

DATA SCIENCE MAJOR

Data and algorithms are increasingly affecting our lives from recommending TV shows to detecting cancer in medical imaging to determining whether we get a car loan. This is due to an increasingly large amount of data available and the computation power to effectively process it. Data science is the study of extracting meaning from large amounts of data to improve our understanding of the world around us.

Managing and analyzing data is becoming an integral part of the sciences, social sciences, business, humanities, and engineering because of the large amounts of unstructured and raw data available for discovery and decision-making. Inherently interdisciplinary, data science combines critical thinking with principals of mathematics, statistics, and computer programming to recommend solutions in a variety of fields. Data-driven solutions and statistical models are impacting more aspects of our lives. The consequences of algorithmic decision making requires urgent examination and understanding of ethical questions related to data science.

The data science program is designed to provide students the mathematical, statistical, and computer programming tools necessary to ethically interpret an increasingly data-driven world. Students will develop organization, analytical, and visualization skills to present actionable information from data. There will be a discussion of ethics throughout the curriculum, including opportunities for students to collect and analyze data in an ethical manner. In addition, students will have the opportunity to participate in semester long team-based consulting project using real data and present results to real clients. Students are encouraged to reflect on areas to apply data science by taking domain area electives that inspire a capstone project.

The major is ideal for students who wish to develop strong analytical, quantitative, and communication skills. It will provide a solid foundation and experiences that prepares students for further work, whether in future employment or graduate study.

Requirements

Degree Requirements

This major is available as a bachelor of arts or bachelor of science degree, as defined in the section on degree requirements (<http://catalog.linfield.edu/degrees-and-programs/undergraduate/ba-bs-bsn/>) for all majors in this catalog.

| Code | Title | Credits |
|---|---|---------|
| Core Courses in Data Science | | |
| DATA 125 | SURVEY OF DATA SCIENCE | 4 |
| DATA 135 | FAIRNESS AND RESPONSIBILITY IN DATA SCI | 4 |
| DATA 225 | INTRODUCTION TO VISUALIZATIONS | 4 |
| DATA 445 | MACHINE LEARNING | 4 |
| Core Courses in Mathematics | | |
| MATH 170 | CALCULUS I | 5 |
| MATH 175 | CALCULUS II | 3 |
| MATH 250 | LINEAR ALGEBRA | 4 |
| MATH 340 | PROBABILITY AND STATISTICS I | 4 |
| Core Courses in Computer Science | | |
| COMP 160 | BEG. PROGRAMMING AND PROBLEM-SOLVING | 4 |
| COMP 260 | DATABASE MANAGEMENT SYSTEMS | 4 |

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| Experiential Learning Requirement | | |
| DATA 488 | DATA SCIENCE CONSULTING (or) | 3 |
| MATH 280 | MATHEMATICAL MODELING EXPERIENCE (3 credits worth) | |
| Approved internship | | |
| Research/Writing Requirement | | |
| MATH 485 | SENIOR SEMINAR (or) | 3 |
| COMP 490 | CAPSTONE PROJECT | |
| Electives | | 7-8 |
| Select two of the following | | |
| BIOL 340 | BIOINFORMATICS | |
| ECON 416 | ECONOMETRICS | |
| MATH 380 | NUMERICAL ANALYSIS | |
| MATH 440 | PROBABILITY & STATISTICS II | |
| PHYS 325 | COMPUTATIONAL PHYSICS | |
| BNSS 255 | DATA MANAGEMENT AND ANALYSIS W/ PYTHON | |
| or other electives approved by the program coordinator | | |
| Total Credits | | 53-54 |

Student Learning Outcomes

- Learn to manage data including collecting and transforming data.
- Create visuals of data to improve or shape understanding.
- Analyze data using statistical tools to draw inference and make predictions.
- Communicate in a clear, logical, and precise fashion about data, methods, and conclusions to a range of audiences.
- Demonstrate an ethical manner in the collection, analytics, and presentation of data.
- Apply their coursework to real-world problems in a domain area of focus.
- Develop teamwork skills.