MATHEMATICS, BS

Banner Code: SC-BS-MATH

Academic Advising

Website: http://math.gmu.edu/advisors.php

This program provides exciting opportunities for students interested in mathematics. Students are encouraged to select an optional concentration in Actuarial Mathematics (ACTM), Applied Mathematics (AMT), or Mathematical Statistics (MTHS). Students who do not select a concentration study traditional mathematics.

Teacher Licensure

Students who wish to become teachers and plan to seek teacher licensure should consider the following options:

- Secondary Education - Mathematics (6-12) Undergraduate Certificate (http://catalog.gmu.edu/colleges-schools/education-human-development/school-education/secondary-education-mathematics-6-12-undergraduate-certificate/)
- Mathematics, BA or BS/Curriculum and Instruction, Accelerated MEd (Secondary Education Mathematics concentration)

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

Admissions & Policies

Admissions

University-wide admissions policies can be found in the Undergraduate Admissions Policies (http://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 (http://catalog.gmu.edu/policies/academic/undergraduate-policies/#ap-5-3-2), including the Mason Core (http://catalog.gmu.edu/mason-core/).

MATH 300 Introduction to Advanced Mathematics meets the writing intensive requirement for this major.

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

Graduating seniors are required to have an exit interview.

Language Proficiency Recommendation

The department recommends proficiency in French, German, or Russian.

Course Recommendations and Policies

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

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
MATH 125	MATH 112

Requirements

Degree Requirements

Total credits: minimum 120

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

In addition to the mathematics core, science, and computational skills requirements, students may select an optional concentration in Actuarial Mathematics (ACTM), Applied Mathematics (AMT) or Mathematical Statistics (MTHS).

Mathematics Core

Code	Title	Credits
MATH 113	Analytic Geometry and Calculus I (Mason Core) (http://catalog.gmu.edu/mason-core/)	4
MATH 114	Analytic Geometry and Calculus II	4
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 [1]	3
MATH 322	Advanced Linear Algebra	3
Total Credits		23

[1]   Fulfills the writing intensive requirement.

Science

Code	Title	Credits
Select a one-year sequence of a laboratory science from the following courses:		8-9
Biology Sequence:		
BIOL 213	Cell Structure and Function (Mason Core) (http://catalog.gmu.edu/mason-core/)	
Choose one from the following:		
BIOL 300	BioDiversity	
BIOL 308	Foundations of Ecology and Evolution	
BIOL 311	General Genetics	
Chemistry Sequence:		
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/)	
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/)	
Geology Sequence:		
GEOL 101	Introductory Geology I (Mason Core) (http://catalog.gmu.edu/mason-core/)	
GEOL 102	Historical Geology (Mason Core) (http://catalog.gmu.edu/mason-core/)	
Physics Sequence:		
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/)	
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/)	
Total Credits		8-9

Computational Skills

Code	Title	Credits
CS 112	Introduction to Computer Programming	4
Total Credits		4

BS without Concentration

In addition to the mathematics core, science, and computational skills requirements listed above, students who are not choosing a concentration must complete the following coursework:

Code	Title	Credits
Traditional Mathematics		
MATH 125	Discrete Mathematics I (Mason Core) (http://catalog.gmu.edu/mason-core/)	3
MATH 315	Advanced Calculus I	3
MATH 316	Advanced Calculus II	3
MATH 321 or MATH 431	Abstract Algebra Topology	3
Select 12 additional credits of MATH courses numbered above 300 (http://catalog.gmu.edu/courses/math/) [1]		12
Additional Science		
Select additional science credits from one of the following three options:		4-9
A second sequence from the choices under "Science" above		
6 credits from more advanced courses in biology, chemistry, geology, or physics [2]		
The 4-credit option of PHYS 262 and PHYS 263		
Total Credits		28-33

[1] Excluding MATH 400 History of Math (Topic Varies) (Mason Core) (http://catalog.gmu.edu/mason-core/).

