

GRADUATE COURSES

Electrical and Computer Engineering

Spring 2018

Classes begin 1/22/2018



UMass

Dartmouth

COLLEGE OF ENGINEERING

Department contact info: 508.910.6619
Dr. Antonio H. Costa, Chairperson
Dr. Hong Liu, Graduate Program Director

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| <p>ECE 521 Random Signals and Systems I
Paul Gendron (pgendron@umassd.edu)
Tuesday, Thursday 5:00-6:15 PM, SENG-212</p> <p>ECE 534 RF Circuit Design
Yifei Li (yli2@umassd.edu)
Tuesday, Thursday 2:00-3:15 PM, DION-109</p> <p>ECE 535 Analog Integrated Circuit Design
David Rancour (drancour@umassd.edu)
Tuesday, Thursday 9:30-10:45 AM, SENG-212</p> <p>ECE 560 Computer Systems Performance Evaluation
Liudong Xing (lxing@umassd.edu)
Tuesday, Thursday 12:30-1:45 PM, LIB-205</p> <p>ECE 562 Advanced Computer Architecture
Honggang Wang (hwang1@umassd.edu)
Tuesday, Thursday 11:00-12:15 PM, DION-110</p> <p>ECE 568 Advanced Digital Design
Paul Fortier (pfortier@umassd.edu)
Monday, Wednesday 5:00-6:15 PM, SENG-212</p> | <p>ECE 571 Digital Communications
Paul Gendron (pgendron@umassd.edu)
Tuesday, Thursday 12:30-1:45 PM, SENG-212</p> <p>ECE 578 Digital Image Processing
W. Vance McCollough (wmccollough@umassd.edu)
Tuesday, Thursday 11:00-12:15 PM, SENG-212</p> <p>ECE 591-01 Topics in Electrical and Computer Engineering
Topic: Wireless Communications
Dayalan Kasilingam (dkasilingam@umassd.edu)
Tuesday, Thursday 3:30-4:45 PM, SENG-212</p> <p>ECE 591-02 Topics in Electrical and Computer Engineering
Topic: Wireless Body Area Networks
Honggang Wang (hwang1@umassd.edu)
Tuesday, Thursday 2:00-3:15 PM, SENG-117</p> <p>ECE 597 Underwater Acoustics I
David Brown (dbrown@umassd.edu)
Monday, Wednesday 3:00-5:00 PM, SENG-117</p> <p>ECE 620 Dependable and Secure Computing
Liudong Xing (lxing@umassd.edu)
Tuesday, Thursday 9:30-10:45 AM, SENG-108</p> |
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COURSE DESCRIPTIONS

ECE 521 three credits

Random Signals and Systems I

3 hours lecture

Prerequisites: EAS 501 or equivalent graduate level applied mathematics course and ECE 320 and ECE 321 or equivalent undergraduate linear systems course

Random variables and probabilistic description of signals and systems. The course provides the analytical tools for studying random phenomena in engineering systems and provides graduate students with an extensive treatment of probability theory, Bayes theorem, random variables, distribution and density functions, conditional distributions, moments, functions of random variables, characteristic functions, stochastic processes, Gaussian processes, stationary processes, correlation functions, power spectral density, response of systems to random inputs, mean square error estimation, filtering and prediction, and noise analysis. The course prepares students for a wide range of courses in communications, signal processing, acoustics, control, and other areas of engineering in which random signals and systems have an important role.

ECE 534 three credits

RF Circuit Design

3 hours lecture

Prerequisite: ECE 435 or permission of instructor

Design and analysis of radio-frequency discrete components and integrated circuits. The course focuses on practical high frequency circuit techniques and physical understanding of active devices such as diodes and transistors. Topics include RF passive circuits and RF active circuits such as amplifiers, mixers, and oscillators. RF integrated circuit design will precede two design projects based on the Agilent ADS EAD package.

ECE 535 three credits

Analog Integrated Circuit Design

3 hours lecture

Introduction to the design of CMOS analog integrated circuits (IC's), with occasional references to bipolar IC's to make comparisons. Required readings from the current literature lead to a formal written report on recent developments in analog IC's. Students are required to complete the design of a complex IC and make a class presentation of its design methodology and simulation results.

