Mathematics (BS)

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 (Verify Requirement) [*]			
COS 100	Science of Change	0	
or E 115	Introduction to Computing Environments		
Communications and Advanced Writing			
ENG 101	Academic Writing and Research	4	
Select one of the following Communications courses (Verify Requirement): [*]		0	
COM 110	Public Speaking		
COM 112	Interpersonal Communication		
COM 211	Argumentation and Advocacy		
COM 289	Science Communication and Public Engagement		
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 425	Analysis of Scientific and Technical Writing		
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	3	
Basic Sciences [2]			
Select one of the following two options for the Chemistry requirement:		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 two options for the Physics requirement:		4	
PY 201	University Physics I		
PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory		

Select one of the following four options for the Additional Basic Science requirement:		4
BIO 181	Introductory Biology: Ecology, Evolution, and Biodiversity	
BIO 183	Introductory Biology: Cellular and Molecular Biology	
CH 201 & CH 202	Chemistry - A Quantitative Science and Quantitative Chemistry Laboratory	
PY 208 & PY 209	Physics for Engineers and Scientists II and Physics for Engineers and Scientists II Laboratory	
Select one of the following Statistics courses: [3]		3
ST 371	Introduction to Probability and Distribution Theory	
ST 372	Introduction to Statistical Inference and Regression	
ST 421	Introduction to Mathematical Statistics I	
ST 422	Introduction to Mathematical Statistics II	
Students considering graduate school are strongly encouraged to select (MA 421 or ST 421) with ST 422		
Select one of the following introductory Programming courses:		3
CSC 111	Introduction to Computing: Python	
CSC 112	Introduction to Computing- FORTRAN	
CSC 113	Introduction to Computing - MATLAB	
ST 114	Statistical Programming	
MA 116	Introduction to Scientific Programming (Math)	
CSC 116	Introduction to Computing - Java	
PY 251	Introduction to Scientific Computing	
Advanced Mathematics		
MA 405	Introduction to Linear Algebra	3
MA 407	Introduction to Modern Algebra for Mathematics Majors	3
MA 425	Mathematical Analysis I	3
Math Electives (p. 3) [2]		18
Select one of the following three options for the Major Paper Requirement		1
MA 494	Major Paper in Mathematics	
MA 491	Reading in Honors Mathematics	
MA 499	Independent Research in Mathematics	
In-Depth Co-Requiremenmt (Verify Requirement) (p. 5)		
Major Electives		
Science/Engineering/Business/ Statistics Electives		15
Students are advised to utilize their Major and Free Electives credits to explore a minor or a second major. Please be aware that several courses listed as Major Electives may have prerequisites or specific restrictions.		
Science/Engineering/Business/ Statistics courses must be selected from the following: BIO/ZO 160, BIO 18*, BIO 200>, CE ***, CH ***, DSC ***, ECE ***, ECI 305, ECI 416, EMS 470, EMS 480, GN ***, ISE ***, MAE ***, MB ***, MEA ***, NE ***, NTR ***, OR ***, PY 200>, PB ***, ZO ***, ACC ***, BUS ***, EC ***, CSC ***, ST 300> (except CH 100, CH 111, CSC 100, CSC 200, CSC 226)		
GEP Courses		

GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)	6	
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)	6	
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)	2	
GEP Elective (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)	3	
GEP Interdisciplinary Perspectives (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-interdisciplinary-perspectives/)	5	
GEP Global Knowledge (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/) (verify requirement)		
World Language Proficiency (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/world-language-proficiency/) (verify requirement)		
Free Electives (Max 12 Hr S/U)	**12**	
Students are encouraged to use Free Electives credits to pursue a minor or second major.		
Total Hours	**120**	

[1] A grade of C or higher is required.

[2] At most one passing letter grade below C- is allowed.

[3] Students are strongly encouraged to complete a two-course sequence in Statistics. The preferred statistics sequence is ST 371 followed by ST 372, in which case ST 372 can be used as a Science/Engineering/Bus/Stat elective. Alternatives include: (MA 421 and ST 422) or (ST 421 and ST 422). If MA 421 (https://catalog.ncsu.edu/search/?P=MA%20421) is taken as an advanced math elective then ST 422 (https://catalog.ncsu.edu/search/?P=ST%20422) will satisfy the ST requirement. If ST421 is taken as ST elective then ST 422 can be used as a Science/Engineering/Bus/Stat elective. ST 370 will be accepted only for students transferring into the Mathematics major having already taken ST 370.

