

# ANALYTICS AND DATA SCIENCE MAJOR: DATA SCIENCE OPTION (B.S.) MANCHESTER

<https://manchester.unh.edu/program/bs/analytics-data-science-major-data-science-option>

## Description

The option in Data Science is intended for students interested in pursuing advanced degrees and conducting original research in data science. The option in data science places its emphasis on a rigorous introduction to the theoretical mathematical and computational underpinnings of modern data science.

During the course of the program, students will demonstrate their acquisition of these skills by successfully completing their program coursework, their internship experience, and their capstone project.

For additional information about the Analytics and Data Science: Data Science Option, contact program coordinator [Jeremiah Johnson](mailto:Jeremiah.Johnson@unh.edu) ([Jeremiah.Johnson@unh.edu](mailto:Jeremiah.Johnson@unh.edu)) or the [UNH Manchester Office of Admissions](#) ([unhm.admissions@unh.edu](mailto:unhm.admissions@unh.edu)) at (603) 641-4150.

## Requirements

### Degree Requirements

**Minimum Credit Requirement:** 128 credits

**Minimum Residency Requirement:** 32 credits must be taken at UNH

**Minimum GPA:** 2.0 required for conferral\*

**Core Curriculum Required:** Discovery & Writing Program Requirements

**Foreign Language Requirement:** No

All Major, Option and Elective Requirements as indicated.

\*Major GPA requirements as indicated.

### Major Requirements

Successful completion of the program entails earning at least 128 credits, meeting the requirements of the University's Discovery program, and completing all of the 18 required courses in the major as listed below. In all major courses, the minimum allowable grade is a C-. The minimum overall GPA for graduation is 2.0. Transfer students may transfer up to a maximum of 32 credits to satisfy major requirements (not counting those courses used to satisfy Discovery requirements).

Students who enroll in the Data Science Option may need to take some required courses on the Durham campus.

| Code               | Title                     | Credits |
|--------------------|---------------------------|---------|
| <b>Mathematics</b> |                           |         |
| MATH 425           | Calculus I                | 4       |
| MATH 426           | Calculus II               | 4       |
| MATH 528           | Multidimensional Calculus | 4       |

|  |  |           |
|--|--|-----------|
| MATH 531   | Mathematical Proof   | 4         |
| COMP 570   | Statistics in Computing and Engineering  | 4         |
| MATH 645   | Linear Algebra for Applications  | 4         |
| MATH 755   | Probability with Applications  | 4         |
| MATH 756   | Principles of Statistical Inference  | 4         |
| <b>Computing</b>   |  |           |
| COMP 424<br>or CS 415  | Applied Computing 1: Foundations of Programming<br>Introduction to Computer Science I  | 4         |
| COMP 525<br>or CS 416  | Data Structures Fundamentals<br>Introduction to Computer Science II  | 4         |
| COMP 625<br>or CS 515  | Data Structures and Algorithms<br>Data Structures and Introduction to Algorithms   | 4         |
| CS 420   | Foundations of Programming for Digital Systems   | 4         |
| CS 659   | Introduction to the Theory of Computation  | 4         |
| COMP 740<br>& MATH 738<br>or COMP 740<br>& DATA 674<br>or DATA 674<br>& DATA 675 | Machine Learning Applications and Tools<br>and Data Mining and Predictive Analytics<br>Machine Learning Applications and Tools<br>and Predictive and Prescriptive Analytics I<br>Predictive and Prescriptive Analytics I<br>and Predictive and Prescriptive Analytics II | 8         |
| CS 758   | Algorithms   | 4         |
| COMP 720   | Database Systems and Technologies  | 4         |
| <b>Analytics &amp; Data Science</b>  |  |           |
| DATA 557   | Introduction to Data Science and Analytics   | 4         |
| <b>English</b>   |  |           |
| ENGL 502   | Professional and Technical Writing   | 4         |
| <b>Analytics Course Capstone</b>   |  |           |
| DATA #790<br>or CS 791<br>& CS 792<br>or CS 799                                  | Capstone Project<br>Senior Project I<br>and Senior Project II<br>Thesis  | 4         |
| <b>Select Approved Minor <sup>1</sup></b>  |  |           |
| <b>Total Credits</b>   |  | <b>80</b> |

<sup>1</sup> Select an approved minor in consultation with the minor supervisor. Must be in a discipline to which Analytics and Data Science can be applied (examples include: Economics, Applied Mathematics) for the Data Science Option.

