

# DATA SCIENCE 4+1

## 4+1 Program Description

A Data Scientist is a professional who combines many types of technical and industry competencies to turn data, which is very often idiosyncratic and ambiguous, into actionable intelligence in a business environment. The skills needed to make this transformation draw from mathematics, statistics, computer science, and business, and require the ability to communicate technical information to people with a range of technical competence. Saint Mary's Master of Science in Data Science program is designed to rapidly bring students to the point of functioning in the role of a data scientist and then, building on the initial growth, to develop expertise with their data science skills.

Data-driven decisions are made across most major industry sectors on a daily basis. This means the work of data scientists can be done by those from an array of backgrounds as long as they have a foundation in the skills listed above, namely, mathematics, statistics, and computer programming. At Saint Mary's students can earn a bachelor's degree, in any area, and the data science master's degree in just five years.

## Study Abroad

Saint Mary's has a long history of providing quality international programs as an essential part of our educational mission—forming women leaders who will make a difference in the world. As this world becomes increasingly interdependent, the College offers an expanding range of semester, year, semester break, and summer study and service programs in a wide variety of countries, and encourages students to take advantage of them. Learn more about the various Study Abroad opportunities (<https://catalog.saintmarys.edu/undergraduate/academic-life/international-programs/>).

## Programs

- 4+1 Program in Data Science (<https://catalog.saintmarys.edu/undergraduate/programs/data-science/4-1-program-data-science/>)

## Department Chair

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## Data Science Courses

### DSCI 501 Data Mining (3)

This course is about mining knowledge from data in order to gain useful insights and predictions. From theory to practice, the course investigates all stages of the knowledge discovery process, which includes data preprocessing, exploratory data analysis, prediction and discovery through regression and classification, clustering, association analysis, anomaly detection, and postprocessing.

### DSCI 502 Advanced Topics in Data Science (3)

Advanced Topics in Data Science is a comprehensive course designed to provide students with both foundational and advanced concepts in data science and machine learning. The course begins with an introduction to programming and data analysis using Python, equipping students with essential coding and analytical skills. It covers core machine learning techniques, including regression methods, classification approaches, and anomaly detection, before advancing into deep learning with neural networks (NNs), recurrent neural networks (RNNs), and convolutional neural networks (CNNs). Students will also explore dimensionality reduction with Principal Component Analysis (PCA) and learn about autoencoders for unsupervised representation learning. A key focus of the course is the practical application of these techniques, culminating in model deployment using Amazon SageMaker. This hands-on approach prepares students to develop and implement scalable machine learning solutions in real-world environments. Prerequisite: DSCI 501

### DSCI 511 Data Preprocess/Visualization (3)

This course is an introduction to data visualization. It includes data preprocessing and focuses on specific tools and techniques necessary to visualize complex data. Data visualization topics covered include design principles, perception, color, statistical graphs, maps, trees and networks, and other topics as appropriate. Visualization tools may include JavaScript D3 library, Python, and R, and commercially available software such as Tableau, etc. The course introduces the techniques necessary to successfully implement visualization projects using the programming languages studied.

### DSCI 590 Data Science Topics (3)

#### DSCI 595 Thesis (1-3)

Thesis credit may be earned for significant work toward the writing of a master's thesis. This thesis may be used to fulfill the culminating project requirement.

#### DSCI 599 Practicum (1-6)

The practicum is an opportunity to directly experience the work of a data scientist or data analytics professional. It consists of project-based learning on a significant and contributory business objective in conjunction with practicing professionals in one of many appropriate industries. May be repeated up to 6 credits.

### DSCI 997 Fulltime (12)