# DATA SCIENCE (BA)

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

NYSED: 40362 HEGIS: 1702.00 CIP. 30.7001

## **Program Description**

The undergraduate major in Data Science develops students' broad knowledge in foundational theories and emerging methods of computational statistics. The program prepares students for the rapidly evolving nature of the field by teaching enduring fundamentals that remain core across diverse settings, even as technologies, programming languages, and applications change, while also exposing students to the latest frontiers of data science. Additionally, the program emphasizes the increasing role that data-driven methods play in the world today and encourages students to critically consider the implications of this expanding reliance on data. Graduates of the program will gain both the technical rigor of data science and the self-awareness to navigate its broader impacts.

As part of the program's design, students take courses in the Departments of Computer Science and Mathematics as well as those offered by the Center for Data Science. Advanced courses are taught by experts in a range of fields, offering opportunities to explore topics in the humanities, social sciences, and natural sciences. As a reflection of the interdisciplinary nature of data science, students are required to pair the major in Data Science with a CAS minor.

### **Honors Program**

This major program of study does not currently offer an honors track.

### 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**

The major in Data Science requires thirteen 4-credit courses (52 credits) as outlined below. It also requires completion of a CAS minor (applicable only to students pursuing Data Science as a single major and not as part of a joint or double major).

Course	Title	Credits		
General Education Requirements				
First-Year Seminar		4		
EXPOS-UA 1	Writing as Inquiry	4		
Foreign Language	16			
Physical Science		4		
Life Science	4			
Texts and Ideas	4			
Cultures and Conte	4			
Societies and the Social Sciences				
Expressive Culture				
Major Requirements				
Data Science Courses:				

Total Credits		128
Other Elective Cre	dits	8
Electives		
Complete 16 cred	its in any CAS minor <sup>3</sup>	16
CAS Minor Requir	rements	
MATH-UA 185	Probability & Statistics (formerly UA 235)	4
or MATH- UA 148	Honors Linear Algebra	
MATH-UA 140	Linear Algebra	4
MATH-UA 132	Mathematics for Economics II	
MATH-UA 122	Calculus II	
Select one of the following:		
MATH-UA 131	Mathematics for Economics I	
MATH-UA 121	Calculus I	
Select one of the	following:	4
Mathematics Cour	ses	
CSCI-UA 479	Data Management and Analysis	4
CSCI-UA 473	Fundamentals of Machine Learning	4
CSCI-UA 102	Data Structures	4
CSCI-UA 101	Experience) ~	4
CSCI-UA 2	Introduction to Computer Programming (No Prior	4
Computer Science	Courses:	
DS-UA 301	Advanced Topics in Data Science (offered every	4
DS-UA 202	Responsible Data Science (offered every spring)	4
DS-UA 201	Causal Inference (offered every semester)	4
DS-UA 112	Principles of Data Science II (offered every semester)	4
DS-UA 111	Principles of Data Science I (offered every semester)	

- <sup>1</sup> 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.
- <sup>2</sup> This course does not count towards the major but is a prerequisite for CSCI-UA 101 Intro to Computer Science. Students who place directly into CSCI-UA 101 simply replace this with an elective.
- <sup>3</sup> CAS minors range from four to six courses. This requirement only applies to students pursuing Data Science as a single major. The minor in Computer Science is now permissible (subject to rules on doublecounting of courses; see the policies tab), as is the cross-school minor in Public Health.

# Sample Plan of Study

	Credits	16
Texts and Ideas		4
First-Year Seminar		4
MATH-UA 131	Mathematics for Economics I	
MATH-UA 121	Calculus I	
Select one of the follow	ing:	4
CSCI-UA 2	Introduction to Computer Programming (No Prior Experience) (If no AP Credit) <sup>1</sup>	4
1st Semester/Term		
Course	Title	Credits

