GRADUATE COURSES

Department of Electrical and Computer Engineering

Spring 2026

Classes begin 1/26/2026

UMass Dartmouth
COLLEGE OF ENGINEERING

Department contact: 508.999.9164
Dr. Dayalan P. Kasilingam, Chairperson
Dr. Paul J. Gendron, Graduate Program Director

ECE 513 **Fundamentals of Optics and Photonics**
A. Doblas (adoblas@umassd.edu)
Tuesday, Thursday 3:30-4:45 PM
SENG-222

ECE 521 **Random Signals and Systems I**
P. Gendron (pgendron@umassd.edu)
Monday, Wednesday 5:30-6:45 PM
SENG-212

ECE 524 **Solid State Electronics**
D. Rancour (drancour@umassd.edu)
Tuesday, Thursday 5:00-6:15 PM
TBA

ECE 530 **Intro. Advanced Electronics & Optoelectronics**
Y. Li (yifei.li@umassd.edu)
Fridays 12:00-2:30 PM
SENG-222

ECE 548 **Cyber Threats and Security Management**
H. Liu (hliu@umassd.edu)
Monday 3:30-6:15 PM
SENG-222

ECE 557 **Fundamentals of Acoustics**
D. Brown (dbrown@umassd.edu)
Monday, Wednesday 3:30-5:30 PM
SENG-212

ECE 560 **Computer Systems Performance Evaluation**
L. Xing (lxing@umassd.edu)
Wednesday, Fridays 12:30-1:45 PM
SENG-212

ECE 562 **Advanced Computer Architecture**
S. Goren (sgoren@umassd.edu)
Mondays, Wednesday 2:00-3:15 PM
SENG-222

ECE 591-02 **Topics in ECE**
Topic: Digital Forensics
B. Morrissette (u_bmorrisset@umassd.edu)
Tuesday 5:00-7:30 PM
SENG-222

ECE 591-05 **Topics in ECE**
Topic: Photonic Devices
Y. Li (yifei.li@umassd.edu)
T. Manzur (tmanzur@umassd.edu)
Fridays 3:00-5:30 PM
SENG-212

COURSE DESCRIPTIONS

ECE 513 three credits
Fundamentals of Optics and Photonics
3 hours lecture
Prerequisite: Permission of instructor
Introduction to optics and photonics. Optics is the study of light in its simplest form by treating light as rays. On the other hand, photonics treats light as an ensemble of photons. This course provides the fundamentals needed for optical engineering and optical system design, and the principles to model optical systems with varying degrees of fidelity. This course will discuss the duality of light, its generation and detection mechanism, & nbsp; and describe the physical principles that determine how rays behave at various interfaces. Natural optical phenomena such as rainbows and mirages, and classical optical systems such as prisms, telescopes, and cameras, will be analyzed throughout the course. Linear systems will be introduced to analyze more complex optical systems.

ECE 521 three credits
Random Signals and Systems I
3 hours lecture
Prerequisite: Permission of instructor
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 524 Three credits
Solid State Electronics
3 hours lecture
Prerequisite: Permission of instructor
Solid state device behavior. Among the topics covered are semiconductor fundamentals, p-n junction theory, and both the bipolar and the field effect transistor. Emphasis is placed on those transistor parameters that need to be considered in VLSI and microwave applications.

ECE 530 three credits
Introduction to Advanced Electronics & **Optoelectronics**
3 hours lecture
Prerequisite: Permission of instructor
Illustration of principles of advanced electronics and photonics by showing their applications in advanced radar, wired/wireless communications, and electronic sensing. Key electronics/photonics devices including high speed transistors, diodes, lasers, high frequency modulators, photodetectors, amplifiers, and passive circuitries are discussed. System applications including advanced radar system, radio over fiber, and millimeter wave /THz signal generation and processing are deliberated and analyzed.

ECE 548 three credits
Cyber Threats and Security Management
3 hours lecture
Prerequisite: Permission of instructor
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 488

ECE 557
Fundamentals of Acoustics
3 hours lecture
Prerequisite: Permission of instructor
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 490

ECE 560
Computer Systems Performance Evaluation
3 hours lecture
Prerequisite: Permission of instructor
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 trade-off analysis.

ECE 562 three credits
Advanced Computer Architecture
3 hours lecture
Prerequisite: 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 468

ECE 591-02 three credits
Topics in Electrical and Computer Engineering
Topic: Digital Forensics
3 hours lecture
Prerequisite: Permission of instructor
Digital Forensics: Practical applications, methods and scope; Legal parameters and boundaries; File Systems & Windows Forensics; Mobile Device Forensics - Android OS; Mobile Device forensics - iOS (Apple); Social Media Applications / Cloud Data Forensics / SQLite Breakdowns; Cell Site Location Information Network Analysis & Cellular Records Analysis; Evidence Management & Lab fundamentals; Practical Usage of Tools/Programs/Readers.

ECE 591-05 three credits
Topics in Electrical and Computer Engineering
Topic: Photonic Devices
3 hours lecture
Prerequisite: Permission of instructor
Electromagnetic analysis of guided-wave optical devices and systems, including transmission properties of optical fibers, photonic crystal waveguides, grating structures, and coupled-wave components; soliton propagation in fibers; Erbium-doped and Raman fiber amplifiers; semiconductor light sources and photodetectors; wavelength-division multiplexed systems. Introduction to nano-photonic devices. Topics to be covered: light and photons, statistical properties of photon sources, temporal and spatial correlations, light-matter interactions, optical nonlinearity, atoms and quantum dots, single- and two-photon devices, optical devices, and applications of nanophotonic devices in quantum and classical computing and communication.