

CIS 500 Computing & Information Science Concepts

Computing & Information Science studies the design, application, use, impact, and ethical implications of computational principles and technology. This class prepares students for advanced courses in Data Science, Cyber Security, and Cyber Risk Management. Topics include: computer organization, data structures, computer programming, networking concepts, computer security, and ethics.

CIS 501 Probability and Statistics

This course provides an overview of concepts in probability and statistics including sampling distributions, normal theory estimation and hypothesis testing, regression and correlation, exploratory data analysis, logistic regression, discriminant analysis, resampling methods and linear model selection. Learning to do statistical analysis on a personal computer is an integral part of the course.

CIS 510 Algorithm Development

This course reviews computer programming concepts and practice. Topics include: algorithms, abstract data types, linear and non-linear data structures, and software engineering. Students will get hands-on experience with the use of a high level programming language to search and sort data.

CIS 550 Relational & Non-relational Databases

This course reviews concepts of traditional relational databases as well as the newer non-relational databases that have become increasingly common in data science applications. Topics include: conceptual data modeling, physical data modeling, computing on data, designing schemas, querying databases, and manipulating databases, SQL, NoSQL, the differences between SQL and NoSQL databases and their respective advantages, the business needs that drive the development and use of each, the criteria that decision makers should consider when choosing between relational and non-relational databases.

CIS 551 Big Data Analytics

This course is an overview of Hadoop, MapReduce, and Hadoop Tools. Topics include: installing Hadoop (both on the desktop and in the cloud) and navigating the Hadoop Distributed File System, MapReduce and other essential Hadoop tools including Pig, Hive, Flume, Sqoop, and Hbase. Programming experience is a prerequisite, and experience with Java and Unix will be helpful.

CIS 552 Data Mining

This course introduces students various data mining techniques for extracting and evaluating patterns from large databases. Topics include: design, creation, query, and management of NoSQL databases, document, graph, and column store data models, and NoSQL query design.

CIS 553 Database Security

This course introduces students to the design and implementation of secure data base systems. Topics include: access control policies, database vulnerability with emphasis on inference and SQL injection, application security models

CIS 560 Cyber Networks

The principles and practice of computer communication networking, focusing on the Internet and its structure, protocols, and applications. Topics include network applications and programming, reliable data transfer, flow and congestion control, routing, multimedia networking, local area networks, security, and network management.

CIS 561 Cyber Security

This course provides a comprehensive overview of essential concepts to better understand cyber security. This course explores the risks, threats, and vulnerabilities associated with the digital world and introduces students to the principles of risk management, security standards, access controls, security audits, cryptography, compliance laws and privacy issues.

CIS 564 Cyber Warfare

This course explores the role that cyber warfare plays in modern military operations. Topics include: offensive and defensive cyberspace operations, intelligence operations, information as a military asset, evolving threats, weaponizing cyberspace, non-state actors in cyber war, defense-in-depth strategies, defending endpoints, networks and data, military doctrine and the future of cyber warfare.

CIS 565 Cyber Security Law & Policy

This course examines the legal aspects of the information security triad of availability, integrity, and confidentiality and prepares students to address areas where law and cyber security concerns meet. Topics include: risk analysis and incident response, intellectual property law, contracts in online transactions, tort law issues in cyberspace, the concept of privacy and its legal protections and the governance of information within organizations.

CIS 562 Cyber Threat Analysis

This course provides an overview of the relatively new discipline of cyber threat analysis, familiarizing students with the methodology of investigation, the threat environment of cyberspace, and various online tools used by analysts. Students will be introduced to the key concepts, tools, and terminologies used by professionals in the field and apply what they learn in lab exercises that model real-world events.

CIS 563 Advanced Cyber Threat Analysis

This second course in Cyber Threat Analysis explores more advanced areas of analysis, introducing students to additional methods of investigation, tools and their application using real world examples. Students will learn further concepts, tools, and terminologies used by professionals in the field and apply what they learn in lab exercises that model real-world events.

CIS 570 Artificial Intelligence

This course explores the topic of intelligent software agents with an emphasis on hands-on design of adaptive problem-solving agents for environments of increasing complexity ranging from single-agent computer games to complex real-world multi-agent environments.

CIS 571 Machine Learning

This course introduces students to various machine learning techniques and tools. Topics include: supervised learning (linear and quadratic discriminant function analysis, logistics regression, kernel and k-nearest neighbor, naïve Bayes, support vector machines, tree classification methods, and ensemble methods such as bagging, boosting, and random forests), unsupervised learning (k-means, hierarchical, and model-based clustering), and techniques for evaluating learning algorithms including cross-validation.



CIS 572 Social Media Mining

This course provides an introduction to social media mining and methods. The course provides hands-on experience mining social data for social meaning extraction (focus on natural language processing and sentiment analysis) using automated methods and machine learning technologies.

CIS 580 Data Visualization

A hands-on course in data analysis and visualization based on key design principles and techniques for interactively visualizing data based on principles from the fields of statistics, perception, graphic design, cognition, communication, and data mining. Through lecture, case studies, and design studios, students will work individually and collaboratively to visualize complex datasets using software applications to identify patterns, trends, and variation across categories, space, and time. Students will obtain practical experience with the visualization of complex data including multivariate data, geospatial data, textual data, time series, and network data.

CIS 598 Research Methods

This course prepares students for planning, conducting, and reporting on research in information sciences. Topics include literature survey to formulate a scientific research question; research methods used in data science, cyber security, and cyber risk management; and scientific writing and publishing. Completion of the course will provide the student with skills needed to undertake supervised thesis or research project work in the area of Information Sciences.

CIS 599 Research Projects

The capstone course experience is designed to allow students to work under the supervision of a cyber risk management faculty member to solve a real world problem and present their findings to the faculty before graduation.



