B.S. in Data Science

Data science is the study and practice of extracting information and structure from data that can then be used for reasoning and adding value to the solution of a problem. It has growing applications in health and medicine, finance, marketing, economics, genomics, social networks, cyber-security, journalism, and other fields where data is collected. It spans academic fields in computer science and mathematics such as machine learning and statistical inference, probability, linear algebra, computer programming, software engineering, high performance computing, and cloud computing.
The B.S. in Data Science program has two options, Computing (in the Ying Wu College of Computing) and Statistics (in the Department of Mathematical Sciences in the College of Science and Liberal Arts).

B.S. in Data Science (Computing Option)

(120 credits)

First Year		
1st Semester		**Credits**
CS 100	Roadmap to Computing	3
MATH 111	Calculus I	4
PHYS 111	Physics I [1]	3
PHYS 111A	Physics I Lab [1]	1
ENGL 101	English Composition: Introduction to Academic Writing	3
FYS SEM	First-Year Student Seminar	0
	Term Credits	**14**
2nd Semester		
CS 113	Introduction to Computer Science I	3
MATH 112	Calculus II	4
PHYS 121	Physics II [1]	3
PHYS 121A	Physics II Lab [1]	1
ENGL 102	English Composition: Introduction to Writing for Research	3
	Term Credits	**14**
Second Year		
1st Semester		
CS 114	Introduction to Computer Science II	3
MATH 244	Introduction to Probability Theory	3
MATH 337	Linear Algebra	3
History and Humanities GER 200 level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-200-level/)		3
Social Sciences GER (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/social-science-ger/)		3
	Term Credits	**15**
2nd Semester		
CS 241	Foundations of Computer Science I	3
CS 280	Programming Language Concepts	3
IS 350	Computers, Society and Ethics	3
MATH 341	Statistical Methods II	3
YWCC 207	Computing & Effective Com	1
Data Science Elective 1		3
	Term Credits	**16**
Third Year		
1st Semester		
CS 288	Intensive Programming in Linux	3
DS 340	Fundamentals and Principles of Data Science	3
CS 331	Database System Design & Mgmt	3
CS 370	Introduction to Artificial Intelligence	3

COM 312 or COM 313	Oral Presentations or Technical Writing	3
	Term Credits	**15**
2nd Semester		
CS 435	Advanced Data Structures and Algorithm Design	3
Data Science Elective 2		3
CS 482	Data Mining	3
CS 375	Introduction to Machine Learning	3
History and Humanities GER 300+ level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/)		3
YWCC 307	Professional Dev in Computing	1
	Term Credits	**16**
Fourth Year		
1st Semester		
CS 450	Data Visualization	3
CS 444	Big Data Systems	3
CS 492	Data Science Capstone I	3
MATH 478	Stat Methods in Data Sci	3
Data Science Elective 3		3
	Term Credits	**15**
2nd Semester		
Humanities and Social Science Senior Seminar GER (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/)		3
Free Elective 1 [2]		3
CS 493	Data Science Capstone II	3
MATH 344	Regression Analysis	3
Data Science Elective 4		3
	Term Credits	**15**
	Total Credits	**120**

Code	Title	Credits
Data Science (Computing Option) Electives		
YWCC 310	Co-op Work Experience I	3
CS 332	Principles of Operating Systems	3
CS 350	Intro to Computer Systems	3
CS 351	Introduction to Cybersecurity	3
CS 356	Introduction to Computer Networks	3
CS 357	Fundamentals of Network Security	3
CS 408	Cryptography and Internet Security	3
CS 485	Selected Topics In CS	3
MGMT 316	Business Research Methods	3
MGMT 416	Artificial Intelligence for Business Decisions	3
MRKT 378	Marketing Analytics	3
MRKT 430	Marketing Research	3
MATH 345	Multivariate Distributions	3
MATH 388	Introduction to Chaos Theory	3
MATH 391	Numerical Linear Algebra	3
MATH 430	Analytical and Computational Neuroscience	3
MATH 447	Applied Time Series Analysis	3
MATH 448	Stochastic Simulation	3
MATH 461	Introduction to Statistical Computing with SAS and R	3
IS 333	Social Network Analysis	3
IS 392	Web Mining and Information Retrieval	3

FIN 218	Financial Markets and Institutions	3
FIN 306	Blockchain Technology for Business	3
FIN 310	Data-Driven Financial Modeling	3
FIN 320	Fin Data Analytics	3
IT 430	Ethical Hacking for System Administrators	3
IT 485	Special Topics in Information Technology I	3

