

Data Science (DS)

Courses

DS 700. Foundations of Data Science. 3 Credits.

This course provides an introduction to data science and highlights its importance in business decision making. It provides overview of commonly used data science tools along with spreadsheet, database, statistics and programming assignments to lay the foundation for data science applications. Fall and Spring.

DS 701. Exploratory Data Analysis. 3 Credits.

This course introduces data science and highlights its importance in decision making. Students will learn how to analyze data using the R programming language. During the course, students will learn how to import data into R, tidy it, conduct exploratory data analysis, develop visualizations, and draw statistical inferences. The course aims to teach data wrangling, visualization and exploration with R. Fall and Spring.

DS 705. Statistical Methods. 3 Credits.

Statistical methods and inference procedures will be presented in this course with an emphasis on applications, computer implementation, and interpretation of results. Topics include simple and multiple regression, model selection, correlation, moderation/interaction analysis, logistic regression, chi-square test, ANOVA, Kruskal-Wallis test, MANOVA, factor analysis, and canonical correlation analysis.

P: DS 701

Fall and Spring.

DS 710. Programming for Data Science. 3 Credits.

Introduction to programming languages and packages used in Data Science.

Fall and Spring.

DS 715. Data Warehousing. 3 Credits.

Introduces 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.

Fall and Spring.

DS 730. Big Data: High-Performance Computing. 3 Credits.

This course will teach students how to process large datasets efficiently. Students will be introduced to non-relational databases. Students will learn algorithms that allow for the distributed processing of large data sets across clusters.

P: DS 710

Fall and Spring.

DS 735. Communicating About Data. 3 Credits.

This course will prepare you to master technical, informational and persuasive communication to meet organizational goals. Technical communication topics include a study of the nature, structure and interpretation of data. Informational communication topics include data visualization and design of data for understanding and action. Persuasive communication topics include the study of written, verbal and nonverbal approaches to influencing decision makers.

Fall and Spring.

DS 740. Data Mining. 3 Credits.

Data mining methods and procedures for diagnostic and predictive analytics. Topics include association rules, clustering algorithms, tools for classification, and ensemble methods. Computer implementation and applications will be emphasized.

P: DS 701 and DS 705

Fall and Spring.

DS 745. Visualization and Unstructured Data Analysis. 3 Credits.

This course covers two aspects of data analytics. First, it teaches techniques to generate visualizations appropriate to the audience type, task, and data. Second, it teaches methods and techniques for analyzing unstructured data - including text mining, web text mining and social network analysis.

P: DS 740

Fall and Spring.

DS 750. Data Storytelling. 3 Credits.

Data storytelling involves using data to tell a compelling narrative that helps audiences understand, engage with, and act on the information. This course combines data analysis with communication techniques to present data in an informative and engaging way. This course is specifically designed as a graduate-level requirement for the MSDS degree, focusing on teaching students how to effectively communicate insights through data storytelling techniques. Participants will learn to craft engaging stories that resonate with various audiences and drive decision-making.

P: DS 701

Fall and Spring.

DS 760. Ethics of Data Science. 3 Credits.

This course explores ethical issues related to data science, including privacy, intellectual property, security, and the moral integrity of inferences based on data.

P: DS 740

Fall and Spring.

DS 770. Ethical Decision-Making Using Data. 3 Credits.

This course examines how data science relates to developing strategies for organizations. The emphasis is on using an organization's data assets to inform better decisions. The course investigates the use of data science findings to develop solutions to competitive organizational challenges. Special attention is given to critically examining decisions to ensure that they are ethical and avoid unfair bias. Professional codes of conduct as well as local and international regulations are also considered.

Fall and Spring.

DS 775. Prescriptive Analytics. 3 Credits.

This course covers procedures and techniques for using data to inform the decision-making process. Topics include optimization, decision analysis, game theory, simulation, and others as time allows. Case studies and applications will be emphasized.

P: DS 705 and DS 710

Fall and Spring.

DS 776. Deep Learning. 3 Credits.

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.

P: DS 740

Fall and Spring.

DS 780. Data Science and Strategic Decision Making. 3 Credits.

The course will investigate the use of data science findings to develop solutions to competitive business challenges. Case studies will be reviewed to examine how data science methods can support business decision-making. A range of methods the data scientist can use to get people within the organization onboard with data science projects will be reviewed.

Fall and Spring.

DS 785. Capstone. 3 Credits.

Capstone course in which students will develop and execute a project involving real-world data. Projects will include: formulation of a question to be answered by the data; collection, cleaning and processing of data; choosing and applying a suitable model and/or analytic method to the problem; and communicating the results to a non-technical audience.

P: DS 701, DS 710, DS 716, DS 730, DS 750. REC: DS 705, DS 740

Fall and Spring.