[2] Only refers to courses acceptable for credit toward a natural science major. Suggested courses include: CHEM 313 Organic Chemistry I through CHEM 332 Physical Chemistry II; CHEM 463 General Biochemistry I; GEOL 302 Mineralogy through GEOL 364 Marine Geology; and PHYS 266 Introduction to Thermodynamics.

Concentration in Actuarial Mathematics (ACTM)

This concentration provides exciting opportunities for students interested in studying actuarial mathematics. Expertise in this field leads directly into a career as a practicing actuary with an insurance company, consulting firm, or in government employment.

Code	Title	Credits
ACTM Courses		
MATH 125	Discrete Mathematics I (Mason Core) (http://catalog.gmu.edu/mason-core/)	3
MATH 351	Probability	3
MATH 352	Statistics	3
MATH 551	Regression and Time Series	3
MATH 554	Financial Mathematics	3
MATH 555	Actuarial Modeling I	3
MATH 557	Financial Derivatives	3
ACCT 203	Survey of Accounting	3
ECON 103	Contemporary Microeconomic Principles (Mason Core) (http://catalog.gmu.edu/mason-core/)	3
ECON 306 or ECON 310 or FNAN 321	Intermediate Microeconomics [1] Money and Banking Financial Institutions	3
STAT 362	Introduction to Computer Statistical Packages	3
Select two from the following:		6
MATH 441	Deterministic Operations Research	
MATH 442	Stochastic Operations Research	
MATH 446	Numerical Analysis I	
MATH 453	Advanced Mathematical Statistics	
Total Credits		39

[1] For mathematics majors, the Department of Economics has agreed to waive the ECON 104 Contemporary Macroeconomic Principles (Mason Core) (http://catalog.gmu.edu/mason-core/) prerequisite.

Concentration in Applied Mathematics (AMT)

This concentration provides exciting opportunities for students interested in taking additional classes on applied mathematics. The concentration prepares numerical analysts able to deal with real world applications in science and engineering.

Code	Title	Credits
AMT Courses		
MATH 125	Discrete Mathematics I (Mason Core) (http://catalog.gmu.edu/mason-core/)	3
MATH 315	Advanced Calculus I	3
MATH 351	Probability	3
MATH 413	Modern Applied Mathematics I	3
MATH 414	Modern Applied Mathematics II	3
MATH 446	Numerical Analysis I	3
Select 6 credits of MATH courses numbered above 300 (http://catalog.gmu.edu/courses/math/) [1]		6
Additional Science Courses		
Select additional science credits from one of the following three options:		4-9
A second sequence from the choices under "Science" above		
6 credits from more advanced courses in biology, chemistry, geology, or physics [2]		
The 4-credit option of PHYS 262 and PHYS 263		
Total Credits		28-33

[1] Excluding MATH 400 History of Math (Topic Varies) (Mason Core) (http://catalog.gmu.edu/mason-core/).

[2] Only refers to courses acceptable for credit toward a natural science major). Suggested courses include: CHEM 313 Organic Chemistry I through CHEM 332 Physical Chemistry II; CHEM 463 General Biochemistry I; GEOL 302 Mineralogy through GEOL 364 Marine Geology; and PHYS 266 Introduction to Thermodynamics.

Concentration in Mathematical Statistics (MTHS)

This concentration provides exciting opportunities for students interested in taking additional classes on statistics and data analysis. The concentration prepares data analysts able to deal with real world applications in science and engineering.

