

# MATHEMATICS, BA

**Banner Code:** SC-BA-MATH

## Academic Advising

Website: <https://science.gmu.edu/academics/departments-units/mathematical-sciences/mathematics-ba>

This bachelor's program provides exciting opportunities for students interested in mathematics.

## Teacher Licensure

Interested students should attend an information session early in their studies. For more information, visit the School of Education's website (<http://gse.gmu.edu/>).

Students majoring in mathematics who wish to pursue a career teaching secondary school may consider applying for the Secondary Education - Mathematics (6-12) Undergraduate Certificate (<https://catalog.gmu.edu/colleges-schools/education-human-development/school-education/secondary-education-mathematics-6-12-undergraduate-certificate/>) offered by the College of Education and Human Development (<https://catalog.gmu.edu/colleges-schools/education-human-development/>) as an option in seeking an initial Virginia teaching license.

Other routes to licensure include the Mathematics, BA or BS/Curriculum and Instruction, Accelerated MEd (Secondary Education Mathematics concentration) or select traditional Master's programs. Please contact the undergraduate advisor in the College of Education and Human Development (<https://catalog.gmu.edu/colleges-schools/education-human-development/>) for more information.

## Admissions & Policies

### Admissions

University-wide admissions policies can be found in the Undergraduate Admissions Policies (<https://catalog.gmu.edu/admissions/undergraduate-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/>).

### Policies

Students must fulfill all Requirements for Bachelor's Degrees (<https://catalog.gmu.edu/policies/academic/undergraduate-policies/#ap-5-3-2>), including the Mason Core (<https://catalog.gmu.edu/mason-core/>). As outlined in the Requirements tab, students in this bachelor's program must also complete the additional College Requirements for the BA Degree.

MATH 300 Introduction to Advanced Mathematics (Mason Core) (<https://catalog.gmu.edu/mason-core/>) meets the writing intensive requirement for this major.

For policies governing all undergraduate programs, see AP.5 Undergraduate Policies (<https://catalog.gmu.edu/policies/academic/undergraduate-policies/>).

Graduating seniors are required to have an exit interview.

## Course Recommendations and Policies

Students intending to enter graduate school in mathematics are strongly advised to take MATH 315 Advanced Calculus I and MATH 321 Abstract Algebra.

Students may not receive credit for both MATH 214 Elementary Differential Equations and MATH 216 Theory of Differential Equations; both MATH 213 Analytic Geometry and Calculus III and MATH 215 Analytic Geometry and Calculus III (Honors); both MATH 351 Probability and STAT 344 Probability and Statistics for Engineers and Scientists I; and both MATH 352 Statistics and STAT 354 Probability and Statistics for Engineers and Scientists II.

After receiving a grade of 'C' or better in one of the courses listed below on the left, students may not receive credit for the corresponding course on the right:

Course	May Not Receive Credit for
MATH 113 or MATH 123	MATH 105 or MATH 108
MATH 351 or STAT 344	MATH 110
MATH 441	MATH 111

## Requirements

### Degree Requirements

Total credits: minimum 120

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

A maximum of 6 credits of grades below 2.00 in coursework designated MATH or STAT may be applied toward the major.

### Required Courses

Code	Title	Credits
<b>Core Courses</b>		
MATH 113	Analytic Geometry and Calculus I (Mason Core) ( <a href="https://catalog.gmu.edu/mason-core/">https://catalog.gmu.edu/mason-core/</a> )	4
MATH 114	Analytic Geometry and Calculus II	4
MATH 125	Discrete Mathematics I (Mason Core) ( <a href="https://catalog.gmu.edu/mason-core/">https://catalog.gmu.edu/mason-core/</a> )	3
MATH 203	Linear Algebra	3
MATH 213 or MATH 215	Analytic Geometry and Calculus III Analytic Geometry and Calculus III (Honors)	3
MATH 214 or MATH 216	Elementary Differential Equations Theory of Differential Equations	3
MATH 300	Introduction to Advanced Mathematics (Mason Core) ( <a href="https://catalog.gmu.edu/mason-core/">https://catalog.gmu.edu/mason-core/</a> ) <sup>1</sup>	3

MATH 322	Advanced Linear Algebra	3
<b>Total Credits</b>		<b>26</b>

<sup>1</sup> Fulfills the writing intensive requirement.

