

# DATA SCIENCE AND MATHEMATICS (BA)

Department Website (<http://math.nyu.edu>)

NYSED: 41255 HEGIS: 1702.00 CIP: 27.9999

## Program Description

### Center for Data Science

Data science is the new language of the 21st century and is a cornerstone of a liberal arts education. Data science skills are also increasingly a requirement for graduates entering the workforce, government, or research. As more academic disciplines, industries, and media outlets rely on data-driven decision making, research, and evidence, being a sophisticated consumer of data, as well as being empowered to analyze and generate discoveries, is naturally becoming a prerequisite for being a global citizen, scientist, and leader.

The College of Arts and Science and the NYU Center for Data Science offer a major and minor in data science, as well as (with the Courant Institute of Mathematical Sciences) both (1) a joint major in data science and computer science and (2) a joint major in data science and mathematics. The major in data science develops students' broad knowledge in emerging theories and methods of computational statistics in fields within the humanities, social sciences, and sciences. Students who complete the major are exposed to diverse ways of knowing, research and critical thinking skills, and communication and inference techniques, and are trained to become ethically responsible data scientists.

The minor in data science teaches foundational computational analysis concepts and how to use data science methods and tools to answer important questions. Students apply those concepts to a range of domain-specific issues that relate to their major course of study.

Students in both the major and the minor have opportunities for hands-on experience with real datasets.

While students do gain skills in programming due to the computational nature of the field, the major and minor are not centered on professional or vocational training. Instead, the development of skills in the data science curriculum unfolds within a broader context of scientific and theoretical frameworks for understanding and pursuing deeper objectives, novel knowledge generation, and robust discovery.

Students may contact [cds-undergraduate@nyu.edu](mailto:cds-undergraduate@nyu.edu) with questions about the major or minor.

### Department of Mathematics

The undergraduate division of the Department of Mathematics offers a wide variety of courses in both pure and applied mathematics. Faculty are members of the Courant Institute of Mathematical Sciences, which has become a leading research center through its tradition of integrating mathematical theory and applications.

In addition to the mathematics major, joint programs are available in mathematics and (1) computer science, (2) data science, (3) economics, and (4) engineering. These majors lead to the B.A. degree in four years, with the exception of the engineering option, which leads to the B.S. degree from the College of Arts and Science and the B.S. degree from the NYU Tandon School of Engineering in five years. An accelerated, five-

year B.A. and M.S. mathematics program is offered with the Graduate School of Arts and Science, as well as an M.A. in mathematics education program with Steinhardt. The department also provides honors programs in (1) mathematics, (2) mathematics and computer science, and (3) economics and mathematics for outstanding students. In addition, independent study courses are available for students with special interests.

Mathematics majors are encouraged to spend a semester studying away. Currently, mathematics courses are offered at NYU Abu Dhabi, NYU London, NYU Paris, and NYU Shanghai.

## 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
<b>General Education Requirements</b>		
First-Year Seminar		4
EXPOS-UA 1	Writing The Essay:	4
Foreign Language <sup>1</sup>		16
Physical Science		4
Life Science		4
Texts and Ideas		4
Cultures and Contexts		4
Societies and the Social Sciences		4
Expressive Culture		4
<b>Major Requirements</b>		
<i>Data Science Requirements</i>		
DS-UA 111	Data Science for Everyone	4
DS-UA 112	Principles of Data Science	4
DS-UA 201	Causal Inference	4
DS-UA 202	Responsible Data Science	4
DS-UA 301	Advanced Topics in Data Science	4
<i>Mathematics Requirements</i>		
MATH-UA 120	Discrete Mathematics	4
MATH-UA 121	Calculus I	4
MATH-UA 122	Calculus II	4
MATH-UA 123	Calculus III	4
or MATH-UA 129	Honors Calculus III	
MATH-UA 140	Linear Algebra	4
or MATH-UA 148	Honors Linear Algebra	
MATH-UA 233	Theory of Probability	4
or MATH-UA 238	Honors Theory of Probability	
MATH-UA 234	Mathematical Statistics	4
MATH-UA 252	Numerical Analysis	4
MATH-UA 325	Analysis	4

or MATH-UA 328	Honors Analysis I	
<b>Computer Science Requirements</b>		
CSCI-UA 2	Introduction to Computer Programming (No Prior Experience) <sup>2</sup>	4
CSCI-UA 101	Intro to Computer Science	4
CSCI-UA 102	Data Structures	4
CSCI-UA 473	Fundamentals of Machine Learning	4
CSCI-UA 479	Data Management and Analysis	4
<b>Electives</b>		
Other Elective Credits		4
<b>Total Credits</b>		<b>128</b>

