CLEMSON UNIVERSITY

Curriculum and Course Change System - Print Major Form

000021

Change Major Name: Mathematical Sciences (BS - 201405)
Degree: BS
Effective Catalog Year: 2014
.. **Change Major Name to:**
.. **Change Degree to:** (CHE approval required)
X **Change Curriculum Requirements**
(Submit or upload Curriculum map in catalog format. CHE approval required for > 18 hours of changes)
.. **Change General Education Requirements**
(Must also submit a General Education Checklist)
.. **Add, Change or Delete Concentration(s)**
(Submit or upload Curriculum map in catalog format. CHE approval required)
.. **Add, Change or Delete Emphasis Area(s)**
Explanation: Curriculum has changed so that there are fewer course substitutions. Also, a new course, MATH 3190, has been added to the curriculum to prepare students better for proof-writing courses. Finally, the Operations Research/Management Science and Statistics Emphasis Areas have been modified.
Form Originator: CAWOOD, Cawood,Mark E. **Date Form Created:** 11/3/2013
Form Last Updated by: CAWOOD, Cawood,Mark E. **Date Form Last Updated:** 11/3/2013
Form Number: 6770

Approval

Chair, Department Curriculum Committee	11/4/2013 Date	Chair, Undergraduate Curriculum Committee	2/7/201 Date
Department Chair	11/4/2013 Date	Chair, Graduate Curriculum Committee	Date
Chair, College Curriculum Committee	11/15/13 Date	Provost	3/24/14 Date
College Dean	11/15/13 Date	President	3/24/14 Date

MATHEMATICAL SCIENCES

The Mathematical Sciences curriculum is designed to be versatile. Students gain a broad knowledge of mathematical concepts and methods that are applicable in sciences, engineering, business, industry, and other professions requiring a strong mathematical background. In addition to the basic courses that provide necessary mathematical skills, the curriculum allows students to select an emphasis area or concentration, providing an introduction to a specific area where mathematics is used. These are Abstract Mathematics, Actuarial Science/Financial Mathematics, Applied and Computational Mathematics, Biology, Computer Science, Operations Research/Management Science, and Statistics.

In addition to the overall goal of preparing students to cope with a variety of mathematical problems, the curriculum seeks to provide an adequate background for students who plan to pursue graduate study or positions in business, industry, or government. Students electing the Biology Concentration will have the necessary preparation for entering medical school. More information about the degree program can be found at *www.clemson.edu/ces/departments/math*.

All mathematical sciences majors are required to complete a capstone experience that provides an opportunity to pursue research, independent study, or an approved internship under the direction of a faculty member, or the opportunity to study mathematical models in some area of the mathematical sciences. The capstone experience requires a written report (thesis, computer code, project description, intern experience, etc.) and an oral or poster presentation by each student.

Combined Bachelor's/Master's Plan

Under this plan, students may reduce the time necessary to earn both degrees by applying up to twelve graduate credits to both undergraduate and graduate program requirements. Students are encouraged to obtain the specific requirements for pursuing the combined degree from the Department of Mathematical Sciences (*www.clemson.edu/ces/departments/math*) as early as possible in their undergraduate program. Enrollment guidelines and procedures can be found under *Academic Regulations* in this catalog.

Bachelor of Science

Freshman Year

First Semester
3 - Social Science Requirement[1]
3 - ENGL 1030 Accelerated Composition
4 - MATH 1060 Calculus of One Variable I
3 - Arts and Humanities (Non-Lit.) Requirement[2]
3 - Foreign Language Requirement[3]
16

Second Semester
4 - MATH 1080 Calculus of One Variable II
3 - Cross-Cultural Awareness Requirement[2]
3 - PHYS 1220 Physics with Calculus I
3 - Computer Science Requirement[4]
3 - Social Science Requirement[1]
16

Sophomore Year

First Semester
4 - MATH 2060 Calculus of Several Variables
1 - MATH 2500 Intro. to Mathematical Sciences
3 - MATH 3190 Introduction to Proof
3 - MATH 3600 Intermediate Math. Computing
4 - Natural Science Requirement[5]
15

Second Semester
4 - MATH 2080 Intro. to Ordinary Diff. Equations
3 - MATH 3020 Statistics for Science and Engr.
3 - Arts and Humanities (Literature) Requirement[2]
4 - Natural Science Requirement[5]
3 - MATH 3110 Linear Algebra
17

