

# GRADUATE COURSES

## Electrical and Computer Engineering



UMass

Dartmouth

COLLEGE OF ENGINEERING

**Fall 2023**

*Classes begin 9/6/2023*

Department contact: 508.999.9164

Dr. Dayalan Kasilingam, Chairperson

Dr. Liudong Xing, Graduate Program Director

ECE 471	<b>Communication Theory</b> P. Gendron (pgendron@umassd.edu) Tuesday, Thursday 11:00 AM-12:15 PM, SENG-212	ECE 551	<b>Acoustic and Electromagnetic Waves</b> D. Brown (dbrown@umassd.edu) Monday, Wednesday 3:00-4:50 PM, SENG-222
ECE 520	<b>Wireless Networks and Mobile Security</b> H. Wang (hwang1@umassd.edu) Tuesday, Thursday 12:30 PM-1:45 PM, TBA	ECE 565	<b>Operating Systems</b> H. Liu (hliu@umassd.edu) Tuesday, Thursday 11:00-12:15 PM, TBA
ECE 533	<b>VLSI Design</b> D. Rancour (drancour@umassd.edu) Monday, Friday 3:30-4:45 PM, TBA	ECE 574	<b>Discrete-Time Signal Processing</b> Instructor: TBA Monday, Wednesday 5:00-6:15 PM, SENG-212
ECE 549	<b>Network Security</b> H. Liu (hliu@umassd.edu) Tuesday 3:30-6:30 PM, SENG-222	ECE 620	<b>Dependable and Secure Computing</b> L. Xing (liudong.xing@umassd.edu) Monday, Wednesday 3:30-4:45 PM, SENG-212

## COURSE DESCRIPTIONS

**ECE 471** three credits

### Communications Theory

3 hours lecture

Prerequisites: ECE 321 and ECE 384

Probability theory, signals and linear networks, Fourier transforms, random processes and noise are reviewed. Analog communications including amplitude and frequency modulation with and without noise are studied. Digital communications including baseband pulse modulation, quantization, sampling theory, digital pulse shaping, matched filter, Nyquist criterion and error rates due to noise are covered.

**ECE 520** three credits

### Wireless Networks and Mobile Security

3 hours Lecture

Prerequisites: ECE 432 or Permission from the instructor

Advanced study of wireless and mobile network architectures, technologies, protocols and mobile security design at graduate level. It covers impediments of the mobile and wireless environments, problems and limitations due to such impediments, various network layers solutions, location management techniques, mobile IP, wireless TCP, wireless LANs, 802.16/WIMAX, Wireless Mesh Networks, ad-hoc networks, routing and power optimization, performance and mobile security issues.

**ECE 533** three credits

### VLSI Design

3 hours lecture

Prerequisite: ECE 311

Design of Very Large-Scale Integrated Circuits (VLSI), taught at the transistor level. Computer tools are used to create and simulate integrated circuit layouts. Levels of design automation covered include Full Custom layout, Schematic Driven layout, Standard Cells, and fully automated synthesis of HDL code. Required readings from the current literature lead to a formal written report on recent developments in VLSI. Students are required to complete and present at least one project. Some designs may be fabricated.

**ECE 549** three credits

### Network Security

3 hours lecture

Prerequisite: Graduate standing in computer engineering or permission of the instructor

Principles and practices of security in computer networks. This course covers the theoretical foundations of securing computer networks including cryptography and models. It steps through the practical process of defending networking resources. It also reveals various case studies, large and small, to familiarize the techniques that attackers use. An Internet Testbed is facilitated for students to experiment attacks and defenses.

**ECE 551** three credits

**Acoustic and Electromagnetic Waves**

3 hours lecture

Principles of oscillations, radiation, and propagation of waves in acoustics and electromagnetics for bounded and unbounded media. Introduction to the derivation of the wave equation from Maxwell's equations in electromagnetics and vibration theory in acoustics and the application of the wave equation to wave propagation in SONAR and RADAR environments. Examples include acoustic and electromagnetic propagation in air and ocean environments, waveguides and optical fibers, transducers and antennas, radiation and reception of signals, dispersion, phase and group velocity, attenuation, reflection, refraction, and scattering.

**ECE 565** three credits

**Operating Systems**

3 hours lecture

Operating system design and implementation using the specifics of current operating systems. The course covers file, process, memory, and Input/Output management; multitasking, synchronization, and deadlocks; scheduling, and inter-process communication. Projects include team system's programming assignments to investigate the kernel interface, files, processes, and inter-process communication for a current operating system.

**ECE 574** three credits

**Discrete-Time Signal Processing**

3 hours lecture

Representation, analysis and design of discrete signals and systems. Topics include a review of the z-transform and the discrete-time Fourier transform, the fast Fourier transform, digital filter structures, digital filter design techniques, quantization issues and effects of finite word-length arithmetic, sampling and oversampling, decimation and interpolation, linear prediction, the Hilbert transform, and the complex cepstrum. Students gain experience in analyzing and designing digital signal processing systems through computer projects.

**ECE 620** three credits

**Dependable and Secure Computing**

3 hours lecture

Prerequisites: ECE 454 or ECE 544

Advanced topics on dependability and security modeling, analysis and design techniques for computer-based systems and networks. Topics covered include multistate systems, phased-mission systems, fault-tolerant networks, wireless sensor networks, distributed computer systems, modular imperfect fault coverage, dependent failures, and trust in social networks. The course includes research projects that aim to prepare the students to perform research in the area of dependable and secure computing. Substantial emphasis will be placed on reading research papers in a critical and analytical manner.