

MASTER OF SCIENCE IN DATA SCIENCE (MSDS)

MSDS 515. Preparing for MSDS Success. 1 Credit Hour.

This course is designed to provide entering MSDS students with the skills necessary to be successful in a graduate data science program. Spanning two full days, it focuses on foundational knowledge in statistics, programming, data visualization, and communication. Moreover, the course offers insights into program expectations and introduces students to the available computing resources.
Session Cycle: Every Semester.

MSDS 610. Deep Learning. 3 Credit Hours.

This is an advanced course requiring background knowledge including probability theory, linear algebra, calculus, understanding of machine learning methods as well as good programming skills. The course will cover many of the most important mathematical foundations and computational tools of deep learning as well as advanced methods, frameworks, and programming tools used in modern deep learning and artificial intelligence. We will examine popular deep learning models from the literature and examine how they can be used for modeling a variety of types of data. This course treats both the art of designing efficient deep learning and artificial intelligence models as well as the science of analyzing and evaluating the properties and computation efficiency of such models. This course will help students to select and potentially design appropriate models to solve real problems. There will be a heavy emphasis on implementation using Python, Keras (for deep learning), and Pytorch (for deep).

Prerequisites: ISA 510 and ISA 530

Session Cycle: Spring

Yearly Cycle: Yearly.

MSDS 620. Natural Language Processing. 3 Credit Hours.

There are many business and artificial intelligence applications that need to process unstructured text data. This course teaches students how to overcome the unique challenges of working with unstructured text in machine learning and deep learning models. Students learn about how to create text representations, embeddings, and features for modeling purposes. Natural language processing applications include sentiment classification, topic modeling, text generation, and named entity recognition. Students in this course will implement these artificial intelligence models in Python, gaining experience with libraries such as NLTK and Hugging Face.

Prerequisites: ISA 530

Session Cycle: Spring

Yearly Cycle: Yearly.

MSDS 630. Large Scale Data Analytics. 3 Credit Hours.

The course focus on manipulating, storing, analyzing, and visualizing big data. The emphasis of the course will be on mastering Spark which emerged as the most important big data processing framework. We will examine Spark SQL, Spark Machine Learning, Spark Graph Analytics, Spark Natural Language Processing, Spark Deep Learning, and Spark Streaming which allows the analysis of data in near real-time. Students will implement machine learning algorithms and execute them on real cloud systems like Amazon AWS and Databricks.

Prerequisites: ISA 530, ISA 540

Session Cycle: Summer Term 1

Yearly Cycle: Yearly.

MSDS 640. Data Science Capstone. 3 Credit Hours.

Students will execute a full data science project, developing their skills as data scientists with a focus on real-world applications and situations. The final project provides an opportunity to integrate all of the core skills and concepts learned throughout the program and prepares students for long-term professional success in the field. It provides experience in formulating and carrying out a sustained, coherent, and influential course of work resulting in a tangible data science project using real-world data. This capstone project will test student skills in data pre-processing, data preparation, data transformation, feature engineering, machine learning/deep learning, data visualization, data communication, and presentation. Projects will be drawn from real-world problems and will be conducted with industry, government, and academic partners. Emphasis will be placed on problem-solving via state-of-the-art data science pipelines and practices and on the ability to “tell a story” using verbal, analytical, written, and visualization skills.

Prerequisites: ISA 530 and MSDS 630

Session Cycle: Summer Term II

Yearly Cycle: Yearly.