

Mathematics (BS)

To see more about what you will learn in this program, visit the Learning Outcomes website (<https://apps.oir.ncsu.edu/pgas/>)!

The bachelor of science in mathematics is our most flexible curriculum. The mathematics and science requirements in the program along with the General Education Program in the humanities and social sciences ensure that graduates receive a broad education with a technical slant. At the same time, the large number of elective choices within the program makes it an appropriate curriculum for students with a variety of interests and career goals.

Undergraduate research opportunities include:

- Budapest Semester in Mathematics
- Society for Undergraduate Mathematics
- NC State Research Experiences for Undergraduates in Mathematics
- The Mathematical Biology Research Training Group
- SUM Club

For more information about this program visit our website (<https://math.sciences.ncsu.edu/undergraduate/undergraduate-programs/mathematics/>).

Contact

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Plan Requirements

Code	Title	Hours	Counts towards
Orientation			
COS 100	Science of Change	1	
or E 115	Introduction to Computing Environments		
Advanced Writing			
Select one of the following Advanced Writing courses:		3	
ENG 331	Communication for Engineering and Technology		
ENG 332	Communication for Business and Management		
ENG 333	Communication for Science and Research		

ENG 101	Academic Writing and Research ¹	4
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Basic Mathematics

MA 141	Calculus I ¹	4
MA 241	Calculus II ¹	4
MA 242	Calculus III ¹	4
MA 225	Foundations of Advanced Mathematics ¹	3
MA 341	Applied Differential Equations I ¹	3

Basic Sciences

Choose one set of courses: ¹		4
CH 101 & CH 102	Chemistry - A Molecular Science and General Chemistry Laboratory	
CH 103 & CH 104	General Chemistry I for Students in Chemical Sciences and General Chemistry Laboratory I for Students in Chemical Sciences	

Select one of the following Physics courses: ¹

PY 201	University Physics I	4
PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory	

Basic Science Elective (p. 2) ¹

Select one of the following Statistics courses: ¹

ST 370	Probability and Statistics for Engineers	4
ST 372	Introduction to Statistical Inference and Regression	3
ST 380		
ST 421	Introduction to Mathematical Statistics I	

ST 422	Introduction to Mathematical Statistics II	
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Select one of the following Introduction to Programming courses: ¹ 3

CSC 112	Introduction to Computing-FORTRAN	
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CSC 113	Introduction to Computing - MATLAB	
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CSC 116	Introduction to Computing - Java	
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MA 116	Introduction to Scientific Programming (Math)	
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PY 251	Introduction to Scientific Computing	
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Advanced Mathematics

MA 405	Introduction to Linear Algebra ¹	3
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MA 407	Introduction to Modern Algebra for Mathematics Majors ¹	3
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MA 425	Mathematical Analysis I ¹	3
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Math Electives (p. 3) ¹		18
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Major Paper Co-Requirement (Verify Requirement) (p. 5)

In-Dept Co-Requirement (Verify Requirement) ²

Major Electives

Science/Engineering/Business/Statistics Electives		12
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The preferred statistics sequence is ST 380 with MA 421. Alternatives include ST 370 with MA 421, or STS 371 with STS 372, or ST 421 with ST 422, or MA 421 with ST 422. If ST 370 or ST 380 is taken, MA 421 will be an advanced mathematics elective. If ST 371/372 is taken, ST 371 will be a Science/Engineering/Bus/Stat. elective. If MA 421 is taken as any advanced math elective then ST 422 will satisfy the ST requirement.

Science/Engineering/Business/Statistics courses must be selected from the following: BIO/ZO 160, BIO 18*, BIO 200>, CE ***, CH ***, ECE ***, ECI 305, ECI 416, EMS 470, EMS 480,

GN ***, ISE ***, MAE ***, MB ***, MEA ***, NE ***, NTR ***, OR ***, PY 300>, PB ***, ZO ***, ACC ***, BUS ***, EC ***, CSC ***, ST 300> (except not the courses CH 100, CH 111, CSC 100, CSC 200, ST 311, or ST 361) Note: Business courses are restricted to BUS majors/minor.

GEP Courses

GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)	6
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GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)	6
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GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)	2
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GEP US Diversity, Equity, and Inclusion (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-usdei/)	3
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GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)	5
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GEP Global Knowledge (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/) (verify requirement)	
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Foreign Language Proficiency (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/foreign-language-proficiency/) (verify requirement)	
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Free Electives

Free Electives (12 Hr S/U Lmt) ²	15
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Total Hours	120
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¹ A grade of C- or higher is required.