## Additional Mathematics

Code	Title	Credits
Select 12 credits in MATH 300-level or higher ( <a href="https://catalog.gmu.edu/courses/math/">https://catalog.gmu.edu/courses/math/</a> ) <sup>1,2</sup>		12
<b>Total Credits</b>		<b>12</b>

<sup>1</sup> Excluding MATH 400 History of Math (Topic Varies) (Mason Core) (<https://catalog.gmu.edu/mason-core/>).

<sup>2</sup> Up to 3 credits in MATH 490 Internship and 6 credits in MATH 491 Reading and Undergraduate Research in Mathematics can be applied to this requirement. A total of 12 credits between MATH 490 Internship and MATH 491 Reading and Undergraduate Research in Mathematics can be applied to the degree via this requirement and any elective credits.

## Mason Core and Elective Credits

In order to meet a minimum of 120 credits, this degree requires an additional 82 credits which may be applied toward any remaining Mason Core (<https://catalog.gmu.edu/mason-core/>) requirements (outlined below), Requirements for Bachelor's Degrees (<https://catalog.gmu.edu/policies/academic/undergraduate-policies/#ap-5-3-2>), College Requirements for the BA Degree (outlined below), and elective courses<sup>1</sup>. Students are strongly encouraged to consult with their advisors to ensure that they fulfill all requirements.

<sup>1</sup> A maximum of 12 credits between MATH 490 Internship and MATH 491 Reading and Problems can be applied to this degree.

### Mason Core

Some Mason Core (<https://catalog.gmu.edu/mason-core/>) requirements may already be fulfilled by the major requirements listed above. Students are strongly encouraged to consult their advisors to ensure they fulfill all remaining Mason Core (<https://catalog.gmu.edu/mason-core/>) requirements.

Students who have completed the following credentials are eligible for a waiver of the Foundation and Exploration (lower level) requirement categories. The Integration category (upper level) is not waived under this policy. See Admissions (<https://catalog.gmu.edu/admissions/undergraduate-policies/#transfertext>) for more information.

- VCCS Uniform Certificate of General Studies
- VCCS or Richard Bland Associate of Science (A.S.), Associate of Arts (A.A.), Associate of Arts and Sciences (A.A.&S.), or Associate of Fine Arts (A.F.A.)

Code	Title	Credits
<b>Foundation Requirements</b>		
	Written Communication (lower-level) ( <a href="https://catalog.gmu.edu/mason-core/#written">https://catalog.gmu.edu/mason-core/#written</a> )	3
	Oral Communication ( <a href="https://catalog.gmu.edu/mason-core/#oral">https://catalog.gmu.edu/mason-core/#oral</a> )	3

	Quantitative Reasoning ( <a href="https://catalog.gmu.edu/mason-core/#quantitative">https://catalog.gmu.edu/mason-core/#quantitative</a> )	3
	Information Technology and Computing ( <a href="https://catalog.gmu.edu/mason-core/#information-technology">https://catalog.gmu.edu/mason-core/#information-technology</a> )	3
<b>Exploration Requirements</b>		
	Arts ( <a href="https://catalog.gmu.edu/mason-core/#arts">https://catalog.gmu.edu/mason-core/#arts</a> )	3
	Global Contexts ( <a href="https://catalog.gmu.edu/mason-core/#global-contexts">https://catalog.gmu.edu/mason-core/#global-contexts</a> )	3
	Global History ( <a href="https://catalog.gmu.edu/mason-core/#global-history">https://catalog.gmu.edu/mason-core/#global-history</a> )	3
	Literature ( <a href="https://catalog.gmu.edu/mason-core/#literature">https://catalog.gmu.edu/mason-core/#literature</a> )	3
	Natural Science ( <a href="https://catalog.gmu.edu/mason-core/#natural-science">https://catalog.gmu.edu/mason-core/#natural-science</a> )	7
	Social and Behavioral Sciences ( <a href="https://catalog.gmu.edu/mason-core/#social-behavioral-science">https://catalog.gmu.edu/mason-core/#social-behavioral-science</a> )	3
	Just Societies (optional) ( <a href="https://catalog.gmu.edu/mason-core/#justsocieties">https://catalog.gmu.edu/mason-core/#justsocieties</a> ) <sup>1</sup>	
<b>Integration Requirements</b>		
	Written Communication (upper-level) ( <a href="https://catalog.gmu.edu/mason-core/#written">https://catalog.gmu.edu/mason-core/#written</a> )	3
	Writing Intensive ( <a href="https://catalog.gmu.edu/mason-core/#wi">https://catalog.gmu.edu/mason-core/#wi</a> ) <sup>2</sup>	3
	Mason Apex ( <a href="https://catalog.gmu.edu/mason-core/#apex">https://catalog.gmu.edu/mason-core/#apex</a> ) <sup>3</sup>	3
<b>Total Credits</b>		<b>40</b>

