2019-2020 CEECS Professional MS in Computer Science
Course Schedule and Course Description

Course Schedule

FALL 2019

**CAP 6010 Multimedia Systems**
August 17th - September 13th
On-campus lecture days: Saturday/ August 17th & August 31st

**CAP 6635 Artificial Intelligence**
September 14th - October 11th
On-campus lecture days: Saturday/ September 14th & September 28th
This course provides a deep and comprehensive overview of concepts, techniques, and applications of artificial intelligence (AI), including representations, search strategies, control, communication, deduction, agents, evolutionary computation, machine learning, and deep learning. It also covers use cases in different areas of human activity and discusses the latest developments in the field as well as the ethical and societal implications of the increasing use of AI.

**COT 6405 Analysis of Algorithms**
October 12th – November 8th
On-campus lecture days: Saturday/ October 12th & October 26th
In this class the students will learn the foundations of algorithm design and analysis. The class will start with a brief overview of theoretical running time analysis using asymptotic notations and strategies for solving recurrences. The class will continue with the study of several algorithmic techniques: divide-and-conquer, network flow, greedy, dynamic programming, linear programming, approximation algorithms, and NP-completeness.

**CEN 5035 Software Engineering**
November 9th – December 10th
On-campus lecture days: Saturday/ November 9th & November 23rd
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.
**SPRING 2020**

**CNT 5109 Sensor Networks and Smart Systems**  
January 11th – February 7th  
On-campus lecture days: Saturday/ January 11th & January 25th  
Sensor networks and smart systems are rapidly emerging in many fields including healthcare, transportation, buildings, environment, agriculture, energy, and many more. A sensor network consists of a large number of sensor nodes that collect information and communicate to a processing facility that leads to intelligent decision-making. This course discusses sensor networks, smart systems, and their applications.

**COP 5339 Object-Oriented Software Design**  
February 8th - March 6th  
On-campus lecture days: Saturday/ February 8th & February 22nd  
This course provides an overview of the software development process and its main phases with focus on an iterative, object-oriented approach. It covers requirements analysis with use cases, object-oriented architecture & design, followed by implementation in the Java programming language. Unified Modeling Language (UML) diagrams are introduced for specifying design models and software architecture. Common design patterns are taught for improving productivity and design quality.

**CAP 6673 Data Mining & Machine Learning**  
March 12th - April 8th  
On-campus lecture days: Saturday/ March 14th & March 28th  
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.

**COT 6930 Emerging Wireless Network Technologies**  
April 9th – May 6th  
On-campus lecture days: Saturday/ April 11th & April 25th  
A study of emerging wireless networks and their protocols. Envisioned applications for these networks will be introduced. Networks covered include ad-hoc networks, body networks, and 5G networks. The course will also discuss the application of artificial intelligence (AI) techniques in these networks, including machine learning and fuzzy logic techniques. Performance and security challenges will be identified and potential solutions to address them will be explored.

**SUMMER 2020**

**CAP 6619 Deep Learning**  
May 16th - June 12th  
On-campus lecture days: Saturday/ May 16th & May 30th  
This course teaches students basic concepts of deep learning with applications in computer science, engineering, business and other areas. The class covers major topics including machine learning basics, deep forward networks, convolutional neural networks, autoencoders, and generative adversarial networks. The class will also cover implementations and applications of different deep learning models.

**CDA 6316 Embedded System Design**  
June 13th - July 10th  
On-campus lecture days: Saturday/ June 13th & June 27th  
A software and hardware integration course, from design concepts to practical implementation covering both analog and digital signal conditioning and interface. The course projects include the design and interface of various sensors such as temperature,
humidity, pressure, flow, accelerometers, compasses, Gyros, GPS. On the output side, you will explore with LEDs arrays, servos, step motors, solid-state relays, etc. This hands-on course is project-based, and each student build his own. We will give you a starter kit including an MSP430 Launchpad platform. You are welcome to use you own, such as Raspberry Pie or higher end.

**COT 6930 Software Optimization**

**July 11th - August 7th**

**On-campus lecture days: Saturday/ July 11th & July 25th**

This course introduces methods, tools, and techniques for high performance software development. The course covers efficient programming techniques including general software optimizations, SIMD programming, multithreaded programming, OpenMP, and programming for HPC clusters. Uses Intel software development tools (Compiler, Advisor, VTune) and includes hands-on software development and performance analysis.

**Note:** the Saturday classes are recorded and made available on Canvas