B.S. in Data Science (Statistics Option)

(120 credits)

First Year		
1st Semester		**Credits**
CS 100	Roadmap to Computing	3
MATH 111	Calculus I	4
PHYS 111	Physics I [1]	3
PHYS 111A	Physics I Lab [1]	1
ENGL 101	English Composition: Introduction to Academic Writing	3
FYS SEM	First-Year Student Seminar	0
	Term Credits	**14**
2nd Semester		
CS 113	Introduction to Computer Science I	3
MATH 112	Calculus II	4
PHYS 121	Physics II [1]	3
PHYS 121A	Physics II Lab [1]	1
ENGL 102	English Composition: Introduction to Writing for Research	3
	Term Credits	**14**
Second Year		
1st Semester		
CS 114	Introduction to Computer Science II	3
MATH 244	Introduction to Probability Theory	3
MATH 337	Linear Algebra	3
History and Humanities GER 200 level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-200-level/)		3
Social Sciences GER (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/social-science-ger/)		3
	Term Credits	**15**
2nd Semester		
CS 241	Foundations of Computer Science I	3
CS 280	Programming Language Concepts	3
MATH 213	Calculus III B	4
MATH 341	Statistical Methods II	3
History and Humanities GER 300+ level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/)		3
	Term Credits	**16**
Third Year		
1st Semester		
MATH 340	Applied Numerical Methods	3
MATH 344	Regression Analysis	3
MATH 391	Numerical Linear Algebra	3
CS 288	Intensive Programming in Linux	3
DS 340	Fundamentals and Principles of Data Science	3
	Term Credits	**15**

2nd Semester		
MATH 345	Multivariate Distributions	3
MATH 447	Applied Time Series Analysis	3
MATH 478	Stat Methods in Data Sci	3
Data Science Elective 1		3
History and Humanities GER 300+ level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ger-300-level/)		3
	Term Credits	**15**
Fourth Year		
1st Semester		
MATH 448	Stochastic Simulation	3
MATH 461	Introduction to Statistical Computing with SAS and R	3
MATH 462	Statistics and Statistical Learning (Capstone I)	3
CS 450	Data Visualization	3
Data Science Elective 2		3
	Term Credits	**15**
2nd Semester		
MATH 463	Statistics and Statistical Learning (Capstone II)	3
Math Upper Level Elective (300+ level)		3
Data Science Elective 3		3
Humanities and Social Science Senior Seminar GER (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/hss-capstone/)		3
Free Elective [2]		4
	Term Credits	**16**
	Total Credits	**120**

Code	**Title**	**Credits**
Data Science (Statistics Option) Electives		
YWCC 310	Co-op Work Experience I	3
CS 331	Database System Design & Mgmt	3
CS 332	Principles of Operating Systems	3
CS 350	Intro to Computer Systems	3
CS 351	Introduction to Cybersecurity	3
CS 356	Introduction to Computer Networks	3
CS 357	Fundamentals of Network Security	3
CS 370	Introduction to Artificial Intelligence	3
CS 375	Introduction to Machine Learning	3
CS 444	Big Data Systems	3
CS 408	Cryptography and Internet Security	3
CS 435	Advanced Data Structures and Algorithm Design	3
CS 482	Data Mining	3
MGMT 316	Business Research Methods	3
MGMT 416	Artificial Intelligence for Business Decisions	3
MRKT 378	Marketing Analytics	3
MRKT 430	Marketing Research	3
MATH 222	Differential Equations	4
MATH 388	Introduction to Chaos Theory	3
MATH 430	Analytical and Computational Neuroscience	3
MATH 453	High-Performance Numerical Computing	3
MATH 477	Stochastic Processes	3
IS 333	Social Network Analysis	3
IS 392	Web Mining and Information Retrieval	3
FIN 218	Financial Markets and Institutions	3

FIN 306	Blockchain Technology for Business	3
FIN 310	Data-Driven Financial Modeling	3
FIN 320	Fin Data Analytics	3
IT 430	Ethical Hacking for System Administrators	3
IT 485	Special Topics in Information Technology I	3

[1] Students considering switching to Data Science should take PHYS 111/111A and 121/121A. Do not take PHYS 102/102A.

[2] A free elective is any 3 credit course except a course that is already required for your program or any course covering prerequisite material for first semester courses in your program. Free electives should be chosen in consultation with your advisor.