

# DATA SCIENCE (DSC)

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**DSC 110. Introduction to Vectors and Matrices for Data Science. 1 Credit Hour.**

Basic concepts and operations of vectors and matrices useful for data science. Use of Python packages for manipulating vectors and matrices. MTH 108 and (CSC 115 or CSC 315).

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Fall & Spring.

**DSC 344. Principles and Practices of Data Science. 3 Credit Hours.**

Concepts and mathematical foundations: probability, statistical learning. Structured data: data visualization, supervised learning, unsupervised learning. Unstructured data: neural networks, deep learning, time series. Applications: natural language processing, image processing. DSC110 and (CSC115 or CSC315 or CSC120) and (CSC113 or MTH224 or other approved statistics course) and MTH161.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Fall & Spring.

**DSC 345. Principles and Practice of Artificial Intelligence. 3 Credit Hours.**

Concepts: AI landscape, research, application. Understanding natural language: neural networks, encoder-decoder networks, machine translation, attention mechanism. Computer vision: image representation and processing, convolutional neural networks multimedia, detecting and classifying objects, deep neural networks. Robotics, games, and creativity: perception and planning, deep reinforcement learning, AI as artists, generative adversarial networks. Tabular data analytics: complex dependencies, computation statistics, data mining.

DSC110 and CSC220 and (CSC113 or MTH224 or other approved statistics course).

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Fall & Spring.

**DSC 615. Introduction to Python Programming for Graduate Students. 3 Credit Hours.**

Python programming and data structures. Program design and implementation. Python packages for scientific applications, data analysis, and machine learning. Designed for graduate students from the sciences. Not available to Computer Science students.

Prerequisite: MTH 161 and MTH 224.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Fall & Spring.

**DSC 622. Introduction to Infographics and Data Visualization. 3 Credit Hours.**

This course is an introduction to the visual display of information with a special focus on the encoding of data by means of graphs, charts, maps, and diagrams.

**Components:** LAB.

**Grading:** GRD.

**Typically Offered:** Fall & Spring.

**DSC 644. Principles and Practices of Data Science. 3 Credit Hours.**

This course provides a comprehensive but accessible introduction to data science. IBM cloud resources allow a broad and complete coverage of topics with hands-on experience, while some initial programming language training is delivered. Students will be equipped with data science tools for academic research, industrial development, or advanced studies into the more detailed fields of data science and interdisciplinary subjects.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Fall & Spring.

**DSC 645. Principles and Practice of Artificial Intelligence. 3 Credit Hours.**

This introductory course provides a comprehensive but accessible coverage of artificial intelligence concepts and technology, without prerequisite while steering perspective talents to potential technique areas. With the IBM materials and cloud resources, we are able to provide a hands-on experience that directly bridging towards academic research and industrial deployment. We use an application-driven organization that covers the technology in several application areas. Then we cover mathematical skills and programming tools when needed. This approach allows us to cover exciting technologies earlier in the course, while providing rigorous foundations and skills needed for academic research and industrial development.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Fall & Spring.

**DSC 710. Data Science Project Design. 1-3 Credit Hours.**

Design of an applied data science project, the exact nature of which will depend on the students track or area of concentration.

**Components:** PRA.

**Grading:** GRD.

**Typically Offered:** Fall, Spring, & Summer.

**DSC 711. Data Science Capstone Project Implementation. 1-3 Credit Hours.**

Implementation of an applied data science project, the exact nature of which will depend on the students track or area of concentration.

Prerequisite: DSC 710.

**Components:** PRA.

**Grading:** GRD.

**Typically Offered:** Fall, Spring, & Summer.

**DSC 712. Data Science Graduate Internship. 1-6 Credit Hours.**

This course monitors students doing an internship in a professional data science environment. The exact nature of the course will be dependent on the nature of the internship and the requirements of the host organizations. Normally 50 internship hours are required per credit earned (the host organization must supply documentary evidence of hours worked). Requisite: Students must complete at least 18 credits prior to enrolling in the internship course.

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**Components:** PRA.

**Grading:** GRD.

**Typically Offered:** Fall, Spring, & Summer.