ECE 560 three credits

Computer Systems Performance Evaluation

3 hours lecture

Prerequisites: ECE 460 and graduate standing

Development of a broad working knowledge of probability, queuing theory, petri-nets, simulation and empirical modeling as applied to computer systems hardware and software performance modeling and assessment. The course is oriented toward a practical application of theory and concepts with an emphasis placed on the use of computer tools to model performance and to perform tradeoff analysis.

ECE 562 three credits

Advanced Computer Architecture

3 hours lecture

Prerequisite: ECE 561 or permission of instructor

Advanced computer design, emphasizing fundamental limitations and tradeoffs in designing high performance computer systems. Students develop an understanding of the theoretical foundations in both hardware and software by studying parallel computer models; program partitioning, granularity, and latency; processor architectures and interconnects; and memory hierarchy, interleaving and bandwidth. Specific architectures such as shared memory multi-processors, message passing multi-computers, and superscalar, supervector, VLIW and dataflow designs will be explored.

ECE 568 three credits

Advanced Digital Design

3 hours lecture

Prerequisite: ECE graduate students

Synthesis of state machines including data path, I/O and control path design, testing and implementation, register transfer languages, ASM chart and mixed mode design methodologies, ROM-centered, embedded processor core centered and FPGA implementations using HDL tools and techniques. Specific applications to embedded controllers and sensor interface devices for embedded and real-time systems applications will be discussed. An FPGA based laboratory and semester project experience is included.

ECE 571 three credits

Digital Communications

3 hours lecture

Fundamentals of digital communications. Topics covered include information theory, vector signal space, detection of digital signals in noise, sampling process, waveform coding techniques, digital modulation and demodulation techniques, error control coding, spread spectrum modulation, and wireless communications.

ECE 578 three credits

Digital Image Processing

Prerequisite: ECE 320 or permission of instructor

3 hours lecture

Fundamentals of digital image processing. Topics include human vision models, 2-D sampling and quantization, image transforms, image enhancements, color image processing, image restoration, image and video compression, image segmentation by thresholding and region analysis, texture analysis, boundary descriptions, morphological methods, image processing system architecture.

ECE 591-01 three credits

Topics in Electrical and Computer Engineering

Topic: Wireless Communications

3 hours lecture

Prerequisite: Permission of instructor

Introduction to the principles and practice of wireless communications. The course presents the concepts of frequency reuse and cellular structure and covers propagation effects, multipath fading, digital and analog modulation, diversity and equalization, multiple access, and wireless networks. The course also presents modern wireless systems and standards. The focus of the course is to understand wireless communications at a systems level and is designed as a senior elective for ELE and CPE majors. Basic understanding of electromagnetic wave propagation and communication theory is expected. The course includes a project related to new technological advances in wireless systems.

ECE 591-02 three credits

Topics in Electrical and Computer Engineering

Topic: Wireless Body Area Networks

3 hours lecture

Prerequisites: ECE 468 or ECE 562; or permission of instructor

Design of wireless body area network (BAN) systems and development of research on the advanced and newly emerging techniques. The fundamentals of low power communications protocols, energy harvesting and optimization, body sensor network management, and applications in healthcare including algorithms for biomedical signal processing will be covered. Topics in seamless coverage of sensing, low-power and practical deployment, biosensor and communication design, interfacing and nanotechnology, energy harvesting and power delivery, ultra-low power bio-inspired processing, wearable, ingestible sensor integration and exemplar applications will be presented. The focus will be on the project aspect of wireless BAN systems for healthcare applications.

ECE 597 three credits

Underwater Acoustics I

3 hours lecture

Production, propagation, and reception of underwater sound. Topics include plane, spherical and cylindrical wave propagation, transmission loss, normal mode theory, waveguides, ray acoustics, active and passive sonar equations, properties of transducers and arrays including transmit and receive sensitivity, beam patterns, directivity, spatial aperture functions and their Fourier transform pairs, equivalent electrical circuits, and calibration of underwater projectors and hydrophones.

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.