Junior Year

First Semester
3 - Advanced Writing Requirement[6]
3 - MATH 4000 Theory of Probability
3 - MATH 4400 Linear Programming
3 - MATH 4530 Advanced Calculus I
3 - Technical Requirement[7]
15

Second Semester
3 - MATH 4120 Introduction to Modern Algebra
3 - MATH 4540 Advanced Calculus II
3 - Emphasis Area Requirement[8]
3 - Technical Requirement[7]
3 - Elective
15

Senior Year

First Semester
3 - Oral Communication Requirement[2]
3 - Capstone Experience[9]
6 - Emphasis Area Requirement[8]
3 - Science and Tech. in Society Requirement[2]
15

Second Semester
1 - MATH 4920 Professional Development
3 - Capstone Experience[9]
3 - Emphasis Area Requirement[8]
3 - Mathematical Sciences Requirement[10]
3 - Elective
13

122 Total Semester Hours

[1]See General Education Requirements. ECON 2110 is recommended. ECON 2110 is required for students whose emphasis area is Actuarial Science/Financial Mathematics.

[2]See General Education Requirements.

[3]Three credits in any foreign language, including American Sign Language, numbered 1020 or above

[4]CPSC 1010, 1110, 1610, or 2200.

[5]Any two-semester sequence selected from the list of Natural Science with Lab courses in the General Education Requirements.

[6]Any one of the courses ENGL 3040, 3120, 3140, or 3150; the cluster of courses AS 3090, 3100, 4090 and 4100; or the cluster of courses ML 3010, 3020, 4010, and 4020. ENGL 3140 is recommended.

[7]ECON 2120, ECON 4050, CPSC 1020, CPSC 2100, CPSC 2120, or FIN 3110; or any two natural science courses from General Education Natural Science Requirements (labs not required). Actuarial Science/Financial Mathematics requires ECON 2120 and FIN 3110, and Computer Science Emphasis Area requires CPSC 1020 and 2120, or 2100 and 2120.

[8]Select from Abstract Mathematics, Actuarial Science/Financial Mathematics, Applied and Computational Mathematics, Computer Science, Operations Research/Management Science, or Statistics.

[9]May be satisfied by (1) completion of six credits of MATH 4820; (2) completion of six credits of MATH 4910 or an approved substitution; or (3) completion of three credits of MATH 4500 and three credits of an additional course approved by the advisor. Students in the Actuarial Science/Financial Mathematics Emphasis Area must take MATH 4070 and 4410. Students in the Operations Research/Management Science Emphasis Area must take MATH 4070 and MATH 4420. Students in the Statistics Emphasis Area must take MATH 4070 and MATH 4410.

[10]Any 4000-level MATH or STAT course approved by the advisor.

Notes:

1. For graduation, a candidate for the BS degree in Mathematical Sciences will be required to have a 2.0 or higher cumulative grade-point average in all required MATH courses.
2. A grade of C or better must be earned in all prerequisite courses before enrolling in the next MATH course.
3. Students who change majors to Mathematical Sciences must have achieved the Minimum Cumulative Grade-Point Average (MCGPA) by Total Credit Hour Level as defined in the Academic Regulations section of the *Undergraduate Announcements* and must have received a grade of C or better in all MATH courses taken.

EMPHASIS AREAS

Abstract Mathematics[1]
6 - Abstract Mathematics Requirement[2]
6 - Mathematical Sciences Requirement[3]
12

Actuarial Science/Financial Mathematics[4]
3 - ACCT 2010 Financial Accounting Concepts
1 - ACCT 2040 Accounting Procedures
3 - FIN 3120 Financial Management II
3 - MATH 4030 Intro. to Statistical Theory
3 - MATH 4310 Theory of Interest
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Applied and Computational Mathematics
3 - MATH 4340 Advanced Engineering Math.
3 - MATH 4600 Intro. to Numerical Analysis I
6 - Applications Area[3]
12

Computer Science
3 - CPSC 2150 Software Development Foundations
9 - Computer Science 3000-Level Requirement[5]
12

Operations Research/Management Science
3 - IE 3860 Production Planning and Control
4 - IE 4820 Systems Modeling
3 - STAT 4020 Statistical Computing
3 - MATH 4410 Intro. to Stochastic Models
13

Statistics
3 - MATH 4020 Statistical Theory and Meth. II
3 - MATH 4030 Intro. to Statistical Theory
3 - MATH 4060 Sampling Theory and Methods
3 - STAT 4020 Statistical Computing
12

[1]See advisor.