2nd Semester/Term		
CSCI-UA 101	Intro to Computer Science	4
EXPOS-UA 1	Writing as Inquiry	4
Cultures and Contexts		4
Select one of the following	1:	4
MATH-UA 122	Calculus II	
MATH-UA 132	Mathematics for Economics II	
	Credits	16
3rd Semester/Term		
DS-UA 111	Principles of Data Science I	4
CSCI-UA 102	Data Structures	4
CAS Minor Requirement		4
Foreign Language		4
	Credits	16
4th Semester/Term		
DS-UA 112	Principles of Data Science II	4
MATH-UA 185	Probability & Statistics ((formerly UA 235))	4
CAS Minor Requirement		4
Foreign Language		4
	Credits	16
5th Semester/Term		
CSCI-UA 479	Data Management and Analysis	4
DS-UA 201	Causal Inference	4
CAS Minor Requirement		4
Foreign Language		4
	Credits	16
6th Semester/Term		
MATH-UA 140	Linear Algebra	4
Foreign Language		4
Societies and the Social S	ciences	4
Other Elective Credits		4
	Credits	16
7th Semester/Term		
CSCI-UA 473	Fundamentals of Machine Learning	4
CAS Minor Requirement		4
Physical Science		4
Expressive Culture		4
	Credits	16
8th Semester/Term		
DS-UA 202	Responsible Data Science	4
DS-UA 301	Advanced Topics in Data Science	4
Life Science		4
Other Elective Credits		4
	Credits	16
	Total Credits	128

This course does not count towards the major but is a prerequisite for CSCI-UA 101 Intro to Computer Science. Students who place directly into CSCI-UA 101 simply replace this with an elective.

## Learning Outcomes

Upon completion of program requirements, students are expected to:

- 1. Achieve a rigorous understanding of the mathematical, statistical, and computational principles that underpin data science, so that students will have the foundational mastery to pursue of the many applications of data sciences without limitation.
- 2. Understand approaches such as causal inference, machine learning, and data management that are involved in different settings across varied academic and applied contexts.

3. Examine the relationship between data science and society by addressing ethical and philosophical issues in modern statistics, data science, and AI, and develop the ability not only to design data models but also to communicate effectively about these models and their outputs.

## **Policies**

#### **Program Policies**

#### **Policy on Declaration of Major**

Students must complete either DS-UA 111 Principles of Data Science I or DS-UA 112 Principles of Data Science II with a grade of C or better before declaring the major in Data Science. This policy applies to all NYU students, not just to those matriculated in CAS.

Students may declare at any time during the academic year using the links below. Any questions or concerns regarding the declaration process should be directed to cds-undergraduate@nyu.edu.

- · Data Science Major or Minor (https://docs.google.com/forms/d/ e/1FAIpQLSdvU0oTPxa\_c8DPzyywxw7LNmofGbfoSaVhz0Dcx4SuksgixA/ viewform/?usp=sf\_link)
- · Joint Major in Computer and Data Science (https://docs.google.com/forms/d/ e/1FAIpQLSfq5ZHkrnd0jvST5Mq\_dF1bEfHYVoIAxJ\_y-9pMuPgGdZoZpQ/ viewform/?usp=sf\_link) (all NYU students must complete both DS-UA 111 Principles of Data Science I and CSCI-UA 101 Introduction to Computer Science with a grade of C or better before declaring this major)
- · Joint Major in Data Science and Mathematics (https://docs.google.com/forms/d/ e/1FAIpQLSffkc8dTgivZTNrToggDAXOtniEwPMr82EqSxOcSPZExReaUq/ viewform/?usp=sf\_link)

College of Arts and Science students cannot enter their junior year undeclared and must begin their data science (and, if applicable, computer 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 (CDS) and CAS both advise that students begin their data science courses earlier and declare the major in the spring of their sophomore year. Although 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. Students cannot declare any major or joint major with CDS after completion of their junior year.

#### Other 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 or another minor (not both).
  - a. The major requires completion of any minor in CAS (the minor in Computer Science and the cross-school minor in Public Health are now accepted for this requirement). Students who choose the minor in Computer Science, the joint minor in Mathematics and Computer Science, or the minor in Mathematics may doublecount no more than two courses between their chosen minor and the major in Data Science and might need to take additional courses for their minor due to overlap with this major. These

students cannot double-count two other courses between the Data Science major and a second major or a second minor.

- 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.
- 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.

#### **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/artsscience/academic-policies/).