

DATA SCIENCE (DS)

DS 140 Basics of Data Analysis with R (2 crs)

Prerequisite: MATH 20, completion of an LE-S2 course, or a suitable mathematics placement test score

Basics of Data Analysis with R will give students a good exposure and understanding of R capabilities. The course will focus on the essentials of R. Students will work with vectors, matrices, and data frames in R. They will also learn to manage, handle, and visualize a dataset in R. Examples from various areas will be used, including Biology, Economics, Mathematics, and Geography and Anthropology.

Lecture/Discussion Hours: 2

Lab/Studio Hours: 0

DS 150 Computing in Python: Fundamentals and Procedural Programming (4 crs)

Prerequisite: MATH 109, MATH 112, or MATH 114, or concurrent enrollment in MATH 109, MATH 112, or MATH 114

Computing in Python provides an introduction to the world of procedural programming in the Python computer language. Students will learn tactics and approaches for solving novel problems in the world of data science. Main tasks are the storage, retrieval, processing, and visualization of data. Examples will be drawn from bioinformatics, economics, and other fields.

Lecture/Discussion Hours: 4

Lab/Studio Hours: 0

DS 250 Data Structures and Algorithms in Bioinformatics (4 crs)

Prerequisite: DS 150; MATH 112 or concurrent enrollment, MATH 113 or concurrent enrollment, or placement into MATH 114 or MATH 215

This course covers algorithmic and data structure techniques that underpin modern biological data analysis. Topics covered include clustering, string searching, tree traversal, maximum parsimony, maximum likelihood, hidden Markov models, and version tracking. Some of the biological applications will include sequence alignment and assembly, phylogeny, gene finding, and variation detection.

Lecture/Discussion Hours: 4

Lab/Studio Hours: 0

DS 700 Foundations of Data Science (3 crs)

Prerequisite: Limited to Data Science master's degree students.

Introduction to data science and its importance in business decision making.

Attributes: Data Science MS OL Flat Rate Tuition, Special Course Fee Required

Grading Basis: A-F Grades Only

Lecture/Discussion Hours: 3

Lab/Studio Hours: 0

DS 705 Statistical Methods (3 crs)

Prerequisite: Limited to Data Science master's degree students.

Statistical methods and inference procedures presented with an emphasis on applications, computer implementation, and interpretation of results.

Attributes: Data Science MS OL Flat Rate Tuition, Special Course Fee Required

Grading Basis: A-F Grades Only

Lecture/Discussion Hours: 3

Lab/Studio Hours: 0

DS 710 Programming for Data Science (3 crs)

Prerequisite: Limited to Data Science master's degree students.

Introduction to programming languages and packages used in data science.

Attributes: Data Science MS OL Flat Rate Tuition, Special Course Fee Required

Grading Basis: A-F Grades Only

Lecture/Discussion Hours: 3

Lab/Studio Hours: 0

DS 715 Data Warehousing (3 crs)

Prerequisite: Limited to Data Science master's degree students.

Introduction to the concepts and techniques to work with and reason about subject-oriented, integrated, time-variant, and nonvolatile collections of data in support of management's decision-making process.

Attributes: Data Science MS OL Flat Rate Tuition, Special Course Fee Required

Grading Basis: A-F Grades Only

Lecture/Discussion Hours: 3

Lab/Studio Hours: 0

DS 730 Big Data: High Performance Computing (3 crs)

Prerequisite: Limited to Data Science master's degree students.

Overview of how to process large datasets efficiently, including introduction of non-relational databases.

Attributes: Data Science MS OL Flat Rate Tuition, Special Course Fee Required

Grading Basis: A-F Grades Only

Lecture/Discussion Hours: 3

Lab/Studio Hours: 0

DS 735 Communicating about Data (3 crs)

Prerequisite: Limited to Data Science master's degree students.

Prepares students to master technical, informational, and persuasive communication to meet organizational goals.

Attributes: Data Science MS OL Flat Rate Tuition, Special Course Fee Required

Grading Basis: A-F Grades Only

Lecture/Discussion Hours: 3

Lab/Studio Hours: 0

DS 740 Data Mining & Machine Learning (3 crs)

Prerequisite: Limited to Data Science master's degree students.

Data mining methods and procedures for diagnostic and predictive analytics.

Attributes: Data Science MS OL Flat Rate Tuition, Special Course Fee Required

Grading Basis: A-F Grades Only

Lecture/Discussion Hours: 3

Lab/Studio Hours: 0

DS 745 Visualization and Unstructured Data Analysis (3 crs)

Prerequisite: Limited to Data Science master's degree students.
Covers various aspects of data analytics including visualization and analysis of unstructured data such as social networks.

Attributes: Data Science MS OL Flat Rate Tuition, Special Course Fee Required
Grading Basis: A-F Grades Only
Lecture/Discussion Hours: 3
Lab/Studio Hours: 0

DS 760 Ethics of Data Science (3 crs)

Prerequisite: Limited to Data Science master's degree students.
Ethical issues related to data science, including privacy, intellectual property, security, and the moral integrity of inferences based on data.

Attributes: Data Science MS OL Flat Rate Tuition, Special Course Fee Required
Grading Basis: A-F Grades Only
Lecture/Discussion Hours: 3
Lab/Studio Hours: 0

DS 775 Prescriptive Analytics (3 crs)

Prerequisite: Limited to Data Science master's degree students.
Procedures and techniques for using data to inform decision making. Topics include optimization, decision analysis, game theory, and simulation.

Attributes: Special Course Fee Required
Grading Basis: A-F Grades Only
Lecture/Discussion Hours: 3
Lab/Studio Hours: 0

DS 776 Deep Learning (3 crs)

Prerequisite: Limited to Data Science master's degree students.
•*Recommended prerequisite: DS 740; Data Science MS OL Flat Rate Tuition*

Introduction to the theory and applications of deep learning. The course begins with the study of neural networks and how to train them. Various deep learning architectures are introduced including convolutional neural networks, recurrent neural networks, and transformers. Applications may include image classification, object detection, and natural language processing. Algorithms will be implemented in Python using a high-level framework such as Pytorch or TensorFlow.

Grading Basis: A-F Grades Only

DS 780 Data Science and Strategic Decision Making (3 crs)

Prerequisite: Limited to Data Science master's degree students.
The interaction between data science and strategic decision making. Leveraging data resources for competitive advantage in the marketplace.

Attributes: Data Science MS OL Flat Rate Tuition, Special Course Fee Required
Grading Basis: A-F Grades Only
Lecture/Discussion Hours: 3
Lab/Studio Hours: 0

DS 785 Data Science Capstone (3 crs)

Prerequisite: Limited to Data Science master's degree students.
•*Full-time equivalent.*

Capstone course; students will develop and execute a data science project using real-world data and communicate results to a non-technical audience.

Attributes: Data Science MS OL Flat Rate Tuition, Special Course Fee Required
Grading Basis: A-F Grades Only
Lecture/Discussion Hours: 3
Lab/Studio Hours: 0
