# **INFORMATION SYSTEMS (ISA)**

## Courses

**ISA 500. Programming Foundations for Analytics. 0 Credit Hours.** This course serves as a pre-requisite to MSDS/MABA programs for students who do not have sufficient background in programming. This course delves into the theory and pragmatics of programming with a special focus on the Python programming language. No previous experience in computer science or programming is required. You will learn basic computer programming concepts and terminologies in Python such as variables, constants, operators, expressions, conditional statements, loops, and functions. This course includes hands-on exercises to help you understand the components of Python programming while incrementally developing more significant programs, data structures and algorithms.

### ISA 501. Math and Statistics Foundations for Analytics. 0 Credit Hours.

This course serves as a pre-requisite to MSDS/MABA programs for students who do not have sufficient background in math and statistics. It is for learners who have basic math skills but may not have taken algebra or pre-calculus. This course introduces the core math that data science/ analytics is built upon, with no extra complexity, introducing unfamiliar ideas and math symbols one-at-a-time. Students who complete this course will master the vocabulary, notation, concepts, and algebraic rules necessary before moving on to more advanced material. Topics covered in this course include linear algebra, basic probability, statistics, and calculus.

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 AI and Machine Learning. 3 Credit Hours.

This course provides a comprehensive introduction to AI through the machine learning pipeline, covering the entire process of building, evaluating, optimizing, and deploying ML models. Core machine learning techniques in both supervised and unsupervised learning will be introduced, covering regression and classification models for labeled data, as well as clustering and dimensionality reduction methods for discovering hidden structures in unlabeled datasets. Time series forecasting will be covered to analyze sequential trends and predict future outcomes, along with reinforcement learning as a framework for decision-making in dynamic and interactive environments. With the increasing role of AI in automating and scaling ML workflows, this course will also incorporate AI tools, large language models (LLMs) and AI-assisted development platforms, to enhance the understanding, deployment, and expansion of ML models.

#### ISA 540. Data Management in the Age of AI. 3 Credit Hours.

In the era of artificial intelligence, traditional database management is evolving to support large-scale machine learning, big data processing, and Al-driven applications. This course explores the fundamentals of database management while integrating modern approaches for handling structured, semi-structured, and unstructured data in Al environments. Students will gain a solid understanding of the relational model and Structured Query Language (SQL), exploring both foundational and advanced SQL functions for various types of data analysis. In addition, students will learn how Al impacts data storage, retrieval, governance, and optimization, with a focus on NoSQL databases, vector databases, and real-time data pipelines. By the end of the course, students will be equipped to design and manage data systems that support AI applications, ensuring efficiency, compliance, and ethical considerations in Al-driven decision-making.

Session Cycle: Every Semester.

### 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.