Program Change Request

Date Submitted: 09/07/23 10:58 am

Viewing: SC-BS-MATH : Mathematics, BS

Last approved: 06/01/23 9:19 am

Last edit: 09/07/23 10:58 am

Changes proposed by: jbazaz

Catalog Pages Using this Program Mathematics, BS

No Longer Anticipated closure date (i.e., calendar

Rationale for

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

Yes

Requestor:

In Workflow

1. **MATH Chair**
2. **SC Curriculum Committee**
3. SC Assistant Dean
4. Assoc Provost-Undergraduate
5. Registrar-Programs

Approval Path

1. 11/09/23 3:36 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)
13. May 4, 2023 by Jennifer Bazaz Gettys (jbazaz)
14. Jun 1, 2023 by Tory Sarro (vsarro)

Name	Extension	Email
Catherine Sausville	1460	csausvil@gmu.edu

Effective Catalog: 2024-2025

Program Level: Undergraduate

Program Type: Bachelor's

Degree Type: Bachelor of Science

Title: Mathematics, BS

Approval Criteria

1. What was the process used within your acade
2. Who was involved in approving the badge?
3. What evidence was used to identify need/dem
4. Please attest to the following statements regarding
a. Have you ensured there are no other existing badg
b. Has CPE confirmed the proposed badge does not
c. Has the instructor(s) for this badge experience been
d. Is there a contact hour minimum?
e. Is an assessment required?
f. Does this badge provide a benefit for current or
5. Is this badge co-sponsored with another organization, association, or unit? (If you would like an
a. What is the organization, program, or department

Earning Criteria

Course:
Badge:
Participant:
Payment:
Portfolio:
Presentation:
Assessment:
Credential:
Education
Other:
Project:

Schedule/Registration:
Volunteer:

Skills Tag

Skills Tag

Badge Attributes

Please select one from each category:
Achievement Type:
Mastery Level:
Time Commitment:
Cost:
Industry Standards:
Recommendations:

Issuance information and Pricing

Pricing: See https://cpe.gmu.edu/digitalbadgepricing/ for more information

Estimated Number of Badges Expected to be Issued:

Notes:

- All badge requests will be routed to CPE for review and approval. Please allow 7
- A Mason Digital Credentials Advisory Group may be developed to review badge

Banner Title:	Mathematics, BS
Is this a retitling of an existing program?	
Existing Program Title	
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	IND
2	Pure Mathematics	PURM
3	Actuarial Mathematics	ACTM
4	Applied Mathematics	AMT

	Associated Concentrations	Registrar's Office Use Only: Concentration Code
5	Data Science	DSCI
6	Mathematical Statistics	MTHS

INTO Major(s):

Registrar/IRR Use Only – Concentration CIP Code

College/School: College of Science

Department / Academic Unit: Mathematical Sciences

Jointly Owned Program? No

Participating

Participating

Justification

What: Adding a fourth option to the "Additional Science Courses" sections of the PURM and IND concentrations.
Why: They were mistakenly omitted when the new concentrations were created.

What: Adding footnotes about MATH 400 being excluded from instances of upper-level MATH course options.
Why: This course's content does not fulfill the requirement's intent.

Catalog Published Information

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 (Mason Core) 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 select one concentration from: Individualized Concentration (IND), Pure Mathematics (PURM), 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 (Mason Core)	13
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 (Mason Core)

Choose one from the following:

BIOL 300	BioDiversity
BIOL 308	Foundations of Ecology and Evolution (Mason Core)
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 Concentration (IND)

Students who are not choosing a concentration in pure mathematics, applied mathematics, data science, mathematical statistics, or actuarial science may choose an individualized concentration. The individualized concentration allows students to take coursework in a variety of fields. Students should work closely with a mathematics advisor and have their individual degree plan approved no later than their junior year.

