# Data Science and Analysis BS, Computer Science Emphasis

## General Education Requirements

Students must satisfy the university general education requirements. Many of the courses for the degree may be used to fulfill math proficiency, information literacy, social science, and math and life/natural sciences requirements. The program recommends students take ENGL 3130 Technical Writing or ENGL 3120 Business Writing to satisfy the Junior-Level Writing requirement. Emphasis areas may require one of these courses. There is no foreign language requirement for the degree.

## Satisfactory/Unsatisfactory Option

Courses required for the major may not be taken on a satisfactory/unsatisfactory basis.

## Degree Requirements

The BS in Data Science and Analysis consists of a set of core courses along with an emphasis area. Students must earn a minimum grade of C- in all core courses and emphasis area courses.

### Core Courses

#### Calculus Course

- **MATH 1800** Analytic Geometry and Calculus I 1  3-5
- or **MATH 1100** Basic Calculus

#### Statistics Course

The Introduction to Statistics course should align with the student’s Discipline Emphasis Area. Choose one of the following:

- **SOC 3220** Quantitative Data Analysis in Social Science Research
- **BIOL 4122** Biostatistics
- **ECON 3100** Economic Data and Statistics
- **CRIMIN 2220** Statistical Analysis in Criminology and Criminal Justice
- **MATH 1320** Introduction to Probability and Statistics
- **PSYCH 2201** Psychological Statistics
- **POL SCI 3000** Political Analysis
- **SCMA 3300** Business Analytics and Statistics

#### Additional Required Courses

- **MATH 4005** Exploratory Data Analysis with R  3
- **CMP SCI 1250** Introduction to Computing  3
- **CMP SCI 4200** Python for Scientific Computing and Data Science  3
- **CMP SCI 4342** Introduction to Data Mining  3
- or **MATH 4250** Introduction to Statistical Methods in Learning and Modeling  3

**Total Hours**  18-20

Other Data Science courses may be included as electives with prior approval of the program coordinator.

### Emphasis Area Requirements

#### CMP SCI 2250 Programming and Data Structures  3
#### CMP SCI 3130 Design and Analysis of Algorithms  3
#### CMP SCI 3411 Introduction to Data Visualization  3
#### CMP SCI 4151 Introduction to Statistical Methods for Data Science  3
#### CMP SCI 4340 Introduction to Machine Learning  3
#### ENGL 3130 Technical Writing  3
#### MATH 1900 Analytic Geometry and Calculus II  5
#### MATH 3000 Discrete Structures  3

Select six of the following:

<table>
<thead>
<tr>
<th>CMP SCI 2261</th>
<th>Object-Oriented Programming</th>
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<tbody>
<tr>
<td>CMP SCI 2751</td>
<td>File Systems, Operations, and Tools</td>
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<tr>
<td>CMP SCI 3260</td>
<td>C/C++ for Advanced Programming</td>
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<tr>
<td>CMP SCI 3010</td>
<td>Web Full Stack Development</td>
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<tr>
<td>CMP SCI 3702</td>
<td>Introduction to Cyber Threats and Defense</td>
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<tr>
<td>CMP SCI 4030</td>
<td>Introduction to Intelligent Web</td>
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<tr>
<td>CMP SCI 4300</td>
<td>Introduction to Artificial Intelligence</td>
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<tr>
<td>CMP SCI 4320</td>
<td>Introduction to Evolutionary Computation</td>
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<tr>
<td>CMP SCI 4370</td>
<td>Introduction to Biological Data Science</td>
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<tr>
<td>CMP SCI 4390</td>
<td>Introduction to Deep Learning</td>
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<tr>
<td>CMP SCI 4610</td>
<td>Database Management Systems</td>
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<tr>
<td>CMP SCI 4750</td>
<td>Introduction to Cloud Computing</td>
</tr>
<tr>
<td>MATH 2450</td>
<td>Elementary Linear Algebra</td>
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</tbody>
</table>

**Total Hours**  44

Other Data Science courses may be included as electives with prior approval of the program coordinator.

### Learning Outcomes

Upon completion of the program, graduates will be able to:

- Apply knowledge of statistical data collection, analysis and quantitative modeling techniques
- Demonstrate proficiency in industry-standard programming languages that support data acquisition, retrieval and analysis
- Select, apply and build data-based models and visualizations to devise solutions to data science problems
- Effectively communicate technical results and recommendations in various formats to appropriate audiences
- Identify and interpret the basic computational issues in problem solving
- Apply appropriate tools and techniques necessary for programming practice
• Apply statistical concepts and data science methods to analyze real-world problems using appropriate computer science processes and techniques