

Program Change Request

Date Submitted: 03/22/23 1:55 pm

Viewing: **SC-BS-MATH : Mathematics, BS**

Last approved: 05/02/22 2:43 pm

Last edit: 03/30/23 11:29 am

Changes proposed by: jbazaz

Catalog Pages
Using this Program
[Mathematics, BS](#)

In Workflow

1. MATH Chair
2. SC Curriculum Committee
3. SC Associate Dean
4. Assoc Provost- Undergraduate
5. Registrar:Concentrat Code
6. Registrar-Programs

Are you completing this form on someone else's behalf?

Yes

Requestor:

Approval Path

1. 03/22/23 2:00 pm
Maria Emelianenko (memelian):
Approved for MATH Chair

History

1. Nov 21, 2017 by clmig-jwehrheim
2. Nov 21, 2017 by clmig-jwehrheim
3. Jan 17, 2018 by rzachari
4. Feb 7, 2018 by rzachari
5. Mar 1, 2018 by Jennifer Bazaz Gettys (jbazaz)
6. Feb 8, 2019 by Jennifer Bazaz Gettys (jbazaz)
7. Mar 27, 2019 by Tory Sarro (vsarro)

- 8. Jan 16, 2020 by
Jennifer Bazaz
Gettys (jbazaz)
- 9. Mar 24, 2020 by
Jennifer Bazaz
Gettys (jbazaz)
- 10. Feb 2, 2021 by
jriemen
- 11. Mar 9, 2022 by
Jennifer Bazaz
Gettys (jbazaz)
- 12. May 2, 2022 by
Jennifer Bazaz
Gettys (jbazaz)

Name	Extension	Email
Catherine Sausville	1460	csausvil@gmu.edu

Effective Catalog: 2023-2024

Program Level: Undergraduate

Program Type: Bachelor's

Degree Type: Bachelor of Science

Title: Mathematics, BS

Banner Title: Mathematics, BS

Registrar/OAPI Use Only – SCHEV Status Approved

Registrar's Office Use Only – Program Start Term

Registrar/OAPI Use Only – SCHEV Letter

Registrar/OAPI Use Only – SACSCOC Status

Concentration(s):

	Associated Concentrations	Registrar's Office Use Only: Concentration Code
1	Individualized Concentration	INDC
2	Pure Mathematics	PURM
3 1	Actuarial Mathematics	ACTM
4 2	Applied Mathematics	AMT
5 4	Data Science	DSCI
6 3	Mathematical Statistics	MTHS

Registrar/IRR Use Only – Concentration CIP Code

College/School: College of Science

Department / Academic Unit: Mathematical Sciences

Jointly Owned Program? No

Justification

What: Remove “no concentration” option.

Why: We would like to require students to choose a concentration.

What: Add “Individualized Concentration”

Why: To create something similar to the current no concentration but more flexible.

What: Add “Pure Math Concentration”

Why: Primarily to prepare graduate school-bound students.

Total Credits Required: Total credits: minimum 120

Registrar's Office Use Only - Program Code: SC-BS-MATH

Registrar/IRR Use Only – Program CIP Code

Admission Requirements:

Admissions

University-wide admissions policies can be found in the [Undergraduate Admissions Policies](#) section of this catalog. To apply for this program, please complete the [George Mason University Admissions Application](#).

Program-Specific Policies:

Policies

Students must fulfill all [Requirements for Bachelor's Degrees](#), including the [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](#).

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

Degree Requirements:

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 **must may** select **one an-optional** concentration **from: Individualized Concentration (INDC), Pure Mathematics (PURM), Actuarial in-Actuarial** Mathematics (ACTM), Applied Mathematics (AMT), Data Science (DSCI), or Mathematical Statistics (MTHS).

Mathematics Core

[MATH 113](#) Analytic Geometry and Calculus I ([Mason Core](#))

4

MATH 114	Analytic Geometry and Calculus II	4
MATH 125	Discrete Mathematics I (Mason Core)	3
MATH 203	Linear Algebra	3
MATH 213	Analytic Geometry and Calculus III	3
or MATH 215	Analytic Geometry and Calculus III (Honors)	
MATH 214	Elementary Differential Equations	3
or MATH 216	Theory of Differential Equations	
MATH 300	Introduction to Advanced Mathematics 1	3
MATH 322	Advanced Linear Algebra	3
Total Credits		26
1	Fulfills the writing intensive requirement.	

