# HONORS MATHEMATICS (BS)

**CIP:** 27.0101

## Program Description

Mathematics forms the cornerstone of the sciences, playing a powerful dual role as both a pure science and a tool for solving problems and modeling phenomena in other disciplines. For example, mathematics allows us to build efficient algorithms in computing, investigate rare events in financial markets, model the physical universe, develop predictions for climate science, map and study the human genome, and analyze the structure of the human brain. Mathematics draws vitality from questions arising in the natural world, as well as applications to industry and technology, and yet it is grounded in rigor and abstraction.

Students wishing to major in Honors Mathematics must have achieved a general GPA of 3.65 or higher, and a GPA of 3.65 or higher in the major sequence. The earliest students are able to declare the major is after completion of Honors Analysis I and Honors Linear Algebra II and posting of their spring semester freshman year grades. If the GPA requirements are not met, the students may graduate as Mathematics majors but retain the Honors designation of the individual courses they took on their transcripts.

## 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 |
|---|---|---|
| **Core Courses** | | |
| Social and Cultural Foundations | | |
| CCSF-SHU 101L | Global Perspectives on Society | 4 |
| Interdisciplinary Perspectives on China (Two Courses) | | 8 |
| *Writing* | | |
| WRIT-SHU 102 | Writing as Inquiry | 4 |
| WRIT-SHU 201 | Perspectives on the Humanities | 4 |
| *Language* [1] | | |
| Language Courses [1] | | 8-16 |
| *Mathematics* | | |
| Mathematics Requirement Fulfilled by Major Coursework | | |
| *Algorithmic Thinking* | | |
| Algorithmic Thinking Course | | 4 |
| *Science* | | |
| Experimental Discovery in the Natural World Course | | 4 |
| Science, Technology and Society Course | | 4 |
| **Major Requirements** | | |
| *Required Mathematics Courses* | | |
| MATH-SHU 141 | Honors Linear Algebra I | 4 |
| MATH-SHU 142 | Honors Linear Algebra II | 4 |
| MATH-SHU 238 | Honors Theory of Probability | 4 |
| MATH-SHU 328 | Honors Analysis I | 4 |
| MATH-SHU 329 | Honors Analysis II | 4 |
| MATH-SHU 339 | Real Variables | 4 |
| MATH-SHU 348 | Honors Algebra I | 4 |
| MATH-SHU 362 | Honors Ordinary Differential Equations | 4 |
| *Math Electives* [2] | | |
| Select five of the following: | | 20 |
| MATH-SHU 160 | Networks and Dynamics | |
| MATH-SHU 226 | Functional Analysis | |
| MATH-SHU 234 | Mathematical Statistics | |
| MATH-SHU 250 | Mathematics of Finance | |
| MATH-SHU 251 | Introduction to Math Modeling | |
| MATH-SHU 252 | Numerical Analysis | |
| MATH-SHU 263 | Partial Differential Equations [3] | |
| MATH-SHU 282 | Functions of a Complex Variable | |
| MATH-SHU 329 | Honors Analysis II | |
| MATH-SHU 345 | Introduction to Stochastic Processes | |
| MATH-SHU 349 | Abstract Algebra I | |
| MATH-SHU 350 | Probability Limit Theorems | |
| MATH-SHU 377 | Differential Geometry | |
| MATH-SHU 997 | Independent Study: Mathematics | |
| *Senior Thesis* [3] | | |
| Other Elective Credits | | 28-36 |
| **Total Credits** | | **128** |

1

Students who did not attend a Chinese-medium high school fulfill the Core language requirement by demonstrating proficiency of the Chinese language through the Intermediate level. Chinese speakers who did not attend an English-medium high school fulfill the Core language requirement through completion of EAP-SHU 100 English for Academic Purposes I and EAP-SHU 101 English for Academic Purposes II . Additional information can be found on the NYU Shanghai Core Curriculum page (https://bulletins.nyu.edu/undergraduate/shanghai/core-curriculum/#text).

