

## **Professional Education 2022 – 2023 Course Offering**

### **Fall 2022**

#### **CIS 6370 Computer Data Security**

**August 20<sup>st</sup> – September 16<sup>th</sup>**

**On-campus lecture days: Saturday August 20<sup>st</sup> & September 3<sup>rd</sup>**

The class will start with preliminary material and mathematical foundations of data security. It will then cover private-key encryptions, public-key encryptions, and fundamental security protocols. Finally, it will focus on emerging technologies such as (a) digital currencies and their implementations, (b) blockchain and its applications, e.g., in supply chain and information sharing, and (c) privacy enhancing technologies using security protocols, e.g., in autonomous systems, auctions and financial paradigms.

#### **COP 6819 Advanced Internet Systems**

**September 17<sup>th</sup> – October 14<sup>th</sup>**

**On-campus lecture days: Saturday September 17<sup>th</sup> & October 1<sup>st</sup>**

This course introduces present and new internet technologies including middleware, web services, cloud computing, fog and edge computing, distributed ledger techniques, and Internet of Things (IoT). Specific internet and web applications will be presented including Search Engine Optimization, applications of distributed ledger technology, and IoT applications for smart cities and homes.

#### **CAP 6673 Data Mining and Machine Learning**

**October 15<sup>th</sup> – November 11<sup>th</sup>**

**On-campus lecture days: Saturday October 15<sup>th</sup> & October 29<sup>th</sup>**

Course deals with the principles of data mining and machine learning. Topics to be covered include machine learning methods, knowledge discovery and representation, classification and prediction models. This course will enable students to understand basic concepts of data mining and machine learning algorithms with an emphasis on real word applications.

#### **CNT 5008 Computer Networks**

**November 12<sup>th</sup> – December 14<sup>th</sup>**

**On-campus lecture days: Saturday November 12<sup>th</sup> & December 3<sup>rd</sup>**

This course provides an in-depth study of the Internet architecture and its main communication protocols. It covers common media access control protocols for wired and wireless networks (WiFi and cellular), the IP protocol at the network layer, routing, and the UDP, and TCP end-to-end transport protocols. It introduces the main application-layer protocols at the foundation of the internet, including HTTP, DNS, and overlay networks.

## Spring 2023

### **COT 6446 Randomized Algorithms**

**January 7<sup>th</sup> – February 3<sup>rd</sup>**

**On-campus lecture days: Saturday January 7<sup>th</sup> & January 21<sup>st</sup>**

This course provides the foundation of randomized algorithm for designs, analyses, and applications to security. The class will start with a brief overview of the theoretical framework for randomized computation and analyses involving probability. Then we will go through famous applications, such as probabilistic data structures and secure protocols.

### **CEN 5035 Software Engineering**

**February 4<sup>th</sup> – March 3<sup>rd</sup>**

**On-campus lecture days: Saturday February 4<sup>th</sup> & February 18<sup>th</sup>**

This course focuses on advanced concepts in software engineering and the application of engineering principles to the creation of complex, long-lived applications. This course will expose students to a wide range of software engineering concepts and state-of-the-art technologies. In addition to software engineering acumen, students are expected to develop excellent writing and presentation skills. This course will first review basic principles of software engineering, and then it will focus on more specific and advanced topics, including model driven development, Internet of Things (IoT), reverse engineering and program comprehension, and finally touch on topics of DevOps.

### **CAP 6776 Information Retrieval**

**March 11<sup>th</sup> – May 3<sup>rd</sup>**

**On-campus lecture days: Saturday March 11<sup>th</sup>, March 25<sup>th</sup>, April 8<sup>th</sup> & April 22<sup>nd</sup>**

This course provides a comprehensive overview of the main concepts, techniques, tools, and applications in the field of information retrieval (IR), which is the process of searching and collecting relevant information from databases or resources based on queries or requirements. The course will cover algorithmic and usability aspects of text classification, indexing, and searching, as well as web retrieval and crawling, and multimedia (image, audio, video) information retrieval.

### **CAP 5768 Introduction to Data Science**

**March 11<sup>th</sup> – May 3<sup>rd</sup>**

**On-campus lecture days: Saturday March 11<sup>th</sup>, March 25<sup>th</sup>, April 8<sup>th</sup> & April 22<sup>nd</sup>**

This course provides a comprehensive introduction to the tools and analysis workflows employed by data scientists that include data wrangling, visualization, exploration, and modeling. Specific topics include an overview of the field of data science and analytics, data visualization, exploratory data analysis, data transformation, parameter estimation, hypothesis testing, linear regression analysis, logistic regression classification, model selection, feature selection, dimensionality reduction, and clustering. The practical application of these techniques to real data, as well as the interpretation and presentation of analysis results will be emphasized throughout the course.

## **Summer 2023**

### **COT 6930 Internet of Things**

**May 13<sup>th</sup> - June 9<sup>th</sup>**

**On-campus lecture days: Saturday May 13<sup>th</sup> & May 27<sup>th</sup>**

This course discusses technical and operational aspects of Internet of Things (IoT). IoT is rapidly emerging as a system of connected devices and is expected to provide unprecedented connectivity and remote accessibility to things that we use in almost every domain of life including healthcare, transportation, agriculture, and energy. The number of connected devices is anticipated to exceed 50 billion by 2030. The course will focus on recent IoT advances and innovative applications.

## **Fall 2023 (Tentative)**

### **CIS 6730 Cryptocurrencies and Blockchain Technologies**

**August 19<sup>st</sup> – September 15<sup>th</sup>**

**On-campus lecture days: Saturday August 19<sup>st</sup> & September 2<sup>th</sup>**

The course introduces technical aspects of blockchains, public distributed ledgers, and cryptocurrency systems. Students will also learn the concepts and tools for developing distributed and secure applications with public distributed ledgers.

### **CAP 6635 Artificial Intelligence**

**September 16<sup>th</sup> – October 13<sup>th</sup>**

**On-campus lecture days: Saturday September 16<sup>th</sup> & September 30<sup>th</sup>**

This course introduces core concepts, techniques, and applications of artificial intelligence (AI). Course subjects include intelligent agents, problem solving by search, search strategies, game playing, knowledge representation and reasoning, learning from examples, and deep learning. The class also discusses ethical and societal implications of the increasing use of AI.

### **CAP 6731 Theory and Implementation of Database Systems**

**October 14<sup>th</sup> – November 10<sup>th</sup>**

**On-campus lecture days: Saturday October 14<sup>th</sup> & October 28<sup>th</sup>**

This class provides an in-depth coverage of data models, query languages, and database management systems. Topics include fundamental concepts of database systems, SQL, relational algebra, database design (e.g., conceptual, logical, and physical data models), query optimization, transaction processing, and new trends (e.g., data warehousing & OLAP, data mining). Oracle database will be used to understand technical components in database systems.

### **CAP 6629 Reinforcement Learning**

**November 11<sup>th</sup> – December 13<sup>th</sup>**

**On-campus lecture days: Saturday November 11<sup>th</sup> & December 2<sup>nd</sup>**

This class provides theoretical properties and practical applications of reinforcement learning. Course topics include Markov decision process, dynamic programming, temporal-difference learning, planning and learning with tabular methods, and deep reinforcement learning.