

# DATA SCIENCE (M.S.)

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## Overview

### Program Highlights

- Designed to meet the demands of an ever-evolving job market
- Develop in-depth knowledge of manipulating large data sets and building computational models
- Explore specific areas of interests, such as Cybersecurity, Economics, Biology, Psychology, Computational Finance, and Urban Studies
- Hands-on experience with cutting-edge technologies such as Tableau, Spark, Deep Learning, and Natural Language Processing

### Program Basics

- Curriculum (p. 2) requires 10 courses for a total of 30 credits, including five core courses, four electives, and a Capstone Project.
- A master's thesis is optional – if taken, it consists of two subsequent courses which replace the Capstone Project and one elective.
- One (1) internship (optional – if taken, this replaces the Capstone Project)
- Designed as a one- to-two year program
- Evening courses to accommodate working professionals

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### CIP Code

30.7001 - Data Science, General.

You can use the CIP code to learn more about career paths associated with this field of study and, for international students, possible post-graduation visa extensions. Learn more about CIP codes and other information resources.

## Admissions

### Prerequisites

- Applicants with undergraduate degrees in non-computer science areas are welcome.
- An undergraduate degree in a field emphasizing quantitative skills is expected, such as a degree in computer science, information science, engineering, math, physical science, health science, business, economics, psychology, social science or urban and city planning.
- Knowledge of discrete math, probability and statistics, including permutations, combinations, descriptive statistics, and basic probabilities concepts.
- Basic programming knowledge and a familiarity with Python programming is expected. This knowledge can be acquired via completion of CISC 5380 Programming with Python.

Admitted students **who seek to bypass** CISC 5380 Programming with Python **must take** a placement examination (CISC 0940), which is administered by the department prior to the beginning of each entry term. The exam covers fundamentals of Python programming language. Students who earn a grade lower than a B are required to enroll in CISC 5380 Programming with Python in their first semester of study. This bridge course can be taken concurrently with courses that fulfill degree requirements.

## Guidelines and Information

Completed applications will include each of the following items:

Official degree transcripts confirming prior degree conferral should be ordered at least one month prior to the application deadline. Please ensure that they are sent directly to the Office of Admissions (fuga@fordham.edu) via secure electronic delivery. If electronic delivery is not available, please request that your transcripts be submitted directly via post, in a sealed envelope, to: Graduate School of Arts and Sciences, Office of Admissions, Fordham University, 441 E. Fordham Rd., Bronx, NY 10458. Please note: you may upload unofficial copies of your transcripts to your application while the Office of Admissions awaits receipt of your official transcripts. Please ensure that all official transcripts from previously attended post-secondary institutions are submitted in English, or are accompanied by a certified English translation. Transcripts and credentials conversion information is available on the GSAS International Students page.

**Official GRE scores are required if an applicant wishes to be considered for GSAS merit-based financial aid. GREs for this program are otherwise recommended.** The scores should be sent directly by the testing service to the Office of Graduate Admissions, Fordham University, Graduate School of Arts and Sciences – Code #2259.

Resume/CV (submit via the online application)

Statement of intent (up to 500 words, submitted electronically, via the online application)

Three letters of recommendation (submitted directly by referees via the online application)

### English Proficiency

International applicants whose native language is not English are required to complete and submit to GSAS prior to matriculation their official scores from the Test of English as a Foreign Language (TOEFL). GSAS will also consider a student's International English Language Testing System (IELTS)—Cambridge English Proficiency Level language testing results.

Official TOEFL or IELTS scores should be sent directly by the testing service to the Office of Graduate Admissions, Fordham University, Graduate School of Arts and Sciences – Code # 2259. TOEFL minimum 85\*, IELTS equivalent 6.5. Please consult the English Proficiency web page for additional information.

\*Applicants with TOEFL scores below 85 may still apply.

### Tuition Rate for Professional Master's Programs

Please visit the GSAS Tuition and Fees page to view the tuition rate for the Computer and Information Sciences programs.