2

Students are strongly encouraged to complete the Required Mathematics Courses before starting their Mathematics Electives

**3**

In their senior year, each Honors Mathematics student is additionally required to complete a capstone project, ending with a written report and an oral presentation. This thesis can be completed as part of any of the following senior courses: MATH-SHU 329 Honors Analysis II, MATH-SHU 250 Mathematics of Finance, MATH-SHU 252 Numerical Analysis, MATH-SHU 263 Partial Differential Equations, MATH-SHU 329 Honors Analysis II, MATH-SHU 345 Introduction to Stochastic Processes, MATH-SHU 350 Probability Limit Theorems, MATH-SHU 997 Independent Study: Mathematics.

# Sample Plan of Study

| Course | Title | Credits |
|---|---|---|
| **1st Semester/Term** | | |
| CCSF-SHU 101L | Global Perspectives on Society | 4 |
| MATH-SHU 201 | Honors Calculus | 4 |
| MATH-SHU 141 | Honors Linear Algebra I | 4 |
| Chinese or EAP | | 4 |
| | **Credits** | **16** |
| **2nd Semester/Term** | | |
| WRIT-SHU 102 | Writing as Inquiry | 4 |
| MATH-SHU 328 | Honors Analysis I | 4 |
| MATH-SHU 142 | Honors Linear Algebra II | 4 |
| Chinese or EAP | | 4 |
| | **Credits** | **16** |
| **3rd Semester/Term** | | |
| WRIT-SHU 201 | Perspectives on the Humanities | 4 |
| MATH-SHU 329 | Honors Analysis II | 4 |
| MATH-SHU 362 | Honors Ordinary Differential Equations | 4 |
| Chinese or Core Course | | 4 |
| | **Credits** | **16** |
| **4th Semester/Term** | | |
| MATH-SHU 339 | Real Variables | 4 |
| MATH-SHU 238 | Honors Theory of Probability | 4 |
| Core Class | | 4 |
| Chinese or Core Course | | 4 |
| | **Credits** | **16** |
| **5th Semester/Term** | | |
| Core Class | | 4 |
| Math Elective | | 4 |
| Math or General Elective | | 4 |
| Core or General Elective | | 4 |
| | **Credits** | **16** |
| **6th Semester/Term** | | |
| Core Class | | 4 |
| Math Elective | | 4 |
| Math or General Elective | | 4 |
| General Elective | | 4 |
| | **Credits** | **16** |
| **7th Semester/Term** | | |
| MATH-SHU 348 | Honors Algebra I | 4 |
| Math Elective or General Elective | | 4 |
| General Elective | | 4 |
| General Elective | | 4 |
| | **Credits** | **16** |
| **8th Semester/Term** | | |
| Math Elective | | 4 |
| Math Elective or General Elective | | 4 |
| General Elective | | 4 |
| General Elective | | 4 |
| | **Credits** | **16** |
| | **Total Credits** | **128** |

# Learning Outcomes

Upon successful completion of this program, students will:

1. Understand the fundamental theorems of analysis, master the ideas of their proofs and learn how to apply them.
2. Understand the fundamental theorems of algebra, geometry and probability, master the ideas of their proofs and learn how to apply them.
3. Develop computational skills in mathematics and apply them to concrete problems.

# Policies

# Honors Mathematics Program Policies

## Honors Math and Data Science Double Major Guidelines

Students who are interested in pursuing a Data Science major along with an Honors Mathematics major can have more than two courses that may be double-counted between the majors. Students would need to complete course requirements for both majors. The following courses are allowed to double counted toward both majors:

**Honors Math and Data Science (Concentration in Mathematics)**

- MATH-SHU 141 Honors Linear Algebra I
- MATH-SHU 142 Honors Linear Algebra II
- MATH-SHU 238 Honors Theory of Probability
- MATH-SHU 329 Honors Analysis II

# NYU Policies

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

# NYU Shanghai Policies

Additional academic policies can be found on the NYU Shanghai Academic Policies page (https://bulletins.nyu.edu/undergraduate/shanghai/academic-policies/).