The option in Analytics is intended for students interested in either heading into industry immediately upon graduation, or pursuing graduate work in a professionally oriented program such as the Master of Science in Analytics at UNH. The option in Analytics places its emphasis on applications of data science in business and industry.

**Program Objectives**

This program has been designed to prepare students for professional careers working with data, with an emphasis on the extraction of meaning from data. The program is not targeted to any one industry; rather, it provides a flexible, practical skillset that can be applied widely. This skillset includes elements of computer science, applied mathematics and statistics, communication skills, and business savvy. Graduates of the bachelor of science in analytics and data science program are expected to have:

- An understanding of the role of data in guiding decision-making in industry
- An understanding of how data is generated, stored, and accessed
- An understanding of data security
- An understanding of the ethical use of data
- An understanding of structured vs. unstructured data
- An understanding of the methods, statistical and other, used to derive actionable information from data
- Experience with multiple programming languages
- Experience with multiple statistical and data analysis software programs
- The ability to communicate detailed, technical information to a variety of audiences clearly and concisely, without the use of jargon
- The ability to work effectively, both as an individual or as a member of a team
- The ability to successfully lead a team
- The ability to adapt to a dynamic, rapidly changing work environment
- Completed projects and other work experiences on a larger scale than is typical in a bachelor’s degree program.

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.

**Requirements**

Successful completion of the program entails earning at least 128 credits, meeting the requirements of the University’s Discovery program, completing all of the 24 required courses in the major as listed below, including the capstone course, the internship preparedness course, and a three-credit internship. 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).

### Program Requirements

#### Mathematics

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 425</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 426</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 644</td>
<td>Statistics for Engineers and Scientists</td>
<td>4</td>
</tr>
<tr>
<td>or COMP 570</td>
<td>Statistics in Computing and Engineering</td>
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</tr>
<tr>
<td>or MATH 539</td>
<td>Introduction to Statistical Analysis</td>
<td></td>
</tr>
<tr>
<td>MATH 645</td>
<td>Linear Algebra for Applications</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 546</td>
<td>Introduction to Linear Algebra</td>
<td></td>
</tr>
<tr>
<td>MATH 739</td>
<td>Applied Regression Analysis</td>
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</table>

#### Computer Science

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>CS 400</td>
<td>Introduction to Computing</td>
<td>1</td>
</tr>
<tr>
<td>CS 414 &amp; CS 417</td>
<td>From Problems to-Algorithms to Programs</td>
<td>8</td>
</tr>
<tr>
<td>or CS 415 &amp; CS 416</td>
<td>Introduction to Computer Science I</td>
<td></td>
</tr>
<tr>
<td>or COMP 424 &amp; COMP 525</td>
<td>Applied Computing I: Foundations of Programming</td>
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</tr>
<tr>
<td>or COMP 425 &amp; COMP 525</td>
<td>Introduction to Programming</td>
<td></td>
</tr>
<tr>
<td>or DATA 457</td>
<td>Introduction to Data Science and Analytics</td>
<td>4</td>
</tr>
<tr>
<td>or DATA 557</td>
<td>Introduction to Data Science and Analytics</td>
<td>4</td>
</tr>
<tr>
<td>CS 515</td>
<td>Data Structures and Introduction to Algorithms</td>
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</tr>
<tr>
<td>or COMP 625</td>
<td>Data Structures and Algorithms</td>
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</tr>
<tr>
<td>IT 505</td>
<td>Integrative Programming</td>
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</tr>
<tr>
<td>or COMP 520</td>
<td>Database Design and Development</td>
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<tr>
<td>IT 520</td>
<td>Computer Architecture</td>
<td>4</td>
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<tr>
<td>or CS 520</td>
<td>Assembly Language Programming and Machine Organization</td>
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</tr>
<tr>
<td>or COMP 430</td>
<td>Systems Fundamentals</td>
<td></td>
</tr>
</tbody>
</table>

#### Business

In consultation with your advisor select:

1. Course in Introduction to Business 4
2. Course in Organizational Behavior 4
3. Course in Organizational Leadership 4

#### English

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENGL 902</td>
<td>Professional and Technical Writing</td>
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#### Analytics Courses

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>DATA 674 &amp; DATA 675</td>
<td>Predictive and Prescriptive Analytics I and II</td>
<td>8</td>
</tr>
<tr>
<td>or DATA 674 &amp; CS 790</td>
<td>Predictive and Prescriptive Analytics I and Machine Learning</td>
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</tr>
<tr>
<td>or MATH 738 &amp; CS 790</td>
<td>Data Mining and Predictive Analytics and Machine Learning</td>
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</tr>
<tr>
<td>DATA 690</td>
<td>Internship Experience</td>
<td>4</td>
</tr>
<tr>
<td>DATA 757</td>
<td>Mining Massive Datasets</td>
<td>4</td>
</tr>
<tr>
<td>or COMP 721</td>
<td>Big Data for Data Engineers</td>
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</table>

#### Capstone

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>DATA 790</td>
<td>Capstone Project</td>
<td>4</td>
</tr>
<tr>
<td>or CS 791 &amp; CS 792</td>
<td>Senior Project I and II</td>
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<tr>
<td>or CS 799</td>
<td>Thesis</td>
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Select three electives 2

<table>
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<tr>
<th>Credits</th>
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<tbody>
<tr>
<td>12</td>
</tr>
</tbody>
</table>

#### Total Credits

93

1 Or another suitable 700-level data science or data engineering course chosen in consultation with the program coordinator.
2 Must be 600 or 700-level and approved by advisor.

For additional information about the Analytics and Data Science: Analytics Option, contact Wheeler Ruml, program co-director (Durham campus), at wheeler.ruml@unh.edu or Jeremiah Johnson,
program co-director (Manchester campus), at (603) 641-4127 or jeremiah.johnson@unh.edu. (jeremiah.johnson@unh.edu)

**Student 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.