Science

Select a one-year sequence of a laboratory science from the following courses: 8-9

Biology Sequence:

[BIOL 213](#) Cell Structure and Function

Choose one from the following:

[BIOL 300](#) BioDiversity

[BIOL 308](#) Foundations of Ecology and Evolution

[BIOL 311](#) General Genetics

Chemistry Sequence:

[CHEM 211](#) General Chemistry I ([Mason Core](#))
& [CHEM 213](#) and General Chemistry Laboratory I ([Mason Core](#))

[CHEM 212](#) General Chemistry II ([Mason Core](#))
& [CHEM 214](#) and General Chemistry Laboratory II ([Mason Core](#))

Geology Sequence:

[GEOL 101](#) Physical Geology ([Mason Core](#))
& [GEOL 103](#) and Physical Geology Lab ([Mason Core](#))

[GEOL 102](#) Historical Geology ([Mason Core](#))
& [GEOL 104](#) and Historical Geology Laboratory ([Mason Core](#))

Physics Sequence:

[PHYS 160](#) University Physics I ([Mason Core](#))
& [PHYS 161](#) and University Physics I Laboratory ([Mason Core](#))

[PHYS 260](#) University Physics II ([Mason Core](#))
& [PHYS 261](#) and University Physics II Laboratory ([Mason Core](#))

Total Credits 8-9

Computational Skills

[CS 112](#) Introduction to Computer Programming ([Mason Core](#)) 4

Total Credits 4

Individualized ~~BS~~ without Concentration (INDC)

Students who are not choosing a concentration in pure mathematics, applied mathematics, data ~~in addition to the mathematics core~~; science, mathematical statistics, or actuarial science may choose an individualized concentration. The individualized concentration allows ~~and computational skills requirements listed above~~; students to take coursework in a variety of fields. ~~who are not choosing a concentration must complete the following coursework~~: Students should work closely with a mathematics advisor and have their individual degree plan approved no later than their junior year.

~~1Excluding MATH 400%7CCode:~~

~~2Only refers to courses acceptable for credit toward a natural science major. Consider courses from the following:~~

~~BIOL 300-499, CHEM 300-499, GEOL 300-499, PHYS 300-499:~~

~~3Up to 3 credits in math 490%7CCode and 6 credits in math 491%7CCode can be applied to this requirement.~~

~~A total of 12 credits between MATH 490%7CCode and MATH 491%7CCode can be applied to this degree via this concentration option and any elective credits:~~

Traditional Mathematics

MATH 315	Advanced Calculus I	3
MATH 316	Advanced Calculus II	3
MATH 321	Abstract Algebra	3
or MATH 431	Topology	

Select 12 additional credits of MATH courses numbered above 300-1,3 12

Additional Science

Select additional science credits from one of the following options: 4-9

1. A second sequence from the choices under "Science" above
2. 6 credits from more advanced courses in biology, chemistry, geology, or physics 2
3. The 4-credit option of PHYS 262 and PHYS 263
4. Choose two courses from the following:

CDS 230	Modeling and Simulation I
CDS 301	Scientific Information and Data Visualization
CS 211	Object-Oriented Programming
CS 310	Data Structures
CS 330	Formal Methods and Models
CS 483	Analysis of Algorithms

Total Credits 0

Required Courses

MATH 315 **Advanced Calculus I** **3**

Select two from the following: **6**

MATH 316	Advanced Calculus II
MATH 321	Abstract Algebra
MATH 421	Abstract Algebra II
MATH 431	Topology
MATH 432	Differential Geometry

<u>MATH 433</u>	Algebraic Geometry
<u>MATH 464</u>	Linear Algebra with Data Applications
<u>MATH 465</u>	Mathematics of Data Science

Electives

Choose 12 additional upper-level MATH-prefixed credits, not taken above. **12**

Additional Science

Select one option from the following: **4-9**

1. A second sequence from the choices under "Science" above
2. 6 credits from more advanced courses in biology, chemistry, geology, or physics 1
3. The 4-credit option of PHYS 262 and PHYS 263

Select two courses from the following: **6**

<u>CDS 230</u>	Modeling and Simulation I
<u>CDS 301</u>	Scientific Information and Data Visualization
<u>CS 211</u>	Object-Oriented Programming
<u>CS 310</u>	Data Structures
<u>CS 330</u>	Formal Methods and Models
<u>CS 483</u>	Analysis of Algorithms

Total Credits 31-36

1Only refers to courses acceptable for credit toward a natural science major. Consider courses from the following: BIOL 300-499, CHEM 300-499, GEOL 300-499, PHYS 300-499.