1

The foreign language requirement is satisfied upon successful completion through the Intermediate level of a language. This may be accomplished in fewer than 16 credits, but those credits must then be completed as elective credit.

2

This course does not count towards the major but is a required prerequisite for CSCI-UA 101 Intro to Computer Science.

## Sample Plan of Study

Course	Title	Credits
<b>1st Semester/Term</b>		
CSCI-UA 2	Introduction to Computer Programming (No Prior Experience)	4
MATH-UA 121	Calculus I	4
Texts and Ideas		4
First-Year Seminar		4
<b>Credits</b>		<b>16</b>
<b>2nd Semester/Term</b>		
CSCI-UA 101	Intro to Computer Science	4
MATH-UA 122	Calculus II	4
Cultures and Contexts		4
EXPOS-UA 1	Writing The Essay:	4
<b>Credits</b>		<b>16</b>
<b>3rd Semester/Term</b>		
DS-UA 111	Data Science for Everyone	4
CSCI-UA 102	Data Structures	4
MATH-UA 123 or MATH-UA 129	Calculus III or Honors Calculus III	4
Foreign Language		4
<b>Credits</b>		<b>16</b>
<b>4th Semester/Term</b>		
DS-UA 112	Principles of Data Science	4
MATH-UA 120	Discrete Mathematics	4
MATH-UA 140 or MATH-UA 148	Linear Algebra or Honors Linear Algebra	4
Foreign Language		4
<b>Credits</b>		<b>16</b>
<b>5th Semester/Term</b>		
DS-UA 201	Causal Inference	4
MATH-UA 233 or MATH-UA 238	Theory of Probability or Honors Theory of Probability	4
Foreign Language		4
Expressive Culture		4
<b>Credits</b>		<b>16</b>

<b>6th Semester/Term</b>		
MATH-UA 234	Mathematical Statistics	4
MATH-UA 325 or MATH-UA 328	Analysis or Honors Analysis I	4
Foreign Language		4
Societies and the Social Sciences		4
<b>Credits</b>		<b>16</b>
<b>7th Semester/Term</b>		
CSCI-UA 479	Data Management and Analysis	4
MATH-UA 252	Numerical Analysis	4
Physical Science		4
Other Elective Credits		4
<b>Credits</b>		<b>16</b>
<b>8th Semester/Term</b>		
DS-UA 202	Responsible Data Science	4
DS-UA 301	Advanced Topics in Data Science	4
CSCI-UA 473	Fundamentals of Machine Learning	4
Life Science		4
<b>Credits</b>		<b>16</b>
<b>Total Credits</b>		<b>128</b>

## Learning Outcomes

Upon completion of program requirements, students are expected to have acquired:

1. Knowledge of how to use data science methods.
2. The ability to understand the mathematical theories required to analyze large data sets.
3. The ability to apply mathematical theories to real-world challenges that require data science and computational solutions
4. The ability to communicate computational, statistical, and mathematical findings, as well as to understand, develop, and critique rigorous arguments supported by data.

## Policies

### Policy on Declaration of Major

The prerequisite for declaring this major is completion of either DS-UA 111 Data Science for Everyone or DS-UA 112 Principles of Data Science (depending on placement) with a C or better.

### Grading Policy

A grade of C or higher is required in all courses used to fulfill joint major requirements (courses taken under the Pass/Fail option cannot be counted toward the major).

### NYU Policies

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

### College of Arts and Science Policies

A full list of relevant academic policies can be found on the CAS Academic Policies page (<https://bulletins.nyu.edu/undergraduate/arts-science/academic-policies/>).