[*] The Orientation and Communication verify requirements are satisfied by some General Education Program courses which could potentially double count.

[**] No more than 6 total credits from undergraduate research (MA 491), independent study (MA 499), or credit by examination may be used to meet program requirements (credit from AP exams or transfer credits is not included under this restriction).

Math Electives

Code	Title	Hours	Counts towards
MA 325	Introduction to Applied Mathematics	3	
MA 326	Mathematical Foundations of Data Science	3	
MA 335	Symbolic Logic	3	
LOG 335	Symbolic Logic	3	
MA 341	Applied Differential Equations I	3	
MA 351	Introduction to Discrete Mathematical Models	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	
ST 412	Long-Term Actuarial Models	3	
MA 413	Short-Term Actuarial Models	3	
ST 413	Short-Term Actuarial Models	3	
MA 414	Foundations of Cryptography	3	
CSC 414	Foundations of Cryptography	3	
MA 416	Introduction to Combinatorics	3	
CSC 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	
CSC 427	Introduction to Numerical Analysis I	3	

MA 428	Introduction to Numerical Analysis II	3
CSC 428	Introduction to Numerical Analysis II	3
MA 432	Mathematical Models in Life Sciences	3
MA 437	Applications of Algebra	3
MA 450	Methods of Applied Mathematics I	3
MA 451	Methods of Applied Mathematics II	3
MA 491	Reading in Honors Mathematics	1-3
MA 501	Advanced Mathematics for Engineers and Scientists I	3
MA 504	Introduction to Mathematical Programming	3
OR 504	Introduction to Mathematical Programming	3
MA 505	Linear Programming	3
ISE 505	Linear Programming	3
OR 505	Linear Programming	3
MA 513	Introduction To Complex Variables	3
MA 514	Foundations of Cryptography	3
CSC 514	Foundations of Cryptography	3
MA 515	Analysis I	3
MA 518	Geometry of Curves and Surfaces	3
MA 520	Linear Algebra	3
MA 521	Abstract Algebra I	3
MA 522	Computer Algebra	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
FIM 528	Options and Derivatives Pricing	3
ECG 528	Options and Derivatives Pricing	3
MBA 528	Options and Derivatives Pricing	3
MA 531	Dynamic Systems and Multivariable Control I	3
E 531	Dynamic Systems and Multivariable Control I	3
OR 531	Dynamic Systems and Multivariable Control I	3
MA 532	Ordinary Differential Equations I	3
MA 534	Introduction To Partial Differential Equations	3
MA 537	Nonlinear Dynamics and Chaos	3
MA 540	Uncertainty Quantification for Physical and Biological Models	3
MA 544	Computer Experiments In Mathematical Probability	3
MA 546	Probability and Stochastic Processes I	3
ST 546	Probability and Stochastic Processes I	3
MA 547	Stochastic Calculus for Finance	3
MA 548	Monte Carlo Methods for Financial Math	3
FIM 548	Monte Carlo Methods for Financial Math	3

Code	Title	Hours
MA 549	Financial Risk Analysis	3
FIM 549	Financial Risk Analysis	3
MA 551	Introduction to Topology	3
MA 555	Introduction to Manifold Theory	3
MA 561	Set Theory and Foundations Of Mathematics	3
MA 565	Graph Theory	3
CSC 565	Graph Theory	3
OR 565	Graph Theory	3
MA 573	Mathematical Modeling of Physical and Biological Processes I	3
BMA 573	Mathematical Modeling of Physical and Biological Processes I	3
MA 574	Mathematical Modeling of Physical and Biological Processes II	3
BMA 574	Mathematical Modeling of Physical and Biological Processes II	3
MA 580	Numerical Analysis I	3
CSC 580	Numerical Analysis I	3
MA 583	Introduction to Parallel Computing	3
CSC 583	Introduction to Parallel Computing	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

