Graduate Courses
Electrical and Computer Engineering
Fall 2017

Classes begin 9/6/2017

UMass Dartmouth
COLLEGE OF ENGINEERING

Department contact info: 508.999.9164
Dr. Antonio H. Costa, Chairperson
Dr. Hong Liu, Graduate Program Director

ECE 435 **Microwave & RF Engineering**
Y. Li (yli2@umassd.edu)
Tuesday, Thursday 3:30-4:45 PM, SENG-350

ECE 471 **Communication Theory**
P. Gendron (pgendron@umassd.edu)
Monday, Wednesday, Friday 9:00-9:50 AM, SENG-212

ECE 520 **Wireless Networks & Mobile Security**
H. Wang (hwang1@umassd.edu)
Tuesday, Thursday 11:00-12:15 PM, DION-114

ECE 532 **Radar Engineering**
D. Kasilingam (dkasilingam@umassd.edu)
Tuesday, Thursday 11:00-12:15 PM, SENG-212

ECE 533 **VLSI Design**
D. Rancour (drancour@umassd.edu)
Tuesday, Thursday 8:00-9:15 PM, SENG-212

ECE 548 **Cyber Threats & Security Management**
H. Liu (hliu@umassd.edu)
Thursday 3:30-6:00 PM, SENG-212

ECE 557 **Fundamentals of Acoustics**
D. Brown (dbrown@umassd.edu)
Monday, Wednesday 3:00-4:50 PM, SENG-114

ECE 561 **Computer Systems**
H. Wang (hwang1@umassd.edu)
Tuesday, Thursday 2:00-3:15 PM, SENG-212

ECE 564 **Database Programming**
P. Fortier (pfortier@umassd.edu)
Monday, Wednesday 5:00-6:15 PM, SENG-212

ECE 565 **Operating Systems**
H. Liu (hliu@umassd.edu)
Tuesday, Thursday 12:30-1:45 PM, SENG-212

ECE 591-03 **Topics in Electrical and Computer Engineering**
Topic: Computing Methods of Num. Analysis
L. Fiondella (lfiondella@umassd.edu)
Monday, Wednesday 3:30-4:45 PM, SENG-212

ECE 672 **Signal Detection Theory**
P. Gendron (pgendron@umassd.edu)
Monday, Wednesday 12:30-1:45 PM, SENG-212

Course Descriptions

ECE 435 three credits
Microwave and RF Engineering
3 hours lecture
Prerequisite: ECE 335
Review of transmission line theory. The concept of impedance transformation is presented. The characteristics of coaxial lines, waveguides, and microstrip lines are studied in detail. Propagation and impedance properties of these lines are derived. Smith charts are used for designing matching and tuning circuits. The use of S-parameters and the analysis of multi-port networks are presented. Passive multi-port devices such as microwave power couplers and dividers are described. The fundamentals of microwave and RF filters and resonators are discussed, and their implementation using microstrip lines and waveguides is also presented.

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
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 532 three credits
Radar Engineering
3 hours lecture
Fundamentals of microwave radar engineering and radar system analysis. The course covers the radar equation, radar detection theory, noise analysis, radar cross-section, continuous wave and pulsed systems, moving target indicators, pulse compression, radar transmitters and receivers. Also covered are radar systems such as pulsed Doppler radar, synthetic aperture radar

(SAR), inverse synthetic aperture radar (ISAR), polarimetric radar and interferometric radar. Applications include target detection, radar remote sensing, satellite oceanography, and terrain mapping.

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 548 three credits
Cyber Threats and Security Management
Prerequisite: Graduate standing in computer engineering
3 hours lecture
Fundamentals and practices in information assurance (IA) and cyber defense (CD). This course covers threats in the cyber realm, design principles to create trustworthy systems, and security lifecycle. Topics include threat models, attack surface, social engineering, vulnerability identification, risk assessment, and fail secure system design. Hands-on exercises will demonstrate the interaction between security and system usability as well as the effects of security mechanisms in specific scenarios.

ECE 557 three credits
Fundamentals of Acoustics
3 hours lecture
Fundamentals of acoustics including vibration and wave propagation in solid and fluid media. Topics include: vibration and wave propagation in one-dimensional, two-dimensional, and three-dimensional media including lumped parameter systems, strings, bars, membranes, thin plates and fluids; mechanical and electrical equivalent circuit models, normal modes, linearized wave equation and solutions, reflection, transmission, refraction and attenuation phenomena in fluids, production and reception of sound, basic properties of transducers and arrays.

ECE 561 three credits
Computer Systems
3 hours lecture
An examination of various components that make up a computer system, including CPU, memory, input/output, and buses, as well as how they all work together to form a functioning computer system. The major advances in the computer organization and architecture including von Neumann architecture, interrupts, the family concept, microprocessors, cache memory, virtual memory, virtual I/O, pipelining, RISC, superscalar processors, IA-64 (EPIC) as well as micro-programmed control unit are also presented. State-of-the-art research projects are assigned to prepare students to perform research in the field of computer organization and architecture.

ECE 564 three credits
Database Programming
3 hours lecture
Prerequisite: Graduate standing in computer engineering
Introduction to database systems design and operations from an applications perspective. The course provides students with a broad view and understanding of the fundamentals of database management systems and operations, they learn how to describe and specify embedded and ad-hoc database applications and to develop least cost solutions to information management problems using production level support tools. A feature of Database Programming is the development of individual database systems applications drawn from the research literature.

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 591-03 three credits
Topics in Electrical and Computer Engineering
Topic: Computing Methods of Numerical Analysis
Prerequisites: ECE 250; MTH 212; and MTH 213 or MTH 211
3 hours lecture
Mathematical methods useful to the computer engineer, including topics from numerical analysis and linear algebra. Students learn how and when to apply a particular numerical analysis tool or method and how to analyze and interpret the results provided by the method. Emphasis is placed on selecting appropriate numerical tools for a variety of basic problems, applying them, and studying their reliability, efficiency, and computer implementation. A large number of problems are solved using the computer.

ECE 672 three credits
Signal Detection Theory
3 hours lecture
Fundamentals of detection theory. Topics include Bayes and Neyman-Pearson tests, composite hypothesis testing, nonparametric test, detection of known signals in Gaussian noise, detection of signals with random parameters in noise, multiple pulse detection of signals, generalized likelihood ratio test, Bayes and maximum likelihood estimators, comparison of communication systems, space-time processing, application to radar and sonar.