² Students should consult their academic advisors to determine which courses fill this requirement.

Basic Science Electives

Code	Title	Hours	Counts towards
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity	4	

BIO 183	Introductory Biology: Cellular and Molecular Biology	4
CH 201 & CH 202	Chemistry - A Quantitative Science and Quantitative Chemistry Laboratory	4
PY 202	University Physics II	4
PY 208 & PY 209	Physics for Engineers and Scientists II and Physics for Engineers and Scientists II Laboratory	4

Math Electives

Code	Title	Hours	Counts towards
LOG 335	Symbolic Logic	3	
MA 325	Introduction to Applied Mathematics	3	
MA 335	Symbolic Logic	3	
MA 341	Applied Differential Equations I	3	
MA 351	Introduction to Discrete Mathematical Models	3	
BMA 573	Mathematical Modeling of Physical and Biological Processes I	3	
BMA 574	Mathematical Modeling of Physical and Biological Processes II	3	
CSC 416	Introduction to Combinatorics	3	
CSC 427	Introduction to Numerical Analysis I	3	
CSC 428	Introduction to Numerical Analysis II	3	
CSC 565	Graph Theory	3	
CSC 580	Numerical Analysis I	3	

CSC 583	Introduction to Parallel Computing	3
E 531	Dynamic Systems and Multivariable Control I	3
ECG 528	Options and Derivatives Pricing	3
FIM 528	Options and Derivatives Pricing	3
FIM 548	Monte Carlo Methods for Financial Math	3
FIM 549	Financial Risk Analysis	3
ISE 505	Linear Programming	3
MA 401	Applied Differential Equations II	3
MA 402	Mathematics of Scientific Computing	3
MA 408	Foundations of Euclidean Geometry	3
MA 410	Theory of Numbers	3
MA 412	Long-Term Actuarial Models	3
MA 413	Short-Term Actuarial Models	3
MA 416	Introduction to Combinatorics	3
MA 421	Introduction to Probability	3
MA 426	Mathematical Analysis II	3
MA 427	Introduction to Numerical Analysis I	3
MA 428	Introduction to Numerical Analysis II	3
MA 430	Mathematical Models in the Physical Sciences	3
MA 432	Mathematical Models in Life Sciences	3
MA 437	Applications of Algebra	3
MA 440		3

MA 444	Problem Solving Strategies for Competitions	1	MA 531	Dynamic Systems and Multivariable Control I	3
MA 450	Methods of Applied Mathematics I	3	MA 532	Ordinary Differential Equations I	3
MA 451	Methods of Applied Mathematics II	3	MA 534	Introduction To Partial Differential Equations	3
MA 491	Reading in Honors Mathematics	1-6	MA 537	Nonlinear Dynamics and Chaos	3
MA 493	Special Topics in Mathematics	1-6	MA 540	Uncertainty Quantification for Physical and Biological Models	3
MA 499	Independent Research in Mathematics	1-6	MA 544	Computer Experiments In Mathematical Probability	3
MA 501	Advanced Mathematics for Engineers and Scientists I	3	MA 546	Probability and Stochastic Processes I	3
MA 502	Advanced Mathematics for Engineers and Scientists II	3	MA 547	Stochastic Calculus for Finance	3
MA 504	Introduction to Mathematical Programming	3	MA 548	Monte Carlo Methods for Financial Math	3
MA 505	Linear Programming	3	MA 549	Financial Risk Analysis	3
MA 509	Survey of Abstract Algebra	3	MA 551	Introduction to Topology	3
MA 512		3	MA 555	Introduction to Manifold Theory	3
MA 513	Introduction To Complex Variables	3	MA 561	Set Theory and Foundations Of Mathematics	3
MA 515	Analysis I	3	MA 565	Graph Theory	3
MA 518	Geometry of Curves and Surfaces	3	MA 573	Mathematical Modeling of Physical and Biological Processes I	3
MA 520	Linear Algebra	3	MA 574	Mathematical Modeling of Physical and Biological Processes II	3
MA 521	Abstract Algebra I	3	MA 580	Numerical Analysis I	3
MA 522	Computer Algebra	3	MA 583	Introduction to Parallel Computing	3
MA 523	Linear Transformations and Matrix Theory	3			
MA 524	Combinatorics I	3			
MA 526	Mathematical Analysis II	3			
MA 528	Options and Derivatives Pricing	3			

