

# 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 science degree only, 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
<b>Core Courses in Data Science</b>		
DATA 125	SURVEY OF DATA SCIENCE	3
DATA 135	FAIRNESS AND RESPONSIBILITY IN DATA SCIENCE	3
DATA 225	INTRODUCTION TO VISUALIZATIONS	4
DATA 445	MACHINE LEARNING	3
<b>Core Courses in Mathematics</b>		
MATH 170	CALCULUS I	5
MATH 175	CALCULUS II	3
MATH 250	LINEAR ALGEBRA	4
MATH 340	PROBABILITY AND STATISTICS I	4
<b>Core Courses in Computer Science</b>		
COMP 160	INTRODUCTION TO PROGRAMMING: FUNCTIONS	3
COMP 260	DATABASE MANAGEMENT SYSTEMS	3

<b>Experiential Learning Requirement</b>		<b>3</b>
DATA 488	DATA SCIENCE CONSULTING (or)	3
MATH 280	MATHEMATICAL MODELING EXPERIENCE (3 credits worth)	
Approved internship		
<b>Research/Writing Requirement</b>		
MATH 485	SENIOR SEMINAR (or)	3
COMP 490	CAPSTONE PROJECT	
<b>Electives</b>		<b>9</b>
Enough elective credits to total 50 for the major		
BIOL 340	BIOINFORMATICS	
ECON 416	ECONOMETRICS	
MATH 380	NUMERICAL ANALYSIS	
MATH 440	PROBABILITY & STATISTICS II	
PHYS 325	COMPUTATIONAL PHYSICS	
or other electives approved by the program coordinator		
<b>Total Credits</b>		<b>53</b>

## 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.