DATA SCIENCE (BS)

CIP: 11.1099

Program Description

Data Science at NYU Shanghai is designed to create data-driven leaders with a global perspective, a broad education, and the capacity to think creatively. Data science involves using computerized methods to analyze massive amounts of data and to extract knowledge from them. Data science addresses a wide range of data types, including scientific and economic numerical data, textual data, and image and video data. This new discipline draws from methodologies and tools in several well-established fields, including computer science, statistics, applied mathematics, and economics. Data science has applications in just about every academic discipline, including sociology, political science, digital humanities, linguistics, finance, marketing, urban informatics, medical informatics, genomics, image content analysis, and all branches of engineering and the physical sciences. The importance of data science is expected to accelerate in the coming years, as data from the web, mobile sensors, smartphones, and Internet-connected instruments continues to grow.

Students who complete the major will not only have expertise in computer programming, statistics, and data mining, but also know how to combine these tools to solve contemporary problems in a discipline of their choice, including the social science, physical science, and engineering disciplines. Upon graduation, data science majors have numerous career paths. Data Science majors can go on to graduate school in data science, computer science, social science, business, finance, medicine, law, linguistics, education, and so on. Outside of academia, there are also myriad career paths. Not only can graduates pursue careers with traditional data-driven computer-science companies and startups such as Google, Facebook, Amazon, and Microsoft, but also they can also be valuable to companies in the transportation, energy, medical, and financial sectors. Graduates can also pursue careers in the public sector, including urban planning, law enforcement, and education.

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		
Language Courses		8-16
Mathematics		
Mathematics Requirement Fulfilled by Major Coursework		
Algorithmic Thinking		
Algorithmic Thinking Requirement Fulfilled by Major Coursework		
Science		
Experimental Discovery in the Natural World		4
Science, Technology, and Society		4
Major Requirements		
Foundational Courses		
CSCI-SHU 101	Introduction to Computer and Data Science	4
Select one of the following:		4
BUSF-SHU 101	Statistics for Business and Economics	
MATH-SHU 235	Probability and Statistics	
MATH-SHU 238	Honors Theory of Probability	
Programming & Computer Science		
CSCI-SHU 210	Data Structures	4
Mathematics		
Select one of the following:		4
MATH-SHU 151	Multivariable Calculus	
MATH-SHU 328	Honors Analysis I	
Select one of the following:		4
MATH-SHU 140	Linear Algebra	
MATH-SHU 141	Honors Linear Algebra I	
MATH-SHU 265	Linear Algebra and Differential Equation	
Data Analysis		
CSCI-SHU 360	Machine Learning	4
Select one of the following:		4
ECON-SHU 301	Econometrics	
MATH-SHU 234	Mathematical Statistics	
Select one of the following:		4
CSCI-SHU 220	Algorithms	
DATS-SHU 235	Information Visualization	
DATS-SHU 240	Introduction to Optimization and Mathematical Programming	
Data Management		
CSCI-SHU 213	Databases	4
Capstone Course		
DATS-SHU 420	Data Science Senior Project	4
Concentration Courses		
Complete one of the following Concentrations:		8-16
Finance		
Marketing		
Economics		
Genomics		
Mathematics		
Artificial Intelligence		
Political Science		

Psychology	
Electives	**28-44**
Total Credits	**128**

Data Science Concentrations

Finance

Course	Title	Credits
ECON-SHU 3	Microeconomics	4
BUSF-SHU 202	Foundations of Finance	4
BUSF-SHU 250	Principles of Financial Accounting	4
BUSF-SHU 303	Corporate Finance	4
Total Credits		**16**

Marketing

Course	Title	Credits
ECON-SHU 3	Microeconomics	4
BUSF-SHU 202	Foundations of Finance	4
BUSF-SHU 250	Principles of Financial Accounting	4
MKTG-SHU 1	Introduction to Marketing	4
Total Credits		**16**

Economics

Course	Title	Credits
ECON-SHU 1	Principles of Macroeconomics	4
ECON-SHU 3	Microeconomics	4
Total Credits		**8**

Genomics

Course	Title	Credits
BIOL-SHU 21	Foundations of Biology I	3
BIOL-SHU 22	Foundations of Biology II	3
BIOL-SHU 123	Foundations of Biology Lab	2
BIOL-SHU 261	Genomics and Bioinformatics	4
Total Credits		**12**

