

# DATA SCIENCE

The exigency for people with data analysis, critical thinking, and communication skills continues as the volume and access to data grows exponentially all around. The Bureau of Labor Statistics projects a 31% growth rate in the employment of data scientists through the year 2029. This is a faster than average growth rate when compared to other occupations, based upon a widespread need for statistical analysis of "the increasing volume of digital and electronic data".<sup>1</sup>

The emergence of "big data" has served as a catalyst for the growth of data science as a discipline, building a solid foundation through the combination of statistics, mathematics, and computer science. Data science captures the already-present interdisciplinary nature of statistics and mixes with it a breadth of knowledge from many other subject domains. A data scientist, grounded within a solid liberal arts education, will continue to have influential roles in discovery and decision-making across the broad spectrum of disciplines and industry. St. Catherine University's mission to educate our students to lead and influence inherently contains our responsibility to learn how to think critically, ethically, and globally about information and data. Our data science students learn to conduct analyses and construct models, to draw conclusions and interpret results, and to allow that thinking to inform the decision-making process - a key component at the heart of ethical, transformational influence and leadership.

<sup>1</sup><https://www.bls.gov/ooh/fastest-growing.htm>

## Major

- Data Science - BS (<http://catalog.stkate.edu/undergraduate/humanities-arts-sciences/data-science/data-science-bs/>)

### DSCI 1000 Telling Stories with Data - Introduction to Data Visualization – 4 credits

The amount and extent of data in our world is constantly growing. There is an increasing need to summarize the data, make sense of it, and use it to tell important stories. Visualizations are an immensely popular way to summarize data and communicate it into a narrative. In this course, we will discuss how we perceive information visually, how to identify and avoid pitfalls in data visualization, how we interpret data visualizations to tell a story, and how to create effective visualizations. Through community-engaged work, students will begin to learn to craft summaries and visualizations of data and to use these tools to construct narratives about the data. Community-engaged work is project-based. No prerequisites required; ideal for first year students, but open to all interested students. Course does not satisfy the math/stat core requirement.

### DSCI 2000 Seminar for Data Science – 2 credits

This seminar course offers an introductory insight into data science and statistics as a major course of study and some of the professional opportunities associated with the discipline. We will learn from data scientists, statisticians, and analysts as guest speakers and professional panels, learn and practice communication skills through general conversations, book discussions, games, and mock interviews, as well as begin framing the process of e-portfolio and resume construction. Offered every odd spring semester in the College for Women.

### DSCI 2100 Introduction to Programming: Applied Computing I – 4 credits

This semester course is designed using Google proprietary curriculum. Students will develop problem solving and programming skills, specifically in Python, and will learn to analyze and visualize data in order to drive well-informed decisions, no matter the student's major or course of study. No prerequisites. Offered every odd fall semester in the College for Women.

### DSCI 2684 Directed Study – 4 credits

#### DSCI 2994 Topics – 4 credits

The subject matter of the course is announced in the annual schedule of classes. Content varies from year to year but does not duplicate existing courses. Offered in the College for Women.

### DSCI 3100 Database Management – 4 credits

An introduction to database concepts, design and implementation. The focus is on database design using the ER model, as well as managing and implementing relational database systems. The design process is iterative and consists of four phases: Requirements, Design, Coding, and Testing. This process is often employed in many project management and technology development projects. Topics include Data Modeling Using Entity-Relationship Model, Chen and Crow's Foot Notation, Relational Database Implementation, Structured Query Language, and schema Normalization. This course is co-convened with LIS 7510. The courses share the same course description, objectives and content, with different course requirements. Offered every odd fall in the College for Women.

### DSCI 3200W Analyzing Social Issues with Data – 4 credits

Students will gain experience with the entire data science pipeline, including asking a research question, collecting/importing, wrangling/cleaning, visualizing, and modeling data, and communicating results of analysis. Students will learn to use R to wrangle and visualize data from large, complex datasets, with examples related to social issues. In this writing-intensive course, students will gain practice writing about their methods and communicating results to different types of audiences.

**Prerequisite:** STAT 1090 or equivalent. Highly

**recommended:** Some exposure to R. Students without exposure to R will be expected to spend some extra time at the beginning of the semester learning the basics. (The instructor will provide resources.).