Code	Title	Credits
MTHS Courses		
MATH 125	Discrete Mathematics I (Mason Core) (http://catalog.gmu.edu/mason-core/)	3
MATH 315	Advanced Calculus I	3
MATH 351	Probability	3
MATH 352	Statistics	3
MATH 453	Advanced Mathematical Statistics	3
MATH 551	Regression and Time Series	3
STAT 362	Introduction to Computer Statistical Packages	3
Select one from:		3
STAT 260	Introduction to Statistical Practice I	
STAT 350	Introductory Statistics II	
STAT 360	Introduction to Statistical Practice II	
Select two from the following:		6
STAT 455	Experimental Design	
STAT 460	Introduction to Biostatistics	
STAT 462	Applied Multivariate Statistics	
STAT 463	Introduction to Exploratory Data Analysis	
STAT 465	Nonparametric Statistics and Categorical Data Analysis	
STAT 472	Introduction to Statistical Learning	
STAT 474	Introduction to Survey Sampling	
Additional Science Courses		
Select additional science credits from one of the following options:		3-4
Choose 3 credits from more advanced courses in biology, chemistry, geology, or physics [1]		
Choose the 4 credit option of PHYS 262 and PHYS 263		
Total Credits		33-34

[1] Only refers to courses acceptable for credit toward a natural science major. Suggested courses include: CHEM 313 Organic Chemistry I through CHEM 332 Physical Chemistry II; GEOL 302 Mineralogy through GEOL 364 Marine Geology; and PHYS 266 Introduction to Thermodynamics.

Mason Core and Elective Credits

In order to meet a minimum of 120 credits, this degree requires additional credits (specific credit counts by concentration are shown below), which may be applied toward any remaining Mason Core (http://catalog.gmu.edu/mason-core/) requirements (outlined below), Requirements for Bachelor's Degrees (http://catalog.gmu.edu/policies/academic/undergraduate-policies/#ap-5-3-2), and elective courses. Students are strongly encouraged to consult with their advisors to ensure that they fulfill all requirements.

- Without concentration: 51-57 credits
- ACTM concentration: 45-46 credits
- AMT concentration: 51-57 credits
- MTHS concentration: 50-52 credits

Mason Core

Some Mason Core (http://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 (http://catalog.gmu.edu/mason-core/) requirements.

Code	Title	Credits
Foundation Requirements		
Written Communication (ENGH 101) (http://catalog.gmu.edu/mason-core/#written)		3
Oral Communication (http://catalog.gmu.edu/mason-core/#oral)		3
Quantitative Reasoning (http://catalog.gmu.edu/mason-core/#quantitative)		3
Information Technology and Computing (http://catalog.gmu.edu/mason-core/#information-technology)		3

Exploration Requirements

Arts (http://catalog.gmu.edu/mason-core/#arts)	3
Global Understanding (http://catalog.gmu.edu/mason-core/#global)	3
Literature (http://catalog.gmu.edu/mason-core/#literature)	3
Natural Science (http://catalog.gmu.edu/mason-core/#natural-science)	7
Social and Behavioral Sciences (http://catalog.gmu.edu/mason-core/#social-behavioral-science)	3
Western Civilization/World History (http://catalog.gmu.edu/mason-core/#western-civilization-world-history)	3
Integration Requirements	
Written Communications (ENGH 302) (http://catalog.gmu.edu/mason-core/#written)	3
Writing-Intensive (http://catalog.gmu.edu/mason-core/#wi) [1]	3
Synthesis/Capstone (http://catalog.gmu.edu/mason-core/#synthesis-capstone) [2]	3
Total Credits	40

[1]   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.

[2]   Minimum 3 credits required.

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) (http://catalog.gmu.edu/mason-core/)), at least one of which has MATH 300 Introduction to Advanced Mathematics 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/Curriculum and Instruction, 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 (http://catalog.gmu.edu/colleges-schools/science/mathematical-sciences/mathematics-ba/) or BS in Mathematics and an MEd in Curriculum and Instruction (http://catalog.gmu.edu/colleges-schools/education-human-development/school-education/curriculum-instruction-med/) (concentration in secondary education mathematics) in an accelerated time-frame after satisfactory completion of 149 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 Mathematical Sciences (http://catalog.gmu.edu/colleges-schools/science/mathematical-sciences/) and the Graduate School of Education (http://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).

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 Graduate Admissions Policies (http://catalog.gmu.edu/admissions/graduate-policies/). For information specific to this accelerated master's program, see Application Requirements and Deadlines (https://cehd.gmu.edu/bachelors-accelerated-masters-program/).