<sup>1</sup> In addition to covering content related to the designated category, Exploration level courses marked with a Just Societies "flag" are specifically designed to help students learn how to interact effectively with others from all walks of life, including those with backgrounds and beliefs that differ from their own. Students who wish to increase their knowledge and skills in this area may choose to enroll in a Just Societies-flagged course. Students interested in this approach to completing their Mason Core Exploration Requirements should work closely with their advisor to identify the appropriate Just Societies-flagged courses.

<sup>2</sup> Most programs include the writing-intensive course designated for the major as part of the major requirements; this course is therefore not counted towards the total required for Mason Core.

<sup>3</sup> Minimum 3 credits required.

## College Requirements for the BA Degree

In addition to the program requirements and the Mason Core (<https://catalog.gmu.edu/mason-core/>) requirements, students pursuing a BA degree must complete the coursework below. Except where expressly prohibited, a course used to fulfill this college-level requirement may also be used simultaneously to satisfy other requirements such as Mason Core (<https://catalog.gmu.edu/mason-core/>) requirements, other college-level requirements, or requirements for the major. In some cases, the requirements listed below may be superseded by requirements of the degree program and the Mason Core (<https://catalog.gmu.edu/mason-core/>).

### Foundational Breadth

Choose two courses from approved Mason Core: Arts (<https://catalog.gmu.edu/mason-core/#arts>), Mason Core: Literature (<https://catalog.gmu.edu/mason-core/#literature>), Mason Core: Global Contexts (<https://catalog.gmu.edu/mason-core/#global-contexts>), and Mason Core: Social and Behavioral Sciences (<https://catalog.gmu.edu/mason-core/#social-behavioral-science>) courses in addition to those required

by the Mason Core (<https://catalog.gmu.edu/mason-core/>). The two courses used to fulfill the college-level requirements must each be from different Mason Core categories. Additionally, they must be from different disciplines than the courses used to fulfill the University Mason Core requirements.

### Natural Science

Choose one credit in addition to the Mason Core: Natural Science (<https://catalog.gmu.edu/mason-core/#natural-science>) requirement for a total of 8 credits<sup>1</sup>. This combined college-level and university requirement must be fulfilled by completing two of any approved Mason Core: Natural Science (<https://catalog.gmu.edu/mason-core/#natural-science>) courses that include a laboratory experience<sup>2</sup>.

Code	Title	Credits
Select an additional Mason Core Natural Science course		1

<sup>1</sup> For Geography, BA majors, this extra credit is not required.

<sup>2</sup> BIOL 124 Human Anatomy and Physiology I and BIOL 125 Human Anatomy and Physiology II may not be used to fulfill this requirement.

### Foreign Language

Code	Title	Credits
Intermediate-level proficiency in one foreign language is required and may be fulfilled via one of the options below:		1

1. Completing a course in a foreign language numbered 202 (or its equivalent), or higher level courses taught in the language.