### DSCI 3300 Introduction to Machine Learning for Data Science – 4 credits

Introduction to Machine Learning for Data Science is a foundational course designed to introduce students to the principles, techniques, and applications of machine learning in the context of data science. Through a combination of theoretical lectures, practical exercises, and hands-on interdisciplinary projects, students will learn how to analyze and interpret data using a variety of machine learning algorithms. Topics covered include supervised learning, unsupervised learning, evaluation methods, and practical considerations for applying machine learning to real-world social problems. Emphasis will be placed on understanding the ethical implications, biases, and limitations of using machine learning in the context of social analysis. Offered at the College for Women.

**Prerequisite:** STAT 1090 or equivalent. A grade of C or better in MATH 1130 or permission of instructor. Recommended to have basic understanding of the Python programming language or have taken CSCI 1110 (seek permission from instructor if transferring or would like to take this course).

**DSCI 4600 Internship — 0 credits**

This is a structured out-of-class learning experience that takes place on- or off-campus and includes a substantial work component. An internship involves students in a particular profession in an exploratory way to test career interests and potential. To initiate an internship experience, meet with the internship coordinator in the Career Development Office.

**Prerequisites:** Faculty sponsorship and approval by department chair.

**DSCI 4604 Internship — 4 credits**

Structured out-of-class learning experience that takes place on or off campus and includes a substantial work component. An internship involves students in a particular profession in an exploratory way to test career interests and potential. To initiate an internship experience, meet with the internship coordinator in the Career Development Office.

**Prerequisites:** Faculty sponsorship and approval by department chair.

**DSCI 4684 Directed Study — 4 credits****DSCI 4950 Independent Study — 0 credits****DSCI 4951 Independent Study — 1 credit****DSCI 4952 Independent Study — 2 credits****DSCI 4954 Independent Study — 4 credits**

## Data Science Minor

A minor in Data Science enhances and complements a wide range of majors, including Psychology, Public Health, Business, Economics, Sociology, and Mathematics, by equipping students with essential skills in data analysis, visualization, and machine learning. In today's data-driven world, the ability to interpret and leverage data is invaluable across disciplines. For Psychology and Sociology majors, data science helps uncover patterns in behavior and societal trends. In Public Health, it enables effective tracking of health outcomes and disease spread. Business and Economics students gain a competitive edge in market analysis and decision-making, while Mathematics majors deepen their computational expertise. By minoring in Data Science, students can amplify their problem-solving abilities and open doors to diverse career opportunities.

This minor is offered in the College for Women only.

### Curriculum

Required Courses:

Code	Title	Credits
CSCI 1110	Algorithms and Computer Programming I with Lab	4
DSCI 1000	Telling Stories with Data - Introduction to Data Visualization	4
DSCI 3000	Data Ethics, Governance and Social Impact	4
Select two of the following courses: <sup>1</sup>		
DSCI 3100	Database Management	
DSCI 3300	Introduction to Machine Learning for Data Science	
DSCI 2100	Introduction to Programming: Applied Computing I	
DSCI 3200W	Analyzing Social Issues with Data	
DSCI 4100	Introduction to Cloud Computing	
DSCI 2000	Seminar for Data Science	
CSCI 2994	Introduction to Artificial Intelligence	

Other courses approved by the division chair.

**Total Credits** **20**

<sup>1</sup> Students are advised to consult with their academic advisor when selecting courses to ensure that they incorporate prerequisites into their course planning.

### Computer Science - Minor

This minor is offered in the College for Women only.

### Curriculum

Code	Title	Credits
MATH 1800	Discrete Mathematics	4
CSCI 1110 & CSCI 1120	Algorithms and Computer Programming I with Lab and Algorithms and Computer Programming II with Lab	8
Select two of the following:		8
CSCI 2200	Introduction to Cyber Security	
CSCI 2994	Introduction to Artificial Intelligence	
DSCI 3100	Database Management	
DSCI 3300	Introduction to Machine Learning for Data Science	
Other courses approved by the division chair		
<b>Total Credits</b>		<b>20</b>