit and applied to the master's program. Reserve graduate credits do not apply to the undergraduate degree.

For more detailed information on coursework and timeline requirements, see AP.6.7 Bachelor's/Accelerated Master's Degrees (https://catalog.gmu.edu/policies/academic/graduate-policies/#text).

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. 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 program can complete both a BS-CS and a Software Engineering, MS (http://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/software-engineering-ms/) in five years through the BS-MS accelerated (BAM) program.

General BAM policies are in the catalog under AP.6.7 Bachelor's/Accelerated Master's Degrees (http://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7). Policies governing all graduate degrees are in the catalog under AP.6 Graduate Policies (http://catalog.gmu.edu/policies/academic/graduate-policies/).

Admission Requirements

Students in the Computer Science, BS program are encouraged to apply to the BAM program after earning 60 undergraduate credits with an overall GPA of at least 3.30. Students must also have successfully completed CS 310 Data Structures and CS 330 Formal Methods and Models .

Accelerated Option Requirements

Students accepted to the BAM program may earn up to 12 credits of graduate coursework that count towards both the BS and MS degrees. They may begin taking graduate courses after completing 75 undergraduate credits and successfully completing CS 367 Computer Systems and Programming.

The following graduate courses can replace the corresponding undergraduate courses.

Code	Title	Credits
CS 540	Compilers (to replace CS 440)	3
CS 550	Database Systems (to replace CS 450)	3
CS 551	Computer Graphics (to replace CS 451)	3
CS 555	Computer Communications and Networking (to replace CS 455)	3
CS 571	Operating Systems (to replace CS 471)	3
CS 580	Introduction to Artificial Intelligence (to replace CS 480)	3
CS 583	Analysis of Algorithms (to replace CS 483)	3
CS 584	Theory and Applications of Data Mining (to replace CS 484)	3
CS 587	Introduction to Cryptography (to replace CS 487)	3
SWE 619	Object-Oriented Software Specification and Construction (to replace SWE 419)	3
SWE 637	Software Testing (to replace SWE 437)	3
SWE 642	Software Engineering for the World Wide Web (to replace SWE 432)	3

Notes:

- Students may not use both the graduate course and the undergraduate alternative for their BS degree.
- Students must satisfy all recommended and required prerequisites for the graduate courses they take.
- Students also have the option to take up to 6 additional credits of graduate coursework *on reserve*, which can be used for the MS degree only.

Degree Conferral

Students must apply for degree conferral the semester before they expect to complete their BS requirements. At the beginning of their final undergraduate semester, students must submit a completed Bachelor's-Accelerated Master's Transition form to the CS department office. The master's degree will be conferred after the student completes the MS requirements.

Computer Science, BS/Systems Engineering, Accelerated MS
Overview

Highly-qualified undergraduates may be admitted to the bachelor's/accelerated master's program and obtain a Computer Science, BS and a Systems Engineering, MS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/systems-operations-research/systems-engineering-ms/) in an accelerated time-frame after satisfactory completion of a minimum of 138 credits.

Admitted students are able to use up to 12 graduate credits in partial satisfaction of requirements for the undergraduate degree. Upon completion and conferral of the bachelor's degree and with satisfactory performance (grade of 'B' or better) in each of the graduate courses, students are given advanced standing in the master's program.

See AP.6.7 Bachelor's/Accelerated Master's Degrees (http://catalog.gmu.edu/policies/academic/graduate-policies/#text) for policies related to this program.

Students in an accelerated degree program must fulfill all university requirements for the master's degree. For policies governing all graduate degrees, see AP.6 Graduate Policies (http://catalog.gmu.edu/policies/academic/graduate-policies/).

BAM Pathway Admission Requirements

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in Graduate Admissions Policies and Bachelor's/Accelerated Master's Degree policies.

Computer Science, BS students will be considered for admission into the BAM Pathway after completion of a minimum of 60 credits with an overall GPA of at least 3.3, and completion of all MATH and Science requirements.

Students who are accepted into the BAM Pathway will be allowed to register for graduate level courses after successful completion of a minimum of 75 undergraduate credits and course-specific pre-requisites.

Accelerated Master's Admission Requirements

The criteria for admission are identical to criteria for admission to the Systems Engineering, MS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/systems-operations-research/systems-engineering-ms/) program. Students already admitted in the BAM Pathway will be admitted to the Systems Engineering, MS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/systems-operations-research/systems-engineering-ms/) program, if they have met the following criteria, as verified on the Bachelor's/Accelerated Master's Transition form:

- An overall GPA of at least 3.3
- Successfully meeting Mason's requirements for undergraduate degree conferral (graduation) and completing the application for graduation.

Accelerated Pathway Requirements

To maintain the integrity and quality of both the undergraduate and graduate degree programs, undergraduate students interested in taking graduate courses must choose from the following:

Advanced Standing course: Students must complete all credits that satisfy requirements for both the BS and MS programs. Up to four courses (12 credits) of approved master's level courses taken as part of the undergraduate degree may be applied to the graduate degree. The courses selected for this purpose must be approved by the academic advisors of both the BS and MS programs and by the SEOR department chair. For the BS programs that allow undergraduate electives from the department of system engineering and operations research, the students may choose the graduate version of such elective courses to replace the corresponding undergraduate courses.

- Students selecting up to two courses (6 credits) of approved master's level courses may select from the combined Computer Science course list and Systems Engineering and Operations Research course list given below.
- Students selecting up to three or four courses (9 or 12 credits) of approved master's level courses may select at most two courses from the Computer Science course list and select the remaining courses from the Systems Engineering and Operations Research course list given below. The undergraduate version of these courses, if any, may *not* be applied toward the Systems Engineering, MS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/systems-operations-research/systems-engineering-ms/). Credit may not be received for both the undergraduate and graduate version of these courses.
- Any course chosen from either course list can be used to satisfy SYST 505 Systems Engineering Principles core requirement in the Systems Engineering, MS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/systems-operations-research/systems-engineering-ms/) program.
- Some of the courses in the Systems Engineering and Operations Research course list applies only to certain concentrations in the Systems Engineering, MS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/systems-operations-research/systems-engineering-ms/) program.
- Students must pay attention to the prerequisites required for a course, and the master's degree concentration that the course may satisfy.

Select at most two from the following Computer Science courses:

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

Select the remaining from the following Systems Engineering and Operations Research courses:

Code	Title	Credits
OR 541	Operations Research: Deterministic Optimization	
OR 542	Operations Research: Stochastic Models	

While still in undergraduate status, a maximum of 6 additional graduate credits may be taken as reserve graduate credit and applied to the master's program. Reserve graduate credits do not apply to the undergraduate degree.

For more detailed information on coursework and timeline requirements, see AP.6.7 Bachelor's/Accelerated Master's Degrees (http://catalog.gmu.edu/policies/academic/graduate-policies/#text).

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. At the completion of MS requirements, a master's degree is conferred.