Major Paper Co-Requirement

Code	Title	Hours	Counts towards
MA 402	Mathematics of Scientific Computing	3	
MA 427	Introduction to Numerical Analysis I	3	
CSC 427	Introduction to Numerical Analysis I	3	
MA 428	Introduction to Numerical Analysis II	3	
CSC 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 Mathematics	1	
MA 573	Mathematical Modeling of Physical and Biological Processes I	3	
MA 574	Mathematical Modeling of Physical and Biological Processes II	3	
BMA 573	Mathematical Modeling of Physical and Biological Processes I	3	
BMA 574	Mathematical Modeling of Physical and Biological Processes II	3	

In-Depth Co-Req (Verify Requirement)

Code	Title	Hours	Counts towards
MA 325 & MA 341	Introduction to Applied Mathematics and Applied Differential Equations I	0	

MA 326 & MA 402	Mathematical Foundations of Data Science and Mathematics of Scientific Computing	0
MA 341 & MA 401	Applied Differential Equations I and Applied Differential Equations II	0
or MA 501	Advanced Mathematics for Engineers and Scientists I	
MA 341 & MA 432	Applied Differential Equations I and Mathematical Models in Life Sciences	0
MA 401 & MA 450	Applied Differential Equations II and Methods of Applied Mathematics I	0
or MA 451	Methods of Applied Mathematics II	
MA 407 & MA 437	Introduction to Modern Algebra for Mathematics Majors and Applications of Algebra	0
or MA 521	Abstract Algebra I	
MA 405 & MA 520	Introduction to Linear Algebra and Linear Algebra	0
or MA 523	Linear Transformations and Matrix Theory	
MA 407 & MA 414	Introduction to Modern Algebra for Mathematics Majors and Foundations of Cryptography	0
or CSC 414	Foundations of Cryptography	
MA 407 & MA 521	Introduction to Modern Algebra for Mathematics Majors and Abstract Algebra I	0
MA 407 & MA 514	Introduction to Modern Algebra for Mathematics Majors and Foundations of Cryptography	0
or CSC 514	Foundations of Cryptography	
MA 408 & MA 518	Foundations of Euclidean Geometry and Geometry of Curves and Surfaces	0
MA 410 & MA 416	Theory of Numbers and Introduction to Combinatorics	0
MA 412 & MA 413	Long-Term Actuarial Models and Short-Term Actuarial Models	0
MA 416 & MA 524	Introduction to Combinatorics and Combinatorics I	0
MA 421 & MA 412	Introduction to Probability and Long-Term Actuarial Models	0
or MA 413	Short-Term Actuarial Models	
MA 425 & MA 426	Mathematical Analysis I and Mathematical Analysis II	0
or MA 526	Mathematical Analysis II	
MA 425 & MA 513	Mathematical Analysis I and Introduction To Complex Variables	0
or MA 515	Analysis I	
MA 427 & MA 428	Introduction to Numerical Analysis I and Introduction to Numerical Analysis II	0
MA 450 & MA 451	Methods of Applied Mathematics I and Methods of Applied Mathematics II	0
MA 515 & MA 551	Analysis I and Introduction to Topology	0

MA 532 & MA 534	Ordinary Differential Equations I and Introduction To Partial Differential Equations	0
MA 546 & MA 547	Probability and Stochastic Processes I and Stochastic Calculus for Finance	0
MA 548 & MA 549	Monte Carlo Methods for Financial Math and Financial Risk Analysis	0
MA 573 & MA 574	Mathematical Modeling of Physical and Biological Processes I and Mathematical Modeling of Physical and Biological Processes II	0
MA 580 & MA 583	Numerical Analysis I and Introduction to Parallel Computing	0
MA 584 & MA 587	Numerical Solution of Partial Differential Equations-- Finite Difference Methods and Numerical Solution of Partial Differential Equations--Finite Element Method	0

Semester Sequence

This is a sample.

