

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		
<i>Social and Cultural Foundations</i>		
CCSF-SHU 101L	Global Perspectives on Society	4
Interdisciplinary Perspectives on China (Two Courses)		8
<i>Writing</i>		
WRIT-SHU 102	Writing as Inquiry	4
WRIT-SHU 201	Perspectives on the Humanities	4
<i>Language</i>		
Language Courses ¹		8-16
<i>Mathematics</i>		
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 Course²

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

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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>).

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Students who are admitted in Business and Econ Honors Program can enroll in ECON-SHU 453 Economics Honors Seminar/BUSF-SHU 3 Business and Economics Honors Seminar to fulfill Data Science capstone requirement.

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:		
MATH-SHU 142	Honors Linear Algebra II	8
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:		
CSCI-SHU 220	Algorithms	8
CSCI-SHU 375	Reinforcement Learning	
CSCI-SHU 376	Natural Language Processing	
CSCI-SHU 381	Recommendation Systems	
DATS-SHU 235	Information Visualization	
DATS-SHU 240	Introduction to Optimization and Mathematical Programming	
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:		
PSYC-SHU 234	Developmental Psychology	8
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 or CSCI-SHU 210	Introduction to Computer and Data Science or Data Structures	4
Language Course		4
Credits		16
3rd Semester/Term		
WRIT-SHU 201	Perspectives on the Humanities	4
Select one of the following:		4
CSCI-SHU 210	Data Structures	
Concentration Course		
MATH-SHU 151	Multivariable Calculus	4
Language Course or Core 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 or General Elective		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
Senior Project		4
Credits		16
8th Semester/Term		
General Elective		4
General Elective		4
General Elective		4
General Elective		4
Credits		16
Total Credits		128

- 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

Credit Policy

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/>).

Learning Outcomes

Upon successful completion of this program, students will:

- Develop the logical and mathematical capability to identify and analyze problems.
- Develop proficiency in programming in a general purpose, high level programming language.
- 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.