Concentration in Pure ~~Actuarial~~ Mathematics (PURM)

Pure mathematics is the study of ideas and structures that underlie all of mathematics. ~~(ACTM)~~ This concentration provides exciting opportunities for students interested in **advanced coursework in the fields traditionally referred to as "pure mathematics". ~~studying actuarial mathematics.~~** The concentration prepares students for a wide variety of careers involving mathematical thinking or graduate studies in pure mathematics.

Breadth Requirements

<u>MATH 315</u>	Advanced Calculus I	3
<u>MATH 321</u>	Abstract Algebra	3
<u>MATH 411</u>	Functions of a Complex Variable	3

Choose one from the following: **3**

<u>MATH 312</u>	Geometry
<u>MATH 431</u>	Topology

Depth Requirements

Select two from the following: **6**

<u>MATH 312</u>	Geometry (if not chosen above)
<u>MATH 316</u>	Advanced Calculus II
<u>MATH 325</u>	Discrete Mathematics II
<u>MATH 421</u>	Abstract Algebra II
<u>MATH 431</u>	Topology (if not chosen above)
<u>MATH 432</u>	Differential Geometry

MATH 433**Algebraic Geometry****Additional Mathematics****Choose 3 credits of upper level MATH-prefixed credits****3****Additional Science****Select one option from the following:****4-9**

1. A second sequence from the choices under "Science" above
2. 6 credits from more advanced courses in biology, chemistry, geology, or physics 1
3. The 4-credit option of **PHYS 262** and **PHYS 263**

Total Credits

25-30

1Only refers to courses acceptable for credit toward a natural science major. Consider courses from the following:**BIOL 300-499, CHEM 300-499, GEOL 300-499, PHYS 300-499.**

~~**Expertise in this field leads directly into a career as a practicing actuary with an insurance company, consulting firm, or in government employment.**~~ **Concentration in Actuarial Applied**

Mathematics (ACTM) (AMT)

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

ACTM Courses

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)	3
ECON 306	Intermediate Microeconomics 1	3
or ECON 310	Money and Banking	
or FNAN 321	Financial Institutions	
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

36**1For mathematics majors, the Department of Economics has agreed to waive the **ECON 104** prerequisite.**

Concentration in Applied Mathematics (AMT)

This concentration provides exciting opportunities for students interested in taking additional classes in applied mathematics. The concentration prepares ~~students numerical analysts able~~ to deal with real world applications in science and ~~engineering, or to pursue graduate studies in applied mathematics. engineering:~~

AMT Courses

MATH 313	Introduction to Applied Analysis	3
MATH 315	Advanced Calculus I	3
MATH 351	Probability	3
MATH 413	Modern Applied Mathematics I	3
MATH 446	Numerical Analysis I	3
Select 3 credits of MATH courses numbered above 300		1
Select two courses from the following:		6
MATH 314	Advanced Differential Equations	
MATH 414	Modern Applied Mathematics II	
MATH 478	Introduction to Partial Differential Equations with Numerical Methods	

Additional Science Courses

Select additional science credits from one of the following options: 4-9

1. A second sequence from the choices under "Science" above
2. Select 6 credits from more advanced courses in biology, chemistry, geology, or physics
3. The 4-credit option of [PHYS 262](#) and [PHYS 263](#)
4. Select two courses from the following:

CDS 230	Modeling and Simulation I
CDS 301	Scientific Information and Data Visualization
CS 211	Object-Oriented Programming
CS 310	Data Structures
CS 330	Formal Methods and Models
CS 483	Analysis of Algorithms

Total Credits 28-33

1Excluding [MATH 400](#).

2Only refers to courses acceptable for credit toward a natural science major. Consider courses from the following:

BIOL 300-499, CHEM 300-499, GEOL 300-499, PHYS 300-499.

Concentration in Data Science (DSCI)

The data science concentration prepares math majors for careers in industry and academia with a focus on the rapidly developing area of the mathematics of data science. Students in this program will develop analytical and computational skills that will provide a deeper understanding of machine learning and data science concepts. By mastering the theoretical foundation underlying practical algorithms and uncovering inherent connections with several branches of modern mathematics, students will hone their creativity and independent thinking skills necessary to lead the data science revolution.

