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)

CS 100 Roadmap to Computing S MATH 1111 Calculus I A MATH 1111 Calculus I A PHYS 1111 Physics I Lab ¹ A ENGL 101 English Composition: Introduction to Academic Writing S FYS SEM First-Year Student Seminar C Tern Credits Tern Credits C AntH 112 Calculus II A PHYS 121 Physics II ¹ C PHYS 121 Physics II ¹ C PHYS 121 Physics II ¹ C Second Year Tern Credits C Second Year Tern Credits C Test Semistry C C C MATH 24 Introduction to Computer Science II C C MATH 244 Introduction to Probability Theory C C MATH 244 Introduction to Probability Theory C C Social Science SGER (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/general-education-requirements/geneconcepticts C C	First Year		
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CS 331 Database System Design & Mgmt 3	CS 288	Intensive Programming in Linux	3
CS 331 Database System Design & Mgmt 3	DS 340	Fundamentals and Principles of Data Science	3
CS 370 Introduction to Artificial Intelligence 3	CS 331	Database System Design & Mgmt	3
	CS 370	Introduction to Artificial Intelligence	3

COM 242	Oral Dressentations	2
COM 312 or COM 313	Oral Presentations or Technical Writing	3
01 0010 313	Term Credits	15
2nd Semester		15
CS 435	Advanced Data Structures and Algorithm Design	3
Data Science Elec		3
CS 482	Data Mining	
CS 375	Introduction to Machine Learning	
	nities GER 300+ level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-	3
YWCC 307	Professional Dev in Computing	1
11100 307	Term Credits	16
Fourth Year		10
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 Elec		3
	Term Credits	15
2nd Semester		15
	ocial Science Senior Seminar GER (http://catalog.njit.edu/undergraduate/academic-policies-procedures/	3
	requirements/hss-capstone/)	3
Free Elective 1 ²		3
CS 493	Data Science Capstone II	3
MATH 344	Regression Analysis	3
Data Science Elec		3
	Term Credits	15
	Total Credits	
		120
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	Title nputing Option) Electives Co-op Work Experience I	Credits 3
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Data Science (Cor YWCC 310 CS 332 CS 350	Title nputing Option) Electives Co-op Work Experience I Principles of Operating Systems Intro to Computer Systems	Credits 3 3 3
Data Science (Cor YWCC 310 CS 332 CS 350 CS 351	Title nputing Option) Electives Co-op Work Experience I Principles of Operating Systems Intro to Computer Systems Introduction to Cybersecurity	Credits 3 3 3 3 3
Data Science (Cor YWCC 310 CS 332 CS 350 CS 351 CS 356	Title mputing Option) Electives Co-op Work Experience I Principles of Operating Systems Intro to Computer Systems Introduction to Cybersecurity Introduction to Computer Networks	Credits 3 3 3 3 3 3 3 3
Data Science (Cor YWCC 310 CS 332 CS 350 CS 351 CS 356 CS 357	Title nputing Option) Electives Co-op Work Experience I Principles of Operating Systems Intro to Computer Systems Introduction to Cybersecurity Introduction to Computer Networks Fundamentals of Network Security	Credits 3 3 3 3 3 3 3 3 3 3 3 3
Data Science (Cor YWCC 310 CS 332 CS 350 CS 351 CS 356 CS 357 CS 408	Title nputing Option) Electives Co-op Work Experience I Principles of Operating Systems Intro to Computer Systems Introduction to Cybersecurity Introduction to Computer Networks Fundamentals of Network Security Cryptography and Internet Security	Credits 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
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Data Science (Cor YWCC 310 CS 332 CS 350 CS 351 CS 356 CS 357 CS 408 CS 485 MGMT 316	Title nputing Option) Electives Co-op Work Experience I Principles of Operating Systems Intro to Computer Systems Introduction to Cybersecurity Introduction to Computer Networks Fundamentals of Network Security Cryptography and Internet Security Selected Topics In CS Business Research Methods	Credits 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
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Data Science (Cor YWCC 310 CS 332 CS 350 CS 351 CS 356 CS 357 CS 408 CS 485 MGMT 316 MGMT 416 MRKT 378 MRKT 430	Title nputing Option) Electives Co-op Work Experience I Principles of Operating Systems Intro to Computer Systems Introduction to Cybersecurity Introduction to Computer Networks Fundamentals of Network Security Cryptography and Internet Security Selected Topics In CS Business Research Methods Artificial Intelligence for Business Decisions Marketing Analytics Marketing Research	Credits 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
Data Science (Cor YWCC 310 CS 332 CS 350 CS 351 CS 356 CS 357 CS 408 CS 485 MGMT 316 MGMT 416 MRKT 378 MRKT 430 MATH 345	Title nputing Option) Electives Co-op Work Experience I Principles of Operating Systems Intro to Computer Systems Introduction to Cybersecurity Introduction to Computer Networks Fundamentals of Network Security Selected Topics In CS Business Research Methods Artificial Intelligence for Business Decisions Marketing Analytics Marketing Research Multivariate Distributions	Credits 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
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Data Science (Cor YWCC 310 CS 332 CS 350 CS 351 CS 356 CS 357 CS 408 CS 485 MGMT 316 MGMT 416 MRKT 378 MRKT 430 MATH 345 MATH 388 MATH 391 MATH 430 MATH 448	Title mputing Option) Electives Co-op Work Experience I Principles of Operating Systems Intro to Computer Systems Introduction to Cybersecurity Introduction to Computer Networks Fundamentals of Network Security Cryptography and Internet Security Selected Topics In CS Business Research Methods Artificial Intelligence for Business Decisions Marketing Analytics Marketing Research Multivariate Distributions Introduction to Chaos Theory Numerical Linear Algebra Analytical and Computational Neuroscience Applied Time Series Analysis Stochastic Simulation	Credits 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
Data Science (Cor YWCC 310 CS 332 CS 350 CS 351 CS 356 CS 357 CS 408 CS 485 MGMT 316 MGMT 416 MRKT 378 MRKT 430 MATH 345 MATH 345 MATH 391 MATH 430 MATH 447 MATH 448 MATH 461	Title nputing Option) Electives Co-op Work Experience I Principles of Operating Systems Intro to Computer Systems Introduction to Cybersecurity Introduction to Computer Networks Fundamentals of Network Security Cryptography and Internet Security Selected Topics In CS Business Research Methods Artificial Intelligence for Business Decisions Marketing Analytics Marketing Research Multivariate Distributions Introduction to Chaos Theory Numerical Linear Algebra Analytical and Computational Neuroscience Applied Time Series Analysis Stochastic Simulation Introduction to Statistical Computing with SAS and R	Credits 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
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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	
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	
History and Huma requirements/ger	anities GER 200 level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education- -200-level/)	3
Social Sciences (social-science-ge	GER (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-requirements/ r/)	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 Huma requirements/ger	anities GER 300+ level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education-	3
requirements/ger	Term Credits	16
Third Year		10
1st Semester		
MATH 340	Applied Numerical Methods	3
MATH 340 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
00010	Term Credits	15
		15

