Data Science, MS—Align (Boston)

Khoury College of Computer Sciences and the College of Engineering jointly offer an interdisciplinary Master of Science in Data Science. This program is designed to give students a comprehensive framework for reasoning about data. Students engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students are also able to choose elective courses from a variety of offerings in Khoury, the College of Engineering, and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates are well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

During the admissions process, applicants take a pretest to determine if the Master of Science in Data Science or Master of Science in Data Science—Align fits better with their current skill level. In addition, prospective applicants work with recruitment and enrollment coaching teams to select the appropriate program before applying.

The Master of Science in Data Science—Align curriculum is specifically designed to prepare incoming students without any prior programming experience. During the first semester of year one, students are expected to take foundational courses in computer science fundamentals, as well as a course in data structures/discrete mathematics. During their second semester, students will take coursework in programming for data science, as well as linear algebra and probability.

In this degree program, students will be admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Computer Science—Khoury College of Computer Sciences
- Engineering Theory and Modeling—College of Engineering

Students will follow all policies associated with their home college.

Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (https://catalog.northeastern.edu/graduate/academic-policies-procedures/course-numbering/).

Align Bridge Coursework

Students are required to complete all bridge courses unless otherwise determined by the program.

A grade of B or higher is required in each course.

Code	Title	Hours
Fundamentals		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
Discrete Structures		
CS 5002	Discrete Structures	4
Programming for Data Science		
DS 5010	Introduction to Programming for Data Science	4
Additional Align Coursework		
DS 5020	Introduction to Linear Algebra and Probability for Data Science	4

Data Science Core

A cumulative GPA of 3.000 or higher is required in the following core courses.

Code	Title	Hours
Programming with Data		
DS 5110	Essentials of Data Science	4
Algorithms		
CS 5800	Algorithms	4
or EECE 7205	Fundamentals of Computer Engineering	
Machine Learning		
CS 6140	Machine Learning	4
or EECE 5644	Introduction to Machine Learning and Pattern Recognition	

Interdisciplinary Capstone		
DS 5500	Data Science Capstone	4

Data Science Concentration Options

Complete one of the following concentrations:

- Computer Science (p. 2)—Khoury College of Computer Sciences
- Engineering Theory and Modeling (p.)—College of Engineering

Program Credit/GPA Requirements

40–48 total semester hours required
Minimum 3.000 GPA required

COMPUTER SCIENCE CONCENTRATION—KHOURY COLLEGE OF COMPUTER SCIENCES

Code	Title	Hours
Complete 16 semester hours from the following: [1]		16
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
CS 6350	Empirical Research Methods	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
CS 7200	Statistical Methods for Computer Science	
CS 7250	Information Visualization: Theory and Applications	
CS 7280	Special Topics in Database Management	
CS 7290	Special Topics in Data Science	
CS 7990	Thesis	
CS 8674	Master's Project	
DS 7995	Project	

ENGINEERING THEORY AND MODELING CONCENTRATION—COLLEGE OF ENGINEERING

Code	Title	Hours
Foundational Courses		
Complete 4 semester hours from the following: [1]		4
DS 7995	Project	
EECE 5360	Combinatorial Optimization	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7346	Probabilistic System Modeling and Analysis	
IE 6400	Foundations for Data Analytics Engineering	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
Translational and Advanced Courses		

Complete the remaining 12 semester hours from the following:		12
BIOE 5750	Modeling and Inference in Bioengineering	
BIOE 5880	Computational Methods in Systems Bioengineering	
BIOE 6200	Mathematical Methods in Bioengineering	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
EECE 5360	Combinatorial Optimization	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5645	Parallel Processing for Data Analytics	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7215	Introduction to Distributed Intelligence	
EECE 7223	Riemannian Optimization	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	
EECE 7346	Probabilistic System Modeling and Analysis	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7945	Master's Project	
IE 5137	Computational Modeling in Industrial Engineering	
IE 5390	Structured Data Analytics for Industrial Engineering	
IE 5630	Biosensor and Human Behavior Measurement	
IE 5640	Data Mining for Engineering Applications	
IE 6400	Foundations for Data Analytics Engineering	
IE 6600	Computation and Visualization for Analytics	
IE 6700	Data Management for Analytics	
IE 6750	Data Warehousing and Integration	
IE 7270	Intelligent Manufacturing	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
IE 7295	Applied Reinforcement Learning in Engineering	
IE 7300	Statistical Learning for Engineering	
IE 7500	Applied Natural Language Processing in Engineering	
IE 7615	Neural Networks and Deep Learning	

[1] Students taking electives worth less than 4 semester hours (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative semester hours to 4. In order to earn this additional 1 semester hour, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.