Data Science Courses

MATH 315	Advanced Calculus I	3
MATH 351	Probability	3
MATH 446	Numerical Analysis I	3
MATH 464	Linear Algebra with Data Applications	3

Select two options from the following: 6-7

MATH 447	Numerical Analysis II	
MATH 462	Mathematics of Machine Learning and Industrial Applications I	
& MATH 463	and Mathematics of Machine Learning and Industrial Applications II	
MATH 465	Mathematics of Data Science	

Select one course from the following: 3

MATH 352	Statistics	
STAT 350	Introductory Statistics II	
STAT 360	Introduction to Statistical Practice II	
STAT 356	Statistical Theory	

Select one course from the following: 3

CDS 301	Scientific Information and Data Visualization	
CDS 302	Scientific Data and Databases	
CS 310	Data Structures	

Additional Science Courses

Select additional science credits from one of the following options: 3-4

1. Select one course from the following:

BIOL 213	Cell Structure and Function	
CHEM 211	General Chemistry I (Mason Core)	
& CHEM 213	and General Chemistry Laboratory I (Mason Core)	
GEOL 101	Physical Geology (Mason Core)	
& GEOL 103	and Physical Geology Lab (Mason Core)	
PHYS 160	University Physics I (Mason Core)	
& PHYS 161	and University Physics I Laboratory (Mason Core)	

2. 3 credits from more advanced courses in biology, chemistry, geology, or physics 1

3. The 4 credit option of [PHYS 262](#) and [PHYS 263](#)

Total Credits 27-29

1Only refers to courses acceptable for credit toward a natural science major. Consider courses from the following:

BIOL 300-499, CHEM 300-499, GEOL 300-499, PHYS 300-499.

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.

MTHS Courses

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:

STAT 260	Introduction to Statistical Practice I	3
STAT 350	Introductory Statistics II	
STAT 360	Introduction to Statistical Practice II	

Select two from the following:

STAT 455	Experimental Design	6
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

1. Choose one from the following different lab sciences:

BIOL 213	Cell Structure and Function
CHEM 211	General Chemistry I (Mason Core)
& CHEM 213	and General Chemistry Laboratory I (Mason Core)
GEOL 101	Physical Geology (Mason Core)
& GEOL 103	and Physical Geology Lab (Mason Core)
PHYS 160	University Physics I (Mason Core)
& PHYS 161	and University Physics I Laboratory (Mason Core)

2. Choose 3 credits from more advanced courses in biology, chemistry, geology, or physics 1

3. Choose the 4 credit option of [PHYS 262](#) and [PHYS 263](#)

4. Choose one course from the following:

CDS 230	Modeling and Simulation I
CDS 301	Scientific Information and Data Visualization
CS 211	Object-Oriented Programming
CS 310	Data Structures
CS 330	Formal Methods and Models
CS 483	Analysis of Algorithms

Total Credits

30-31

1Only refers to courses acceptable for credit toward a natural science major. Consider courses from the following:

BIOL 300-499, CHEM 300-499, GEOL 300-499, PHYS 300-499.

**Retroactive
Requirements
Updates:**

Plan of Study:**Honors****Information:**

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](#))), 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.

Program Outcomes

Additional Program Information

This information is required by the Office of Accreditation and Program Integrity.

Courses offered via distance (if applicable):

What is the primary delivery format for the program?
Face-to-Face Only

Does any portion of this program occur off-campus?
No

Are you working with a vendor / other collaborators to offer your program?
No

Related Departments

Could this program prepare students for any type of professional licensure, in Virginia or elsewhere?
No

Are you adding or removing a licensure component?

No

Additional SCHEV & SACSCOC Information

Is this change a simple retitling of an existing program, with no other changes, to any existing program content, curriculum requirements, etc?

No

Does this change represent a repackaging of content in an existing approved degree/certificate program at the same instructional level (i.e., baccalaureate, master's, or doctoral)?

No

Percentage of total credits containing new course content. ("New course content" is defined by SACSCOC as content that is not currently included in an existing approved degree/certificate program at the same instructional level. Do not exclude gen ed credits in calculations for undergraduate programs.)

0%-24%

Does this change include the addition of a distance education or face-to-face method of delivery for this program?

No

Does this change include the addition of a course/credit-based competency-based education delivery option?

No

Will any additional equipment/facilities be needed?

No

Will any additional faculty be required?

No

Will any additional financial resources be needed?

No

Additional library/learning resources needed?

No

OAPI Use Only – Determination of SACSCOC Impact

Comments or Notes

Green Leaf Program Designation

Is this a Green Leaf program? No

Does this program cover material which crosses into another department?

No

Additional Attachments

- [UGC-COS-Program Mod BS Math.pdf](#)
- [UGC-COS-Program-Mod-bsmath_001.pdf](#)
- [BS_in_math_modification_ProgramApprovalForm_COSCC-2_ACTUARIAL.pdf](#)

SCHEV Proposal

Executive Summary

Reviewer Comments

Additional Comments

Is this course required of all students in this degree program?

%wi_required.eshtml%

Key: 587