2nd Semester

MATH 345	Multivariate Distributions	3
MATH 447	Applied Time Series Analysis	
MATH 478	Stat Methods in Data Sci	
Data Science Elective 1		
History and Hum requirements/ge	nanities GER 300+ level (http://catalog.njit.edu/undergraduate/academic-policies-procedures/general-education- r-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)	
CS 450	Data Visualization	3
Data Science Ele	Elective 2	3
	Term Credits	15
2nd Semester		
MATH 463	Statistics and Statistical Learning (Capstone II)	3

Math Upper Level Elective (300+ level) Data Science Elective 3 Humanities and Social Science Senior Seminar GER (http://catalog.njit.edu/undergraduate/academic-policies-procedures/ general-education-requirements/hss-capstone/)

Free Elective²

	4
Term Credits	16
Total Credits	120

3 3

3

4

Title Credits Code Data Science (Statistics Option) Electives **YWCC 310** Co-op Work Experience I 3 CS 331 Database System Design & Mgmt 3 3 CS 332 Principles of Operating Systems Intro to Computer Systems 3 CS 350 3 CS 351 Introduction to Cybersecurity 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 3 **Big Data Systems** CS 408 Cryptography and Internet Security 3 3 CS 435 Advanced Data Structures and Algorithm Design CS 482 Data Mining 3 **MGMT 316 Business Research Methods** 3 **MGMT 416** Artificial Intelligence for Business Decisions 3 **MRKT 378** Marketing Analytics 3 3 **MRKT 430** Marketing Research **Differential Equations MATH 222** 4 **MATH 388** Introduction to Chaos Theory 3 3 **MATH 430** Analytical and Computational Neuroscience 3 **MATH 453** High-Performance Numerical Computing **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.