

# COMPUTATIONAL SCIENCE, MS

**Banner Code:** SC-MS-CSIM

## Academic Programs Administrator

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Website: [science.gmu.edu/academics/departments-units/computational-data-sciences/computational-science-ms](http://science.gmu.edu/academics/departments-units/computational-data-sciences/computational-science-ms)

The Master of Science in Computational Science addresses the growing demand for trained computational scientists and engineers, and data scientists. It combines a solid foundation in computational science skills with courses in a variety of scientific and engineering computer-intensive areas where modeling and simulation, data analysis, and high performance computing play a central role.

Working with an advisor, a student may choose to pursue an area of emphasis. The areas of emphasis are:

- **Computer Modeling and Simulation:** Intended for students who wish to learn computational solution techniques for modeling and simulation of scientific and engineering phenomena.
- **Data Science:** Intended for students who wish to learn computational methods for acquiring, extracting, and analyzing large-scale data obtained by observations, experiments, modeling, and database searches.

Students may also combine areas of emphasis to create their own customized curriculum under the guidance of the graduate coordinator.

Most of the courses are offered in the late afternoon or early evening to accommodate students with full-time employment outside of the university.

## Admissions & Policies

### Admissions

University-wide admissions policies can be found in the Graduate Admissions Policies (<http://catalog.gmu.edu/admissions/graduate-policies/>) section of this catalog.

To apply for this program, please complete the George Mason University Admissions Application (<https://www2.gmu.edu/admissions-aid/apply-now/>).

### Eligibility

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in the Graduate Admissions Policies (<http://catalog.gmu.edu/admissions/graduate-policies/>) section of this catalog. Applicants to the Computational Science, MS should have an academic background in one of the following fields: physical sciences, life sciences, engineering, mathematics, or computer science. They should have an earned baccalaureate from an institution of higher education accredited by a Mason-recognized U.S. institutional accrediting agency (<https://www2.gmu.edu/admissions-aid/apply-now/how-apply/graduate/>

[application-deadlines-and-requirements/accreditation/](#)), or international equivalent, verified from official transcripts with a GPA of at least 3.00 in their last 60 credits of study. In addition, applicants should have taken at least one course in differential equations and have facility in using a high-level computer programming language.

### Application Requirements

To apply, prospective students should complete the George Mason University Admissions Application (<https://www2.gmu.edu/admissions-aid/apply-now/>), supply two copies of official transcripts from each university attended, a current résumé, and an expanded goals statement. Applicants should also provide two letters of recommendation.

International applicants must provide Mason with verification of their proficiency in English for admission consideration. For more information visit Admission of International Students (<http://catalog.gmu.edu/admissions/international-students/>) and English Proficiency Requirements (<https://www.gmu.edu/admissions-aid/apply-now/how-apply/international/english-proficiency-requirements/>).

### Policies

For policies governing all graduate degrees, see AP.6 Graduate Policies (<http://catalog.gmu.edu/policies/academic/graduate-policies/>).

## Requirements

(Formerly: SC-MS-COMP)

### Degree Requirements

Total credits: 30

Students should refer to the Admissions & Policies tab for specific policies related to this program.

### Core Courses

Code	Title	Credits
Select 6 credits from the following:		6
CSI 690	Numerical Methods	
CSI 695	Scientific Databases	
CSI 702	High-Performance Computing	
CSI 703	Scientific and Statistical Visualization	
Total Credits		6

### Computational Extended Core

Code	Title	Credits
Select 15 credits from any graduate-level CSI, CDS, or CSS courses <sup>1</sup>		15
CDS ( <a href="http://catalog.gmu.edu/courses/cds/">http://catalog.gmu.edu/courses/cds/</a> )		
CSI ( <a href="http://catalog.gmu.edu/courses/csi/">http://catalog.gmu.edu/courses/csi/</a> )		
CSS ( <a href="http://catalog.gmu.edu/courses/css/">http://catalog.gmu.edu/courses/css/</a> )		
Total Credits		15

1

Not including the following research courses: CSI 796 Directed Reading and Research, CSI 798 Practicum Project, CSI 799 Master's Thesis, CSI 898 Research Colloquium in Computational Sciences and Informatics, CSI 899 Colloquium in Computational and Data Sciences, CSI 991 , CSI 996 Doctoral Reading and Research, or from courses previously taken.