## Degree Plan

This degree plan is a sample and does not reflect the impact of transfer credit or current course offerings. UNH Manchester undergraduate students will develop individual academic plans with their professional advisor during the first year at UNH.

## Sample Course Sequence

### First Year

| Fall                  |  | Credits   |
|-----------------------|--|-----------|
| MATH 425              | Calculus I   | 4         |
| COMP 424<br>or CS 415 | Applied Computing 1: Foundations of Programming<br>or Introduction to Computer Science I | 4         |
| ENGL 401              | First-Year Writing   | 4         |
| Discovery Course      |  | 4         |
| <b>Credits</b>        |  | <b>16</b> |

### Spring

|                       |  |   |
|-----------------------|--|---|
| MATH 426              | Calculus II  | 4 |
| COMP 525<br>or CS 416 | Data Structures Fundamentals<br>or Introduction to Computer Science II | 4 |

|                         |  |            |
|-------------------------|--|------------|
| DATA 557<br>or CS 457   | Introduction to Data Science and Analytics<br>or Introduction to Data Science and<br>Analytics | 4          |
| CS 420                  | Foundations of Programming for Digital<br>Systems  | 4          |
| <b>Credits</b>          |  | <b>16</b>  |
| <b>Second Year</b>      |  |            |
| <b>Fall</b>             |  |            |
| MATH 645                | Linear Algebra for Applications  | 4          |
| MATH 531                | Mathematical Proof   | 4          |
| COMP 625<br>or CS 515   | Data Structures and Algorithms<br>or Data Structures and Introduction to<br>Algorithms         | 4          |
| ENGL 502                | Professional and Technical Writing   | 4          |
| <b>Credits</b>          |  | <b>16</b>  |
| <b>Spring</b>           |  |            |
| COMP 570<br>or MATH 644 | Statistics in Computing and Engineering<br>or Statistics for Engineers and Scientists          | 4          |
| CS 659                  | Introduction to the Theory of Computation  | 4          |
| MATH 528                | Multidimensional Calculus  | 4          |
| Discovery Course        |  | 4          |
| <b>Credits</b>          |  | <b>16</b>  |
| <b>Third Year</b>       |  |            |
| <b>Fall</b>             |  |            |
| MATH 755                | Probability with Applications  | 4          |
| MATH 738                | Data Mining and Predictive Analytics <sup>1</sup>  | 4          |
| Minor Course            |  | 4          |
| Discovery Course        |  | 4          |
| <b>Credits</b>          |  | <b>16</b>  |
| <b>Spring</b>           |  |            |
| MATH 756                | Principles of Statistical Inference  | 4          |
| CS 750                  | Machine Learning <sup>1</sup>  | 4          |
| CS 755                  | Computer Vision  | 4          |
| Discovery Course        |  | 4          |
| <b>Credits</b>          |  | <b>16</b>  |
| <b>Fourth Year</b>      |  |            |
| <b>Fall</b>             |  |            |
| CS 758                  | Algorithms   | 4          |
| DATA #790               | Capstone Project   | 4          |
| Minor Course            |  |            |
| Discovery Course        |  |            |
| <b>Credits</b>          |  | <b>8</b>   |
| <b>Spring</b>           |  |            |
| Minor Course            |  | 4          |
| Minor Course            |  | 4          |
| Minor Course            |  | 4          |
| Discovery Course        |  | 4          |
| <b>Credits</b>          |  | <b>16</b>  |
| <b>Total Credits</b>    |  | <b>120</b> |

## Student Learning Outcomes

Analytics and Data Science focuses on the extraction of meaning from data through the application of computer science, mathematics and business domain knowledge. Within a few years of obtaining a bachelor's degree in Analytics and Data Science, our alumni will have:

- Engaged in successful career areas of analytics and data science and will already have, or be pursuing, advanced degrees in Analytics, Data Science, Computer Science, Mathematics or related fields
- Applied the full range of core Data Science concepts and techniques to fill the analytics needs of an organization
- Communicated effectively with diverse stakeholders as well as functioned appropriately in a team environment
- Navigated the complex interconnections between data, computing technology, and the goals and constraints of the organization served
- Understood the pervasive and changing role of data in global society, and participated responsibly as both an Analytics and Data Science professional and citizen

<sup>1</sup> Either MATH 738 and CS 750, or DATA 674 and DATA 675, or DATA 674 and CS 750.