First Year

Fall Semester

		Hours
MA 141	Calculus I [1,2]	4
ENG 101	Academic Writing and Research	4
COS 100	Science of Change	2
GEP requirement		3
Health and Exercise Studies		1
	Hours	**14**

Spring Semester

MA 241	Calculus II [1,2]	4
CH 101	Chemistry - A Molecular Science	3
CH 102	General Chemistry Laboratory	1
Introduction to Programming Elective (p. 1) [3]		3
COM 289	Science Communication and Public Engagement	3
	Hours	**14**

Second Year

Fall Semester

MA 242	Calculus III [1,2]	4
MA 225	Foundations of Advanced Mathematics [1,2]	3
PY 205	Physics for Engineers and Scientists I	3
PY 206	Physics for Engineers and Scientists I Laboratory	1
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**

Spring Semester

MA 341	Applied Differential Equations I [1,2]	3
MA 405	Introduction to Linear Algebra [2]	3
ST 371	Introduction to Probability and Distribution Theory	3
Science/Engineering/ Business/Statistics Elective (p. 1)		3
Free Elective		3
	Hours	**15**

Third Year

Fall Semester

MA 407	Introduction to Modern Algebra for Mathematics Majors [2]	3
Advanced Mathematics Elective (p. 3) [2]		3
Advanced Writing Elective (p. 1)		3
PY 208	Physics for Engineers and Scientists II	3
PY 209	Physics for Engineers and Scientists II Laboratory	1
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
	Hours	**16**

Spring Semester

MA 425	Mathematical Analysis I [2]	3
Science/Engineering/ Business/Statistics Elective (p. 1)		3
Advanced Mathematics Elective (p. 3)		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
MA 494	Major Paper in Mathematics	1
Science/Engineering/ Business/Statistics Elective (p. 1)		3
Free Elective		3
GEP Requirement (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)		3
Hours		**16**
Spring Semester		
Advanced Mathematics Elective1 (p. 1) [2]		6
Science/Engineering/ Business/Statistics Elective (p. 1)		3
	3	
Free Electives		3
Hours		**15**
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 Electives. No grades below a C are permitted in MA 141, MA 241, MA 242, and MA 225.

Career Opportunities

Career Titles

- Actuary
- Aeronautical & Aerospace Engineer
- Aerospace Engineering Technician
- Air Traffic Controller
- Anesthesiologist Assistants
- Astronomer
- Atmospheric and Space Scientist
- Bank and Branch Managers
- Biopsychologist
- Budget Analyst
- Buyer
- Chief Financial Officer
- Compensation Administrator
- Compensation Specialist
- Computer and Information Scientists
- Computer Programmer
- Computer Systems Engineer
- Controller
- Credit Analyst
- Database Administrator
- Elementary School Teacher
- Employee Benefits Analyst
- Financial Aid Counselor
- Financial Analyst
- Fuel Cell Engineers
- Government Budget Analyst
- High School Teacher
- Hospitalists
- Logisticians
- Math Professor
- Mathematical Technician
- Mathematician
- Meteorologist
- Middle School Teacher
- Operations Research Analyst
- Physicist
- Psychometrist
- Purchasing Agent
- Purchasing Manager
- Securities and Commodities Sales Agent
- Social Science Research Assistants
- Statistician
- Technical Publications Writer
- Video Game Designer

Learn More About Careers

NCcareers.org (https://nccareers.org/)
Explore North Carolina's central online resource for students, parents, educators, job seekers and career counselors looking for high quality job and career information.

Occupational Outlook Handbook (https://www.bls.gov/ooh/)
Browse the Occupational Outlook Handbook published by the Bureau of Labor Statistics to view state and area employment and wage statistics. You can also identify and compare similar occupations based on your interests.

Career One Stop Videos (https://www.careeronestop.org/)
View videos that provide career details and information on wages, employment trends, skills needed, and more for any occupation. Sponsored by the U.S. Department of Labor.

Focus 2 Career Assessment (https://careers.dasa.ncsu.edu/explore-careers/career-assessments/) (NC State student email address required)
This career, major and education planning system is available to current NC State students to learn about how your values, interests, competencies, and personality fit into the NC State majors and your future career. An NC State email address is required to create an account. Make an appointment with your career counselor (https://careers.dasa.ncsu.edu/about/hours-appointments/) to discuss the results.

Focus 2 Apply Assessment (https://www.focus2career.com/Portal/Register.cfm?SID=1929) (Available to prospective students)
A career assessment tool designed to support prospective students in exploring and choosing the right major and career path based on your unique personality, interests, skills and values. Get started with Focus 2 Apply and see how it can guide your journey at NC State.

American Mathematical Society (https://www.ams.org/home/page/)

Society for Industrial and Applied Mathematics (https://www.siam.org/)