## Electives

Code	Title	Credits
Select 9 credits of electives <sup>1,2,3</sup>		9
Total Credits		9

1

Typically chosen from computational sciences and informatics (<http://catalog.gmu.edu/courses/csi/>), chemistry (<http://catalog.gmu.edu/courses/chem/>), mathematics (<http://catalog.gmu.edu/courses/math/>), physics (<http://catalog.gmu.edu/courses/phys/>), engineering (<http://catalog.gmu.edu/colleges-schools/engineering-computing/>), information technology (<http://catalog.gmu.edu/courses/it/>), and statistics courses (<http://catalog.gmu.edu/courses/stat/>).

2

Students should create a curriculum plan for an area of emphasis or combined areas of emphases in consultation with their academic advisor.

3

No more than 6 credits may be chosen from areas outside of CSI.

Elective credits may also include:

Code	Title	Credits
CSI 796	Directed Reading and Research	1-6
CSI 798	Practicum Project	1-3
CSI 799	Master's Thesis	1-6

## Accelerated Master's

### Computational and Data Sciences, BS/ Computational Science, Accelerated MS

#### Overview

This bachelor's/accelerated master's degree program allows academically strong undergraduates with a commitment to advance their education to obtain both the Computational and Data Sciences, BS (<http://catalog.gmu.edu/colleges-schools/science/computational-data-sciences/computational-data-sciences-bs/>) and the Computational Science, MS degrees within an accelerated timeframe. Upon completion of this 138 credit accelerated program, students will be exceptionally well prepared for entry into their careers or into a doctoral program in the field or in a related discipline.

Students are eligible to apply for this accelerated program once they have earned at least 60 undergraduate credits and can enroll in up to 18 credits of graduate coursework after successfully completing 75 undergraduate credits. This flexibility makes it possible for students to complete a bachelor's and a master's in five years.

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

[policies/#ap-6-7](http://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7)). For policies governing all graduate degrees, see AP.6 Graduate Policies (<http://catalog.gmu.edu/policies/academic/graduate-policies/>). For more information on undergraduates enrolling in graduate courses, see AP.1.4.4 Graduate Course Enrollment by Undergraduates (<https://catalog.gmu.edu/policies/academic/registration-attendance/#text>).

## Application Requirements

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in the Graduate Admission Policies (<http://catalog.gmu.edu/admissions/graduate-policies/>) section of this catalog.

Important application information and processes for this accelerated master's program can be found here (<https://www2.gmu.edu/admissions-aid/how-apply/accelerated-masters/>).

Students should seek out the graduate program's advisor who will aid in choosing the appropriate graduate courses and help prepare the student for graduate studies.

GRE-general scores are waived for graduates of BS degrees from any program in the College of Science or in the Volgenau School of Engineering at George Mason University.

Applicants must have an overall undergraduate GPA of at least 3.00. Additionally, applicants will have completed the following courses with a GPA of 3.00 or better:

Code	Title	Credits
CDS 205	Introduction to Agent-based Modeling and Simulation	3
or CDS 251	Introduction to Scientific Programming	
CDS 230	Modeling and Simulation I	3
CDS 301	Scientific Information and Data Visualization	3
CDS 302	Scientific Data and Databases	3
CDS 303	Scientific Data Mining	3
CDS 411	Modeling and Simulation II	3
Select one from the following:		3
CDS 461	Molecular Dynamics and Monte Carlo Simulations	
CDS 490	Directed Study and Research	
CSI 500	Computational Science Tools	
Total Credits		21

## Accelerated Option Requirements

After the completion of 75 undergraduate credits, students may complete 3 to 12 credits of graduate coursework that can apply to both the undergraduate and graduate degrees.

In addition to applying to graduate from the undergraduate program, students in the accelerated program must submit a bachelor's/accelerated master's transition form (available from the Office of the University Registrar (<https://registrar.gmu.edu/forms/>)) to the College of Science's Office of Academic and Student Affairs (<https://cos.gmu.edu/about/contact-us/>) by the last day to add classes of their final undergraduate semester. Students should enroll for courses in the master's program in the fall or spring semester immediately following

conferral of the bachelor's degree, but should contact an advisor if they would like to defer up to one semester.

