

# DATA SCIENCE (BA)

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

**NYSED:** 40362 **HEGIS:** 1702.00 **CIP:** 27.0501

## Program Description

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.

## 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 \(https://www.nyu.edu/admissions/undergraduate-admissions/how-to-apply.html\)](https://www.nyu.edu/admissions/undergraduate-admissions/how-to-apply.html).

## Program Requirements

The major requires the completion of a CAS minor which only applies to students pursuing data science as a single major (not applicable for students pursuing a joint or double major).

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

### Major Requirements

#### Data Science Courses:

DS-UA 111	Data Science for Everyone (offered every semester)	4
DS-UA 112	Principles of Data Science (offered every semester)	4
DS-UA 201	Causal Inference (offered every fall)	4
DS-UA 202	Responsible Data Science (offered every spring)	4
DS-UA 301	Advanced Topics in Data Science (offered every spring)	4

#### Computer Science Courses:

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

#### Mathematics Courses

Select one of the following:		4
MATH-UA 121	Calculus I	
MATH-UA 131	Mathematics for Economics I	
Select one of the following:		4
MATH-UA 122	Calculus II	
MATH-UA 132	Mathematics for Economics II	
MATH-UA 140	Linear Algebra	4
or MATH-UA 148	Honors Linear Algebra	
MATH-UA 235	Probability & Statistics	4

### CAS Minor Requirements

Complete 16 credits in any CAS minor <sup>3</sup> 16

#### Electives

Other Elective Credits 8

**Total Credits** 128

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.

3

Completion of any CAS minor. CAS minors range from four to six courses. This minor requirement only applies to students pursuing data science as a single major. Please note that due to the substantial overlap with computer science, data science majors cannot minor in computer science.

## Sample Plan of Study

Course	Title	Credits
<b>1st Semester/Term</b>		
CSCI-UA 2	Introduction to Computer Programming (No Prior Experience) (If no AP Credit)	4
Select one of the following:		
MATH-UA 121	Calculus I	4
MATH-UA 131	Mathematics for Economics I	4
First-Year Seminar		4
Texts and Ideas		4
<b>Credits</b>		<b>16</b>
<b>2nd Semester/Term</b>		
EXPOS-UA 1	Writing The Essay:	4
Cultures and Contexts		4
Select one of the following:		
MATH-UA 122	Calculus II	4
MATH-UA 132	Mathematics for Economics II	4
CSCI-UA 101	Intro to Computer Science	4
<b>Credits</b>		<b>16</b>
<b>3rd Semester/Term</b>		
CSCI-UA 102	Data Structures	4
DS-UA 111	Data Science for Everyone	4
Major Requirements		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 140	Linear Algebra	4
Major Requirements		4
Foreign Language		4
<b>Credits</b>		<b>16</b>
<b>5th Semester/Term</b>		
DS-UA 201	Causal Inference	4
Expressive Culture		4
Major Requirements		4
Foreign Language		4
<b>Credits</b>		<b>16</b>
<b>6th Semester/Term</b>		
Major Requirements		4
Foreign Language		4
Societies and the Social Sciences		4
Other Elective Credits		4
<b>Credits</b>		<b>16</b>
<b>7th Semester/Term</b>		
MATH-UA 235	Probability & Statistics	4
CSCI-UA 479	Data Management and 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. Broad knowledge of emerging theories and methods of computational statistics in academic fields across the humanities, social sciences, and natural sciences.
2. Knowledge of current methods and tools used to analyze big data and inferences, and to explore data-driven decision making.
3. A thorough knowledge base in computer science and statistics as they are aligned with the discipline of data science.
4. Diverse ways of knowing, research and critical thinking skills, and communication and inference techniques to make them ethically and scientifically responsible stewards of data, as well as rigorous scientists.

## Policies

### Policies Applying to the Major

1. A grade of C or better is necessary in all courses used to fulfill major requirements; courses graded Pass/Fail do not count toward the major.
2. Two courses may be double-counted between the data science major and another major. For permission to double-count more than two courses, students must first request approval from the Center for Data Science ([cds-undergraduate@nyu.edu](mailto:cds-undergraduate@nyu.edu)). If approved by the CDS, students must then petition CAS Academic Standards (726 Broadway, 7th floor; 212-998-8140).
3. Advanced Placement credit (or other advanced standing credit by examination) in computer science and calculus is treated exactly as in the majors and minors in computer science and mathematics. Consult the AP and other tables in the admission section of this Bulletin for course equivalencies.
4. Students must check the prerequisites for each course before enrolling. See the section on course offerings for all prerequisites.
5. CAS students (in any major or minor) are not permitted to take computer science courses in the Tandon School of Engineering.
6. Those interested in spending a semester away should work out their schedule with an adviser as early as possible.

### Policy on Declaration of Major or Minor in Data Science

Students must complete either DS-UA 111 or 112 (depending on placement) with a grade of C or better before they can declare the major or minor in data science or the joint major in data science and mathematics. To declare the joint major in computer and data science, students must first meet this prerequisite and also complete either CSCI-UA 101 or 102 (depending on placement) with a grade of C or better. These policies apply to all NYU students, not just to those matriculated in CAS. For the data science major, minor, and joint data science and mathematics major, students may declare during the declaration periods in the fall and spring semesters and the summer sessions. During the fall semester, the declaration period is the month of October; during the spring semester, the declaration period is mid-February to mid-March; and in the summer, the declaration period is mid-June to mid-July. For the joint computer science and data science major, students may declare anytime throughout the academic year. Please write to [cds-undergraduate@nyu.edu](mailto:cds-undergraduate@nyu.edu) to request the declaration form during the proper

timeframes. For more information, please visit <https://cds.nyu.edu/academics/undergraduate-program/>.

It is an official policy in CAS that students cannot enter their junior year undeclared. In order to comply with this policy, students must begin their data science course sequence no later than the spring semester of their sophomore year, which will allow them to declare the major or minor during the summer before their junior year. The Center for Data Science and CAS both advise that students begin their data science courses earlier, and, consistent with the usual practice in CAS, declare the major or minor in the spring of their sophomore year. While students may begin their data science courses later than this point, there is no guarantee they will finish their major requirements in time to graduate within four years.

## **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/>).