

# INFORMATION SYSTEMS (ISA)

## Courses

### ISA 510. Probability and Statistics for Data Analytics. 3 Credit Hours.

Probability and statistics are at the foundation of data science and artificial intelligence. The objective of this course is to provide students with an understanding of how to analyze and understand data through statistics and probability. As such, this course provides an overview of more foundational probability and statistics topics, before delving into more advanced topics through projects. Students will work with data in Python Notebooks to demonstrate their analytical skills.

Session Cycle: Fall

Yearly Cycle: Annual.

### ISA 520. Data Visualization and Communication. 3 Credit Hours.

This course examines the art and science of data visualization. It teaches how to visually explore data and how to criticize, design, and implement data visualizations. It teaches the fundamentals of human perception and data visualization, exploratory data analysis and the importance of interaction in exploration, techniques for data visualization of specific data sets (networks, temporal data, geographic data, business data, etc.), and storytelling. The course will enable students to describe a visualization problem, to explore the data using visualizations, to discuss and design appropriate visualization concepts, and to implement and critically reflect on them. We will learn multiple popular data visualization tools such as Power BI, Tableau, and Python to implement our data visualization projects throughout the course.

Session Cycle: Fall

Yearly Cycle: Annual.

### ISA 530. Fundamentals of Machine Learning. 3 Credit Hours.

This is a fundamental machine learning course requiring background knowledge including probability theory, linear algebra, calculus as well as good programming skills. The programming environment used in the lecture examples, assignments, and projects will be using the following tools including Python/Pytorch/Keras. The course will cover many of the most important mathematical foundations and computational tools of modern machine learning as well as advanced methods and frameworks used in modern machine learning. We will examine specific models from the literature and examine how they can be used for modeling particular types of data. This course treats both the art of designing efficient machine learning algorithms as well as the science of analyzing and evaluating the properties and computation efficiency of algorithms. This course will help students to select and potentially develop appropriate methods and approaches to problems in real applications.

Session Cycle: Fall

Yearly Cycle: Annual.

### ISA 540. Large Scale Data Management and Data Ethics. 3 Credit Hours.

This course introduces data preparation and data management with a focus on applications in large-scale analytics projects utilizing relational, document, and graph database systems. Students learn about the relational model, the normalization process, and structured query language. They learn about data cleaning and integration, and database programming for extract, transform and load operations. Students work with unstructured data, indexing and scoring documents for effective and relevant responses to user queries. They learn to load, store and process big data in a cloud environment. In addition, they explore the social and ethical dimensions of data science and critically evaluate all stages of the data lifecycle from data collection and storage to data analysis and use.

Session Cycle: Fall

Yearly Cycle: Annual.

### ISA 691. Directed Independent Study. 3 Credit Hours.

Students interested in exploring an idea, contributing to research, or developing a project may do so under the guidance of an affiliated faculty member in the Data Science/Business Analytics program. At the initiation of the graduate student, the faculty member and the student will develop an academic plan that is submitted to the Chair of the ISA department for approval.

### ISA 692. Data Science/Business Analytics Internship. 3 Credit Hours.

ISA internships give students the opportunity for supervised employment in an area where they can apply the Data Science and/or Business Analytics skills they have studied through our curriculum. Interns work at least ten hours per week, meet periodically with a supervising faculty member, and prepare a substantive report on their work experience.

Prerequisites: ISA 510, ISA 520, ISA 530, and ISA 540.