MA 584	Numerical Solution of Partial Differential Equations--Finite Difference Methods	3
MA 587	Numerical Solution of Partial Differential Equations--Finite Element Method	3
MA 591	Special Topics	1-6
MBA 528	Options and Derivatives Pricing	3
OR 504	Introduction to Mathematical Programming	3
OR 505	Linear Programming	3
OR 531	Dynamic Systems and Multivariable Control I	3
OR 565	Graph Theory	3
ST 412	Long-Term Actuarial Models	3
ST 413	Short-Term Actuarial Models	3
ST 546	Probability and Stochastic Processes I	3

Major Paper Co-Requirement (Verify Requirement)

Code	Title	Hours	Counts towards
BMA 573	Mathematical Modeling of Physical and Biological Processes I	3	
BMA 574	Mathematical Modeling of Physical and Biological Processes II	3	
CSC 427	Introduction to Numerical Analysis I	3	
CSC 428	Introduction to Numerical Analysis II	3	
MA 402	Mathematics of Scientific Computing	3	
MA 427	Introduction to Numerical Analysis I	3	

MA 428	Introduction to Numerical Analysis II	3
MA 432	Mathematical Models in Life Sciences	3
MA 437	Applications of Algebra	3
MA 491	Reading in Honors Mathematics	1-6
MA 494	Major Paper in Math	1
MA 544	Computer Experiments In Mathematical Probability	3
MA 573	Mathematical Modeling of Physical and Biological Processes I	3
MA 574	Mathematical Modeling of Physical and Biological Processes II	3

Semester Sequence

This is a sample.

First Year

Fall Semester		Hours
MA 141	Calculus I ^{1,2}	4
CH 101	Chemistry - A Molecular Science	3
CH 102	General Chemistry Laboratory	1
ENG 101	Academic Writing and Research	4
COS 100	Science of Change	2
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		17

Spring Semester

MA 241	Calculus II ^{1,2}	4
PY 205	Physics for Engineers and Scientists I ³	3
PY 206	Physics for Engineers and Scientists I Laboratory ³	1
Introduction to Programming Elective (p. 1) ³		3
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		15

Second Year

Fall Semester		Hours
MA 242	Calculus III ^{1,2}	4

MA 225	Foundations of Advanced Mathematics ^{1,2}	3
PY 208	Physics for Engineers and Scientists II ³	3
PY 209	Physics for Engineers and Scientists II Laboratory ³	1
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
ST 380	³	3
Hours		15

Spring Semester

MA 341	Applied Differential Equations I ^{1,2}	3
MA 405	Introduction to Linear Algebra ²	3
MA 421	Introduction to Probability ²	3
Free Elective		2
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		14

Third Year**Fall Semester**

MA 407	Introduction to Modern Algebra for Mathematics Majors ²	3
Advanced Mathematics Elective (p. 3) ²		3
Science/Engineering/ Business/Statistics Elective (p. 1)		3
Advanced Writing Elective (p. 1)		3
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		15

Spring Semester

MA 425	Mathematical Analysis I ²	3
MA 325	Introduction to Applied Mathematics ²	3
Science/Engineering/ Business/Statistics Elective (p. 1)		3
Free Elective		3
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		15

Fourth Year**Fall Semester**

Select one of the following: ²		3
MA 426	Mathematical Analysis II	
MA Elective (p. 3)		
Advanced Mathematics Elective (p. 3) ²		3
Science/Engineering/ Business/Statistics Elective (p. 1)		3
Free Elective		3
GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)		3
Hours		15

Spring Semester

Advanced Mathematics Elective1 (p. 1) ²		3
Science/Engineering/ Business/Statistics Elective (p. 1)		3
Free Electives		6

GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)	2
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Hours	14
Total Hours	120

¹ A grade of C- or higher is required.

² At most one grade below a C- is permitted in Advanced Mathematics courses. No grades below a C- are permitted in Basic Mathematics courses.

³ At least one grade below a C- is permitted in CH 101 Chemistry - A Molecular Science, CH 102 General Chemistry Laboratory, the two courses satisfying the physics requirement, and the course satisfying the statistics requirement.