### Application Deadlines

For information see Application Deadlines.

### Conditional Acceptances

There are no conditional acceptances, only changes to degree requirements such as added coursework taken while students are in the program.

# Requirements

## Degree Requirements

The master's program in Data Science requires 30 credits of coursework (10 classes), which will typically be completed in one to two years. Classes are offered in the evenings and during weekends. Please consult the Admissions Requirements page for more information about applying to the program.

Course	Title	Credits
<b>Five Core Courses (see below)</b>		<b>15</b>
<b>Four elective (4) courses from one or more of the following of eight (8) thematic clusters</b>		<b>12</b>
	Computer and Data Science	
	Cybersecurity	
	Bioinformatics and Health Informatics	
	Financial Informatics	
	Urban and City Informatics	
	Election and Government Informatics	
	Behavior Informatics	
	Media Informatics	
<b>One of the following options:</b>		<b>3</b>
CISC 6080	Capstone Project in Data Science	
CISC 6085 & CISC 6086	Master's Thesis in Data Science I and Master's Thesis in Data Science II <sup>1</sup>	
CISC 6081	Data Science Practicum (internship)	
<b>Total Credits</b>		<b>30</b>

<sup>1</sup> Students completing two semesters of thesis (6 credits) may complete one fewer 3-credit elective.

## Data Science Core Courses

Five courses are required from the list below. Courses on this list have the DATI attribute code.

Course	Title	Credits
CISC 5450	Mathematics for Data Science	3
CISC 5500	Data Analytics Tools and Scripting	3
CISC 5790	Data Mining	3
CISC 5800	Machine Learning	3
CISC 5835	Algorithms for Data Science	3
CISC 5900	Information Fusion	3
CISC 5950	Big Data Computing	3

## Thematic Clusters

All courses that can apply to the M.S. in Data Science as electives have the DATA attribute code.

### AI and Data Science Courses

Course	Title	Credits
CISC 5550	Cloud Computing	3
CISC 5640	Nosql Database Systems	3
CISC 5700	Cognitive Computing	3
CISC 6000	Deep Learning	3

CISC 6210	Natural Language Processing	3
CISC 5325	Database	3
CISC 6525	Artificial Intelligence	3
CISC 6745	Data Visualization	3

### Cybersecurity courses

Course	Title	Credits
CISC 5009	Network Essentials	3
CISC 5650	Cybersecurity Essentials	3
CISC 5750	Information Security and Ethics	3
CISC 6640	Privacy and Security in Big Data	3
CISC 6650	Forensic Computing	3
CISC 6680	Intrusion Detection and Network Forensics	3
CISC 6880	Blockchain Technology	3

### Bioinformatics and Health Informatics courses

Course	Title	Credits
CISC 6500	Bioinformatics	3
CISC 6550	Systems Neuroscience	3
BISC 7502	Eukaryotic Molecular Biology	4

### Financial Informatics courses

Course	Title	Credits
CISC 5352	Machine Learning in Finance	3
CISC 6352	Advanced Computational Finance	3
ECON 6950	Financial Econometrics	3
ECON 6910	Applied Econometrics	3

### Urban and City Informatics courses

Course	Title	Credits
URST 5000	Issues in Urban Studies	3
URST 6200	Research Skills in Urban Studies	3
BISC 7529	Principles of Geographical Information Science	4

### Election and Government Informatics courses

Course	Title	Credits
POSC 5100	American Political Behavior	3
POSC 5130	Political Institutions and Processes	3
POSC 5251	Political Survey Research	3

### Behavior Informatics courses

Course	Title	Credits
PSYC 6850	Evaluation of Psychological and Social Programs	3
PSYC 7804	Regression with Lab	3
PSYC 7830	Structural Equation Modeling	3
PSYC 7920	Item Response Theory	3

### Media Informatics courses

Course	Title	Credits
PMMA 6103	Data Journalism and Interactive Graphics	3
PMMA 6205	Online Analytics and Metrics	3