Accelerated Option Requirements

Students complete the following courses in their senior year:

Senior			
Fall Semester	**Credits**	**Spring Semester**	**Credits**
SEED 572	3	EDRD 619	3
SEED 540	3	SEED 672	3
	6		6

Total Credits 12

Alternative course options are available for students who begin their program in the spring. Students should contact the coordinator for the Bachelor's/Accelerated Master's Degree program in the College of Education and Human Development.

While undergraduate students, accelerated master's students are able to apply two of the courses listed above to both the bachelor's and master's degrees. These courses are considered advanced standing for the MEd. A minimum grade of B must be earned to be eligible to count as advanced standing. The other two courses are taken as reserve graduate credit and do not apply to the undergraduate degree. Early in their final undergraduate semester, students must submit the Bachelor's/Accelerated Master's Transition Form to the CEHD Admissions Office and specify which of the four courses are to be designated as advanced standing and reserve graduate credit.

Mathematics, BA or BS/Mathematics, Accelerated MS
Overview

This degree program allows academically strong Mathematics, BA (http://catalog.gmu.edu/colleges-schools/science/mathematical-sciences/mathematics-ba/) and Mathematics, BS students to obtain

their bachelor's and a Mathematics, MS (http://catalog.gmu.edu/colleges-schools/science/mathematical-sciences/mathematics-ms/) by successfully completing 144 credits. Well-prepared students may be admitted to this program after the completion of 90 undergraduate credits. Upon completion and conferral of the bachelor's degree and with satisfactory graduate-level performance (3.00 GPA) in graduate courses, students are given advanced standing in the Mathematics, MS (http://catalog.gmu.edu/colleges-schools/science/mathematical-sciences/mathematics-ms/) program and complete an additional 24 credits to receive the master's degree.

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 Graduate Admission Policies (http://catalog.gmu.edu/admissions/graduate-policies/). Application information for this accelerated master's program can be found on the Department of Mathematical Sciences website (http://math.gmu.edu/).

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: MATH 315 Advanced Calculus I, MATH 321 Abstract Algebra, and MATH 322 Advanced Linear Algebra.

Accelerated Option Requirements

At the beginning of the student's final undergraduate semester, students must submit a bachelor's/accelerated master's transition form (available from the Office of the University Registrar (http://registrar.gmu.edu)) to the College of Science's Office of Academic and Student Affairs (https://cos.gmu.edu/about/contact-us/). Students must begin their master's program in the semester immediately following conferral of the bachelor's degree.

Students must maintain an overall GPA of 3.00 or higher in graduate coursework.

Reserve Graduate Credit

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. See AP.1.4.4 Graduate Course Enrollment by Undergraduates (http://catalog.gmu.edu/policies/academic/registration-attendance/#ap-1-4-4).

BS (selected)/Statistical Science, Accelerated MS

Overview

Highly-qualified students in BS programs have the option of applying to the accelerated Statistical Science, MS (http://catalog.gmu.edu/colleges-schools/engineering/statistics/statistical-science-ms/) program.

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/).

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/statistics/statistical-science-ms/) program **if such an accelerated 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;** and if they have earned 90 undergraduate credits with an overall GPA of 3.00. Students must have successfully completed the following Mason courses each with a grade of C or better prior to admission to the accelerated program:

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 Option Requirements

Students must complete all credits satisfying degree requirements for the BS and MS programs, with 6 credits overlap chosen from the following courses: STAT 515 Applied Statistics and Visualization for Analytics, STAT 544 Applied Probability, STAT 554 Applied Statistics I, STAT 560 Biostatistical Methods, and STAT 574 Survey Sampling I. (Credit may not be received for both STAT 474 and STAT 574; nor for both STAT 460 and STAT 560.) The graduate courses selected for overlap must be approved by the academic advisors of both the BS and MS programs. All graduate course prerequisties 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.

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.