[2]MATH 4100, 4110, 4350, 4550, or 4560.

[1]Any 4000-level MATH course

[4]Students who want to take the Society of Actuaries "P" and "FM" exams are also advised to take MATH 4300 and 4320.

[5]Any 3000-4000-level CPSC course

BIOLOGY CONCENTRATION

Freshman Year

First Semester
5 - BIOL 1100 Principles of Biology I
3 - ENGL 1030 Accelerated Composition
4 - MATH 1060 Calculus of One Variable I
3 - Foreign Language Requirement[1]
15

Second Semester
5 - BIOL 1110 Principles of Biology II
4 - MATH 1080 Calculus of One Variable II
3 - Social Science Requirement[2]
3 - Computer Science Requirement[3]
15

Sophomore Year

First Semester
4 - CH 1010 General Chemistry
3 - Arts and Humanities (Non-Lit.) Requirement[4]
4 - MATH 2060 Calculus of Several Variables
1 - MATH 2500 Intro. to Mathematical Sciences
3 - PHYS 2070 General Physics I
1 - PHYS 2090 General Physics I Lab.
16

Second Semester
4 - CH 1020 General Chemistry
4 - MATH 2080 Intro. to Ordinary Diff. Equations
3 - MATH 3110 Linear Algebra
3 - PHYS 2080 General Physics II
1 - PHYS 2100 General Physics II Lab.
15

Junior Year

First Semester
3 - CH 2230 Organic Chemistry
1 - CH 2270 Organic Chemistry Lab.
3 - Advanced Writing Requirement[5]
3 - MATH 3600 Intermediate Math. Computing
3 - MATH 319 Introduction to Proof
3 - Arts and Humanities (Literature) Requirement[4]
16

Second Semester

3 - CH 2240 Organic Chemistry
1 - CH 2280 Organic Chemistry Lab.
3 - Oral Communication Requirement[6]
3 - MATH 3020 Statistics for Science and Engr.
3 - MATH 4400 Linear Programming
3 - Math Science Requirement[7]
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Senior Year

First Semester
3 - MATH 4000 Theory of Probability
3 - MATH 4530 Advanced Calculus I or
3 - Animal or Plant Diversity Requirement[8]
3 - Capstone Experience[9]
3 - Social Science Requirement[4]
15

Second Semester
3 - MATH 4120 Introduction to Modern Algebra
3 - MATH 4540 Advanced Calculus II
1 - MATH 4920 Professional Development
3 - Biological Sciences Requirement[10]
3 - Capstone Experience[9]
13

121 Total Semester Hours

[1]Three credits in any foreign language, including American Sign Language, numbered 1020 or above

[2]See General Education Requirements. ECON 2000 or 2110 is recommended.

[3]CPSC 1010, 1110, 1610, or 2200

[4]See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

[5]Any one of the courses ENGL 3040, 3120, 3140, or 3150; the cluster of courses A S 3090, 3100, 4090, and 4100; or the cluster of courses M L 3010, 3020, 4010, and 4020.

[6]See General Education Requirements.

[7]Any 4000-level MATH or STAT course approved by the advisor.

[8]BIOL 3020, 3030, 3040, or 3050

[9]May be satisfied by (1) completion of six credits of MATH 4820; (2) completion of six credits of MATH 4910 or an approved substitution; or (3) completion of three credits of MATH 4500 and three credits of an additional course approved by advisor.

[10]BCHM 3010, GEN 3020/3030, MICR 3050, or any 3000-4000-level BIOL course

Notes:

1. For graduation, a candidate for the BS degree in Mathematical Sciences will be required to have a 2.0 or higher cumulative grade-point average in all required MATH courses.
2. A grade of C or better must be earned in all prerequisite courses before enrolling in the next MATH course.
3. Students who change majors to Mathematical Sciences must have achieved the Minimum Cumulative Grade-Point Average (MCGPA) by Total Credit Hour Level as defined in the Academic Regulations section of the *Undergraduate Announcements* and must have received a grade of C or better in all MATH courses taken.