2. Achieving a satisfactory score on an approved proficiency test.

3. Completing a three course sequence in American Sign Language:

EDSE 115 American Sign Language (ASL) I

EDSE 116 American Sign Language (ASL) II

EDSE 219 American Sign Language (ASL) III

4. Conferral of a baccalaureate degree.<sup>2</sup>

<sup>1</sup> Students who are already proficient in a second language may be eligible for a waiver of this requirement. Additional information on waivers can be found with the college's Office of Academic and Student Affairs (<http://cosundergrad.gmu.edu/>).

<sup>2</sup> This option is only available to students in the Biology, BA with a concentration in Biological Health who have already conferred a baccalaureate degree.

## Honors

### Honors in the Major Eligibility

Mathematics majors who have maintained a GPA of at least 3.50 in mathematics courses and a GPA of 3.50 in all courses taken at George Mason University may apply to the departmental honors program upon completion of two MATH courses at the 300+ level (excluding MATH 400 History of Math (Topic Varies) (Mason Core) (<https://catalog.gmu.edu/mason-core/>)), at least one of which has MATH 300 Introduction to Advanced Mathematics (Mason Core) (<https://catalog.gmu.edu/mason-core/>) as a prerequisite. Admission to the program will be monitored by the undergraduate committee.

### Honors Requirements

To graduate with honors in mathematics, a student is required to maintain a minimum GPA of 3.50 in mathematics courses and successfully complete MATH 405 Honors Thesis in Mathematics I and MATH 406 RS: Honors Thesis in Mathematics II with an average GPA of at least 3.50 in these two courses.

## Accelerated Master's

### Mathematics, BA or BS/Mathematics, Accelerated MS Overview

This bachelor's/accelerated master's degree program allows academically strong undergraduates with a commitment to advance their education to obtain the Mathematics, BA or Mathematics, BS (<https://catalog.gmu.edu/colleges-schools/science/mathematical-sciences/mathematics-bs/>) and the Mathematics, MS (<https://catalog.gmu.edu/colleges-schools/science/mathematical-sciences/mathematics-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 (<https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7>). For policies governing all graduate degrees, see AP.6 Graduate Policies (<https://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 (<https://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://www.gmu.edu/admissions-aid/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.

Successful applicants will have an overall undergraduate GPA of at least 3.00. Additionally, they will have completed the following courses with a GPA of 3.00 or higher:

Code	Title	Credits
MATH 315	Advanced Calculus I	3
MATH 321	Abstract Algebra	3
MATH 322	Advanced Linear Algebra	3

## 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.

Code	Title	Credits
MATH 621	Algebra I	3
MATH 631	Topology I: Topology of Metric Spaces	3
MATH 675	Linear Analysis	3
MATH 677	Ordinary Differential Equations	3
MATH 685	Numerical Analysis	3

## Mathematics, BA or BS/ Secondary Education, Accelerated MEd, (Secondary Education - Mathematics Concentration) Overview

Highly-qualified undergraduates may be admitted to the bachelor's/accelerated master's program and obtain a BA or BS in Mathematics (<https://catalog.gmu.edu/colleges-schools/science/mathematical-sciences/mathematics-bs/>) and an MEd in (<https://catalog.gmu.edu/colleges-schools/education-human-development/school-education/curriculum-instruction-med/>) Secondary Education (Secondary Education - Mathematics 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 (<https://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 Mathematical Sciences (<https://catalog.gmu.edu/colleges-schools/science/mathematical-sciences/>) 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 (<https://catalog.gmu.edu/policies/academic/graduate-policies/#text>).

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/>).

## BAM Pathway Admission Requirements

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**

## 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	Literacy Across the Disciplines	3
SEED 522	Foundations of Secondary Education	3
SEED 540	Human Development and Learning: Secondary Education	3

SEED 572	Teaching Mathematics in the Secondary School	3
SEED 672	Advanced Methods of Teaching Mathematics in the Secondary School	3
Up to two of the following:		
SEED 507	Assessing Learning and Teaching in the Secondary Classroom	
SEED 508	Creating Advocacy with Adolescent Learners	
SEED 509	Perspectives on Extraordinary Teaching	
SEED 510	Secondary Education in International Contexts	

For more detailed information on coursework and timeline requirements, see AP6.7 Bachelor's/Accelerated Master's Degree (<https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7>) policies.