Data Science and Physics, BS (Boston)

The data science and physics combined major brings together computer and data science, physics, and mathematics. The computer science and mathematics requirements serve as a foundation for both data science and physics. From hands-on experience with sophisticated physics instruments, to mathematical theory, to the latest computational innovations, our interdisciplinary approach is designed to prepare students for the myriad challenges in today's rapidly changing world.

Program Requirements

Complete all courses listed below unless otherwise indicated. Also complete any corequisite labs, recitations, clinicals, or tools courses where specified and complete any additional courses needed beyond specific college and major requirements to satisfy graduation credit requirements.

Universitywide Requirements

All undergraduate students are required to complete the Universitywide Requirements (https://catalog.northeastern.edu/undergraduate/university-academics/university-wide-requirements/).

NUpath Requirements

All undergraduate students are required to complete the NUpath Requirements (https://catalog.northeastern.edu/undergraduate/university-academics/nupath/).

Data Science Courses

Code	Title	Hours
Computer Science Overview		
Must be taken in alignment with your home college:		
CS 1200	First Year Seminar	1
or INSC 1000	Science at Northeastern	
or PHYS 1000	Physics at Northeastern	
CS 1210	Professional Development for Khoury Co-op	1
or EESC 2000	Professional Development for Co-op	
Computer Science Required Courses		
All students can take a self-assessment to attempt to place out of CS 2000 and CS 2001. Students who place out of CS 2000 and CS 2001 will instead substitute with 4-5 semester hours of CS, CY, or DS coursework at the 3000 level or higher not otherwise required in the degree.		
CS 1800 and CS 1802	Discrete Structures and Seminar for CS 1800	5
CS 2000 and CS 2001	Introduction to Program Design and Implementation and Lab for CS 2000	5
CS 3200	Introduction to Databases	4
Programming Sequence Pathways		
Choose one of the two options:		9
Computer Science Option		
CS 2100 and CS 2101	Program Design and Implementation 1 and Lab for CS 2100	
CS 3100 and CS 3101	Program Design and Implementation 2 and Lab for CS 3100	
Data Science Option		
DS 2500 and DS 2501	Intermediate Programming with Data and Lab for DS 2500	
DS 3500	Advanced Programming with Data	
Data Science Foundations		
DS 3000	Foundations of Data Science	4
DS 4200	Information Presentation and Visualization	4
DS 4300	Large-Scale Information Storage and Retrieval	4
DS 4400	Machine Learning and Data Mining 1	4

Physics Courses

Code	Title	Hours
Introductory Physics		
Physics 1		
Complete one of the following:		5
PHYS 1161 and PHYS 1162 and PHYS 1163	Physics 1 and Lab for PHYS 1161 and Recitation for PHYS 1161	
PHYS 1191 and PHYS 1192 and PHYS 1193	Foundations of Theoretical Physics and Lab for PHYS 1191 and Recitation for PHYS 1191	
Physics 2		
PHYS 1165 and PHYS 1166 and PHYS 1167	Physics 2 and Lab for PHYS 1165 and Recitation for PHYS 1165	5
Intermediate Physics		
PHYS 2303	Modern Physics	4
PHYS 3601	Classical Dynamics	4
PHYS 3602	Electricity and Magnetism 1	4
PHYS 3603	Electricity and Magnetism 2	4
Advanced Physics		
PHYS 3600	Advanced Physics Laboratory	4
PHYS 4115	Quantum Mechanics	4
or PHYS 5116	Network Science 1	
PHYS 4305	Thermodynamics and Statistical Mechanics	4

Electives

Code	Title	Hours
Khoury Approved Electives		
With adviser approval, directed study, research, project study, and appropriate graduate-level courses may also be taken as upper-division electives.		
Complete 4 semester hours from within the following options:		4
CS 2500 or higher, except CS 5010		
CY 2000 or higher, except CY 4930		
DS 2500 or higher, except DS 4900		
MKTG 4606	Digital, Analytics, Technology, and Automation Research Practicum	
Physics Elective		
Complete one course not already required in the following range:		4
PHYS 3000 to PHYS 5999		