Mathematics

Course	Title	Credits
Select two of the following:		8
MATH-SHU 142	Honors Linear Algebra II	
MATH-SHU 234	Mathematical Statistics	
MATH-SHU 238	Honors Theory of Probability	
MATH-SHU 329	Honors Analysis II	
MATH-SHU 345	Introduction to Stochastic Processes	
Total Credits		**8**

Artificial Intelligence

Course	Title	Credits
Select two of the following:		8
CSCI-SHU 220	Algorithms	
CSCI-SHU 375	Reinforcement Learning	
CSCI-SHU 376	Natural Language Processing	
CSCI-SHU 381	Recommendation Systems	
DATS-SHU 200	Topics in Machine Learning	
DATS-SHU 235	Information Visualization	
DATS-SHU 240	Introduction to Optimization and Mathematical Programming	
DATS-SHU 369	Machine Learning with Graphs	
DATS-SHU 377	Computer Vision	
Total Credits		**8**

Political Science

Course	Title	Credits
SOCS-SHU 150	Introduction to Comparative Politics	4
SOCS-SHU 160	Introduction to International Politics	4
Total Credits		**8**

Psychology

Course	Title	Credits
PSYC-SHU 101	Introduction to Psychology	4
Select two of the following:		8
PSYC-SHU 234	Developmental Psychology	
PSYC-SHU 352	Psychology of Human Sexuality	
SOCS-SHU 334	Legal Psychology	
SOCS-SHU 350	Empirical Research Practice	
Total Credits		**12**

Sample Plan of Study

Course	Title	Credits
1st Semester/Term		
CCSF-SHU 101L	Global Perspectives on Society	4
MATH-SHU 131	Calculus	4
CSCI-SHU 11	Introduction to Computer Programming	4
Language Course		4
	Credits	**16**
2nd Semester/Term		
WRIT-SHU 102	Writing as Inquiry	4
MATH-SHU 235	Probability and Statistics	4
CSCI-SHU 101	Introduction to Computer and Data Science	4
Language Course		4
	Credits	**16**
3rd Semester/Term		
WRIT-SHU 201	Perspectives on the Humanities	4
CSCI-SHU 210	Data Structures	4
MATH-SHU 151	Multivariable Calculus	4
Language Course or Concentration Course		4
	Credits	**16**
4th Semester/Term		
MATH-SHU 140	Linear Algebra	4
CSCI-SHU 360	Machine Learning	4

ECON-SHU 301 or MATH-SHU 234	Econometrics or Mathematical Statistics	4
Language Course or Core Course		4
	Credits	**16**
5th Semester/Term		
Core Course		4
CSCI-SHU 213	Databases	4
Concentration Course		4
General Elective		4
	Credits	**16**
6th Semester/Term		
Core or General Elective		4
Core Class		4
Concentration Course or General Elective		4
General Elective		4
	Credits	**16**
7th Semester/Term		
DATS-SHU 420	Data Science Senior Project	4
Data Science Concentration Course or General Elective		4
General Elective		4
Choose one of the following:		4
CSCI-SHU 220 Algorithms		
DATS-SHU 235 Information Visualization		
DATS-SHU 240 Introduction to Optimization and Mathematical Programming		
	Credits	**16**
8th Semester/Term		
General Elective		4
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. Develop the logical and mathematical capability to identify and analyze problems.
2. Develop proficiency in programming in a general purpose, high level programming language.
3. Have a sound understanding of the field of data science, and the ability to analyze, model and visualize data using some of its main methods to gain insights and make decisions.
4. Be able to combine mathematics, computer programming and data science tools to solve contemporary problems in a specialty area within data science such as biology, finance.

Policies

Program Policies

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 who are admitted in Business and Econ Honors Program can enroll in ECON-SHU 453 Economics Honors Program or BUSF-SHU 3 Business Honors Program to fulfill Data Science capstone requirement. For Data Science and Economic Double Major Students: Students who choose to enroll in ECON-SHU 453 Economics Honors Program to fulfill Data Science major capstone requirement would still need to take ECON-SHU 400 Economics Capstone Research to fulfill Economic major capstone requirement.

Prerequisite Courses for Declaring a Major

Final grade of C/current semester midterm grade of B or higher in Introduction to Computer Programming OR Introduction to Computer and Data Science + Calculus.

Policy on Double-Counting of Courses

Computer science and data science share many courses, so double-majoring is not allowed. However, students in data science can minor in computer science.

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/).