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	
MATH 433	Algebraic Geometry	
MATH 464	Linear Algebra with Data Applications	
MATH 465	Mathematics of Data Science	
Electives		
Choose 12 additional upper-level MATH-prefixed credits, not taken above. 1		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 2		
3. The 4-credit option of PHYS 262 and PHYS 263		
~~Select two courses from the following:~~		~~6~~
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		25-30

1

Excluding MATH 400 History of Math (Topic Varies) (Mason Core)

2

Only 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 Mathematics (PURM)

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

Breadth Requirements		
MATH 315	Advanced Calculus I	3
MATH 321	Abstract Algebra	3
MATH 411	Functions of a Complex Variable	3
Choose one from the following:		3
MATH 312	Geometry	
MATH 431	Topology	
Depth Requirements		

Select two from the following:		6
MATH 312	Geometry (if not chosen above)	
MATH 316	Advanced Calculus II	
MATH 325	Discrete Mathematics II	
MATH 421	Abstract Algebra II	
MATH 431	Topology (if not chosen above)	
MATH 432	Differential Geometry	
MATH 433	Algebraic Geometry	
Additional Mathematics		
Choose 3 credits of upper level MATH-prefixed credits 1		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 2		
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		25-30

1

Excluding MATH 400 History of Math (Topic Varies) (Mason Core)

2

Only 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 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.

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

1

For 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 to deal with real-world applications in science and engineering, or to pursue graduate studies in applied mathematics.

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		3
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 2
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

1

Excluding MATH 400 History of Math (Topic Varies) (Mason Core)

2

Only 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 (Mason Core)	
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 (Mason Core)	
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

1

Only 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:		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

1. Choose one from the following different lab sciences:

BIOL 213	Cell Structure and Function (Mason Core)
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

1

Only 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 (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 Description/Dual Degree Description:

INTO-Mason Requirements:

College Requirements & Policies:

Department / Academic Unit Requirements & Policies:

Program Outcomes

Additional Program Information

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

Courses offered via distance (if applicable):

Indicate whether students are able

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

Please explain:

Related Departments

Could this program prepare students for any type of professional licensure, in Virginia or elsewhere?

No

Please explain:

Are you adding or removing a licensure component?

No

Please explain:

Additional SCHEV & SACSCOC Information

Is the content of the new program closely related to that of an existing approved program at the same instructional level (i.e., baccalaureate, master's, doctoral)?

Which existing approved program(s)?

Is this new program considered to be "advancing the degree level of a currently approved program" (i.e existing content is at lower degree level, new content is at the higher degree level)?

Which existing approved program(s)?

Is this new program considered to be "lowering the degree level of a currently approved program" (i.e. existing content is at higher degree level, new content is at the lower degree level)?

Which existing approved program(s)?

Is this a re-opening of a program that was closed to admission within the last five years?

Date of Program Closure

What are the methods of delivery for the program?

Does this program include a course/credit-based competency-based education delivery option?

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

Which existing approved program(s)?

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

What is the new method of delivery?

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

Description of institutional impact:

Will any additional faculty be required?

No

Description of institutional impact:

Will any additional financial resources be needed?

No

Description of institutional impact:

Additional library/learning resources needed?

No

Description of institutional impact:

OAPI Use Only – Determination of SACSCOC Impact

Comments or Notes

Green Leaf Program Designation

Is this a Green Leaf program? No

Green Leaf Designation

Sustainability-focused academic programs require at least one green leaf course. Either that course is itself sustainability-focused or else the program requires a set of sustainability-related courses with aggregated substance equivalent to a sustainability-focused course.

Relationship to Existing Programs

List sustainability-focused courses currently required in the degree

Sustainability-related academic programs either require at least one sustainability-related course or else offer any green leaf course as an option or elective.*

List sustainability-related courses currently required in the degree

Does this program cover material which crosses into another department?

No

Impacted Departments

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.eschtml%

Attached Document

%attach_document.eschtml%

Key: 587