Computer Science Writing Requirement

Code	Title	Hours
College Writing		
ENGW 1111	First-Year Writing	4
or ENGW 1102	First-Year Writing for Multilingual Writers	
Advanced Writing in the Disciplines		
ENGW 3302	Advanced Writing in the Technical Professions	4
or ENGW 3307	Advanced Writing in the Sciences	
or ENGW 3315	Interdisciplinary Advanced Writing in the Disciplines	

Supporting Courses

Code	Title	Hours
Calculus		
MATH 1341	Calculus 1 for Science and Engineering	4
MATH 1342	Calculus 2 for Science and Engineering	4

MATH 2321	Calculus 3 for Science and Engineering	4
Additional Mathematics Requirements		
MATH 2341	Differential Equations and Linear Algebra for Engineering	4
MATH 3081	Probability and Statistics	4

Integrative Course and Capstone

Code	Title	Hours
PHYS 5318	Principles of Experimental Physics	4

Required General Electives

Code	Title	Hours
Complete 16 semester hours of general electives.		16

Khoury College GPA Requirement

Minimum cumulative 2.000 GPA required in all CS, CY, DS, and IS courses

Science GPA Requirement (Physics)

A minimum 2.000 GPA in the following course codes is required: PHYS.

NUpath Requirements Satisfied

- Advanced Writing in the Disciplines
- Analyzing and Using Data
- Conducting Formal and Quantitative Reasoning
- Demonstrating Thought and Action in a Capstone
- Engaging with the Natural and Designed World
- Writing in the First Year
- Writing-Intensive in the Major

Integrating Knowledge and Skills Through Experience is satisfied through co-op.

Program Requirement

132 total semester hours required

Plan of Study
Sample Plan of Study

FOUR YEARS, TWO CO-OPS IN SUMMER SECOND HALF/FALL

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CS 1200	1	DS 2500 and DS 2501	5	MATH 2321	4	MATH 2341	4
CS 1800 and CS 1802	5	ENGW 1111	4	General elective	4	General elective	4
CS 2000 and CS 2001	5	MATH 1342	4				
MATH 1341	4	PHYS 1165 and PHYS 1166 and PHYS 1167	5				
PHYS 1161 and PHYS 1162 and PHYS 1163	5						
	20		**18**		**8**		**8**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
DS 3000	4	CS 1210	1	MATH 3081	4	Co-op	0
PHYS 2303	4	DS 3500	4	PHYS 3600	4		
PHYS 3602	4	DS 4200	4				
General elective	4	PHYS 3601	4				

	Hours		Hours		Hours		Hours
		General elective	4				
16		**17**		**8**		**0**	

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op		DS 4300	4	PHYS 3603	4	Co-op	
		PHYS 4305	4	PHYS Elective	4		
		CS 3200	4				
		ENGW 3302, 3307, or 3315	4				
0		**16**		**8**		**0**	

Year 4

Fall	Hours	Spring	Hours
Co-op		DS 4400	4
		PHYS 5318	4
		PHYS 4115 or 5116	4
		Khoury Elective	4
0		**16**	

Total Hours: 135

PHYSICS COURSE OFFERING SCHEDULE

PHYS 2303 offered every fall, spring, and summer second half

PHYS 2371/PHYS 2372 offered every fall

PHYS 3600 offered every summer first half and summer second half

PHYS 3601 offered every fall and spring

PHYS 3602 offered every fall and spring

PHYS 3603 offered fall, spring all years, and summer first half (odd years)

PHYS 4115 offered every fall and spring

PHYS 4305 offered fall, spring all years, and summer second half (even years)

PHYS 4621 offered fall (even years) and spring (odd years)

PHYS 4623 offered fall (even years) and summer first half (even years)

PHYS 4651 offered fall (odd years) and spring (odd years)

PHYS 4652 offered every spring

PHYS 5318 offered every spring