# DATA SCIENCE MAJOR (B.S.)

https://ceps.unh.edu/computer-science/program/bs/data-science

## Description

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

## 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 degree program includes earning a minimum of 128 credits, meeting the requirements of the University's Discovery Program, completing all of the 20 required courses in the major as listed below, capstone course, and a minor approved by the advisor.

In all major courses, a minimum grade of C- must be earned. 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).

| Code | Title | Credits |
|---|---|---|
| **Required Courses** | | |
| *Mathematics* | | |
| MATH 425 | Calculus I | 4 |
| MATH 426 | Calculus II | 4 |
| MATH 528 | Multidimensional Calculus | 4 |
| MATH 531 | Mathematical Proof | 4 |
| MATH 539 | Introduction to Statistical Analysis | 4 |
| or MATH 644 | Statistics for Engineers and Scientists | |
| MATH 645 | Linear Algebra for Applications | 4 |
| or MATH 545 | Introduction to Linear Algebra | |
| MATH 755 | Probability with Applications | 4 |
| MATH 756 | Principles of Statistical Inference | 4 |
| *Computer Science* | | |
| CS 400 | Introduction to Computing | 2 |
| CS 415 | Introduction to Computer Science I | 4 |
| or CS 410P | Introduction to Scientific Programming/Python | |
| CS 416 | Introduction to Computer Science II | 4 |
| CS 420 | Foundations of Programming for Digital Systems | 4 |
| CS 457 | Introduction to Data Science and Analytics | 4 |
| CS 515 | Data Structures and Introduction to Algorithms | 4 |
| CS 659 | Introduction to the Theory of Computation | 4 |
| CS 674 & CS 675 | Fundamentals of Statistical Learning I and Fundamentals of Statistical Learning II | 8 |
| or CS 674 & CS 750 | Fundamentals of Statistical Learning I and Machine Learning | |
| CS 758 | Algorithms | 4 |
| IT 630 | Data Science and Big Data Analytics | 4 |
| or CS 775 | Database Systems | |
| *Capstone* | | |
| CS 791 & CS 792 | Senior Project I and Senior Project II | 4 |
| or CS 799 | Thesis | |
| *Select an Approved Minor* [1] | | |
| Complete five (5) additional courses | | 20 |
| **Total Credits** | | **98** |

[1] Minor must be approved by an academic advisor and must be in a discipline to which Analytics & Data Science can be applied (i.e. Economics or Applied Mathematics).
Instead of a minor, students may complete four (4) 600/700-level CS or MATH courses plus one (1) general elective. The additional general elective is required to meet the minimum 128 credits needed for graduation.

## Degree Plan

## Sample Degree Plan

*This sample degree plan serves as a general guide; students collaborate with their academic advisor to develop a personalized degree plan to meet their academic goals and program requirements.*

| | | |
|---|---|---|
| **First Year** | | |
| **Fall** | | **Credits** |
| CS 400 | Introduction to Computing | 2 |
| CS 415 | Introduction to Computer Science I | 4 |
| CS 457 | Introduction to Data Science and Analytics | 4 |
| MATH 425 | Calculus I | 4 |
| ENGL 401 | First-Year Writing | 4 |
| | **Credits** | **18** |
| **Spring** | | |
| CS 416 | Introduction to Computer Science II | 4 |
| CS 420 | Foundations of Programming for Digital Systems | 4 |
| MATH 426 | Calculus II | 4 |
| Discovery Course | | 4 |
| | **Credits** | **16** |
| **Second Year** | | |
| **Fall** | | |
| CS 515 | Data Structures and Introduction to Algorithms | 4 |
| MATH 531 | Mathematical Proof | 4 |
| MATH 645 or MATH 545 | Linear Algebra for Applications or Introduction to Linear Algebra | 4 |
| Discovery Lab | | 4 |
| | **Credits** | **16** |
| **Spring** | | |
| MATH 539 or MATH 644 | Introduction to Statistical Analysis or Statistics for Engineers and Scientists | 4 |

| | | |
|---|---|---|
| MATH 528 | Multidimensional Calculus | 4 |
| Minor Elective I | | 4 |
| Discovery | | 4 |
| | **Credits** | **16** |
| **Third Year** | | |
| **Fall** | | |
| CS 659 | Introduction to the Theory of Computation | 4 |
| CS 674 | Fundamentals of Statistical Learning I | 4 |
| Minor Elective II | | 4 |
| Discovery | | 4 |
| | **Credits** | **16** |
| **Spring** | | |
| CS 758 | Algorithms | 4 |
| CS 675<br>or CS 750 | Fundamentals of Statistical Learning II<br>or Machine Learning | 4 |
| Minor Elective III | | 4 |
| Discovery Course | | 4 |
| | **Credits** | **16** |
| **Fourth Year** | | |
| **Fall** | | |
| CS 791 | Senior Project I | 2 |
| MATH 755 | Probability with Applications | 4 |
| IT 630 | Data Science and Big Data Analytics | 4 |
| Minor Elective IV | | 4 |
| Discovery | | 4 |
| | **Credits** | **18** |
| **Spring** | | |
| CS 792 | Senior Project II | 2 |
| MATH 756 | Principles of Statistical Inference | 4 |
| Minor Elective V | | 4 |
| Discovery | | 4 |
| | **Credits** | **14** |
| | **Total Credits** | **130** |

## Student Learning Outcomes

# Program Learning Outcomes

- Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Communicate effectively in a variety of professional contexts.
- Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Apply theory, techniques, and tools throughout the data analysis lifecycle and employ the resulting knowledge to satisfy stakeholders' needs.