Students must maintain an overall GPA of 3.00 or higher in all graduate coursework and should consult with their faculty advisor to coordinate their academic goals.

## Reserve Graduate Credit

Accelerated master's students may also take up to 6 graduate credits as reserve graduate credits. These credits do not apply to the undergraduate degree, but will reduce the master's degree by up to 6 credits. With 12 graduate credits counted toward the undergraduate and graduate degrees plus the maximum 6 reserve graduate credits, the credits necessary for the graduate degree can be reduced by up to 18.

## Graduate Course Suggestions

The following list of suggested courses is provided for general reference. To ensure an efficient route to graduation and post-graduation readiness, students are strongly encouraged to meet with an advisor before registering for graduate-level courses. Undergraduate students may not register for courses at the 700-level or higher.

Code	Title	Credits
For students focusing on Data Science, the following courses are suggested:		
CSI 501	Introduction to Scientific Programming	3
CSI 672	Statistical Inference	3
CSI 695	Scientific Databases	3
STAT 544	Applied Probability	3
For students focusing on Modeling, the following courses are suggested:		
CSI 500	Computational Science Tools	3
CSI 501	Introduction to Scientific Programming	3
CSI 600	Quantitative Foundations for Computational Sciences	3
CSI 690	Numerical Methods	3

## Mechanical Engineering, BS/ Computational Science, Accelerated MS Overview

This option enables enthusiastic, highly qualified, undergraduates to obtain the Mechanical Engineering, BS (<https://mechanical.gmu.edu/>) and the Computational Science, MS within the accelerated time frame of five years. The program requires 139 credits total, allowing students to undertake graduate coursework during their final year in the bachelor's degree. Upon completion of this 139 credit BS/MS combined program, students are exceptionally well prepared for undertaking doctoral studies or entering the professional workforce.

For more detailed information, see AP.6.7 Bachelor's/Accelerated Master's Degrees (<http://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7>). For policies governing all graduate degrees, see AP.6 Graduate Policies (<http://catalog.gmu.edu/policies/academic/graduate-policies/>).

## Application Requirements

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in the Graduate Admission Policies

(<http://catalog.gmu.edu/admissions/graduate-policies/>) section of this catalog<sup>1</sup>. Application information for this Accelerated Master's program can be found on the Department of Computational and Data Sciences (<http://cos.gmu.edu/cds/academic-programs/>) website. Applicants must have an overall undergraduate GPA of at least 3.00 and have completed at least 60 credits. Additionally, applicants will have completed the following courses with a GPA of 3.00 or better:

Code	Title	Credits
CS 112	Introduction to Computer Programming (Mason Core) ( <a href="http://catalog.gmu.edu/mason-core/">http://catalog.gmu.edu/mason-core/</a> )	4
ME 212	Solid Mechanics	3
ME 231	Dynamics	3
ME 313	Material Science	3
ME 322	Fluid Mechanics	3
ME 323	Heat Transfer	3
ME 351	Analytical Methods in Engineering	3
Total Credits		22

Students must maintain an overall GPA of 3.00 or higher in graduate coursework and should consult with their faculty advisor to coordinate their academic goals within the modeling and simulation or data science emphases of the Computational Science, MS.

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<sup>1</sup>

GRE-general scores are waived for graduates of BS degrees from any program in the College of Science or the Volgenau School of Engineering at George Mason University.

## Accelerated Option Requirements

Students must complete all credits that satisfy requirements for both the BS and MS programs, with up to twelve credits overlap chosen from the following courses:

Code	Title	Credits
CSI 500	Computational Science Tools	3
CSI 501	Introduction to Scientific Programming	3
CSI 600	Quantitative Foundations for Computational Sciences	3
Select one course from the following options:		3
Any CDS, CSI, or CSS-prefixed courses numbered 500-689, or		
STAT 544	Applied Probability	
STAT 554	Applied Statistics I	
Total Credits		12

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>).