MATHEMATICS (BS)

CIP: 27.0101

Program Description

Mathematics is the branch of human inquiry involving the study of data, numbers, relations, shapes, space, symmetries, and how these concepts relate to each other. Despite its often abstract nature, mathematics takes inspiration from the real world and provides the logical and analytical tools for tackling many of the important problems of our time. By its very nature, mathematics provides the means to break many problems into manageable pieces that can be analyzed and solved. In fact, mathematical approaches have been central to solving problems and modeling phenomena in a wide array of disciplines. Probability and statistical analysis are fundamental for mapping and analyzing the human genome. Advanced mathematical theories provide the keys to analyzing the risk of rare events, a basic problem of the financial markets. In physics, geometry finds applications to particle physics, to string theory, and to cosmology. In neuroscience, exciting new research into the structure and functioning of the brain relies heavily on the insights provided by mathematical modeling. These are but a few of the contemporary problems relying on mathematical analysis. Mathematical thinking is grounded in rigor and abstraction, but draws its vitality from questions arising in the natural world as well as applications to industry and technology.

Mathematics majors acquire solid foundations in differential and integral calculus, as well as basic concepts of algebra and modern geometry. Students are introduced to classical subjects such as complex and real analysis, abstract algebra, number theory, and topology. Students interested in applications of mathematics to social and physical sciences may pursue courses in numerical methods, theoretical mechanics, probability, dynamical systems, and differential equations.

Mathematics majors at NYU Abu Dhabi attain a breadth of knowledge within the field, pursue their own interests in math electives, explore the role of mathematics as an applied discipline, and undertake a capstone project. The major offers a rigorous and broad foundation in mathematics through eight required courses: *Calculus with Applications; Foundations of Mathematics; Linear Algebra; Multivariable Calculus with Applications to Science and Engineering; Ordinary Differential Equations; Analysis 1; Probability and Statistics; and Abstract Algebra 1. Mathematics students who place out of Calculus are required to complete one additional mathematics elective of their choosing.* Mathematics majors who choose to take Multivariable Calculus with Applications to Economics (for example because they plan to major in both Mathematics and Economics) must take Analysis 2.

Students select two electives. These are divided in two overlapping categories, denoted with an A and P. Courses in category A have an applied flavor, courses in category P tend to be more theoretical. To attain greater depth in analysis or algebra, students choose at least one elective from category A and one from category P. Mathematics majors must also complete a minor or major in one of the following areas that use mathematics or mathematical modeling: Computer Science, Economics, or the Natural Sciences. An alternative minor may be approved as substitute on a case-by-case basis when the courses used to complete that alternative minor are judged sufficiently germane to mathematics by the program. Requiring Mathematics majors to complete a minor provides them with a basic knowledge of how math is applied

to a specific discipline and is intended to foster the requisite capstone projects.

The study away pathway for the Mathematics major can be found on the NYUAD Student Portal at students.nyuad.nyu.edu/pathways (http://students.nyuad.nyu.edu/pathways/). Students with questions should contact the Office of Global Education.

The program strongly recommends that not more than one mathematics elective be taken while studying away.

Admissions

New York University's Office of Undergraduate Admissions supports the application process for all undergraduate programs at NYU. For additional information about undergraduate admissions, including application requirements, see How to Apply (https://www.nyu.edu/admissions/undergraduate-admissions/how-to-apply.html).

Program Requirements

Course	Title	Credits
General Education Requirements		
Colloquia		8
First-Year Seminar		4
Arts, Design, and Technology		4
Cultural Exploration Analysis		4
Data and Discovery		4
Structures of Thought and Society		4
January Term Courses (3 courses)		12
Required Courses		
MATH-UH 1010	Foundations of Mathematics	4
MATH-UH 1012Q	Calculus with Applications to Science and Engineering	4
MATH-UH 1020	Multivariable Calculus with Applications to Science and Engineering	4
MATH-UH 1022	Linear Algebra	4
MATH-UH 2010	Ordinary Differential Equations	4
MATH-UH 2011Q	Probability and Statistics	4
MATH-UH 2012	Abstract Algebra 1	4
MATH-UH 2013	Analysis 1	4
Electives		
Select two Mathematics electives (one from Category A and one from Category P)		8
Research Seminar		
MATH-UH 3090	Research Seminar in Mathematics (half course)	2
Capstone		
MATH-UH 4001	Capstone Project in Mathematics 1	4
MATH-UH 4002	Capstone Project in Mathematics 2	4
Minor		
Select one of the following: [1]		16
Computer Science		
Natural Science		
Economics		
Engineering		

Other Elective Credits		22
Total Credits		**128**

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Note that completing a major in Computer Science, Biology, Chemistry, Physics or Economics removes the need to complete one of the four listed minors.

Sample Plan of Study

Course	Title	Credits
1st Semester/Term		
MATH-UH 1011		4
MATH-UH 1010	Foundations of Mathematics	4
First-Year Seminar		4
Elective Course		4
	Credits	**16**
2nd Semester/Term		
Elective Course		4
	Credits	**4**
3rd Semester/Term		
MATH-UH 1022	Linear Algebra	4
MATH-UH 1020	Multivariable Calculus with Applications to Science and Engineering	4
Colloquium		4
Core Courses		4
	Credits	**16**
4th Semester/Term		
MATH-UH 2010	Ordinary Differential Equations	4
MATH-UH 2013	Analysis 1	4
Core Courses		4
Minor 1		4
	Credits	**16**
5th Semester/Term		
Elective Course		4
	Credits	**4**
6th Semester/Term		
MATH-UH 2011Q	Probability and Statistics	4
MATH-UH 2012	Abstract Algebra 1	4
Colloquium		4
Minor 2		4
	Credits	**16**
7th Semester/Term		
MATH-UH 3090	Research Seminar in Mathematics	2
Core Courses		4
Advanced Analysis Electives		4
Elective Course		4
Minor 3		4
	Credits	**18**
8th Semester/Term		
Elective Course		4
	Credits	**4**
9th Semester/Term		
Applied Mathematics Electives		4
Abroad		
Abroad		
Abroad		
	Credits	**4**
10th Semester/Term		
MATH-UH 4001	Capstone Project in Mathematics 1	4
Elective Course		4

Minor 4		4
	Credits	**12**
11th Semester/Term		
MATH-UH 4002	Capstone Project in Mathematics 2	4
Core Courses		4
Elective Course		4
Elective Course		4
	Credits	**16**
	Total Credits	**126**

Learning Outcomes

Upon successful completion of the program, graduates will:

1. Apply the fundamental theorems of Analysis, Algebra and Geometry.
2. Apply appropriate mathematical and statistical techniques, both theoretical and numerical, to concrete problems.
3. Present and communicate effectively mathematical knowledge and mathematical research.
4. Learn new mathematics independently.

Policies
NYU Policies

University-wide policies can be found on the New York University Policy pages (https://bulletins.nyu.edu/nyu/policies/).

NYU Abu Dhabi Policies

A full list of relevant policies can be found on NYU Abu Dhabi's undergraduate academic policies page (https://bulletins.nyu.edu/undergraduate/abu-dhabi/academic-policies/).