COURSES FOR ELECTRICAL ENGINEERING AND COMPUTER ENGINEERING

Electrical and Computer Engineering Courses

ECE508 Communications
Hours 3

Analog and digital communication systems, random signals, sampling, filtering, analog-to-digital encoding, advanced digital modulation/demodulation, source encoding/decoding, channel encoding/decoding, multiplexing, system performance anaylsis.

Prerequisite(s): ECE 370 and MATH 355

ECE509 Communications Lab
Hours 1

Modeling and design of communication systems. Familiarization with specialized communications equipment and techniques. Proper use of laboratory instruments.

Prerequisite(s): ECE 370 and MATH 355

Prerequisite(s) with concurrency: ECE 508

ECE530 Solid State Devices
Hours 3

Solid state physics for semiconductor devices, PN junction, metal semiconductor, JFET/MESFET, MOSFET, BJT, and non-ideal behaviors of solid state devices. Organic thin film devices, including organic solar cells, thin film transistors, light emitting diodes, and their application for flexible displays.

Prerequisite(s): ECE 330

ECE539 Thin Film Technology
Hours 3

Crystal structure and defects, film nucleation and growth models, growth of polycrystaline and epitaxial fims, vacuum science technology, physical and chemical vapor deposition, solution based methods, thin film characterization techniques.

Prerequisite(s): ECE 225 or PH 253

ECE540 Electromagnetic Waves
Hours 3

Mathematics and physics of the radiation, propagation and scattering of electromagnetic waves. Boundary value problems involving finite and infinite structures, waveguides, antennas and media.

Prerequisite(s): ECE 340

ECE545 Microwave Remote Sensing
Hours 3

Fundamentals of active and passive microwave remote sensing.

ECE546 Ground- and Surface- Water Remote Sensing
Hours 3

Requirements, design, and operation of surface-based, airborne, and spaceborne remote sensing technologies for surface-water, soil moisture, groundwater, river flow and bathymetry and snow.

ECE547 Water Quality Remote Sensing
Hours 3

Requirements, design, and operation of in-situ and remote sensing technologies for water quality of river, lake, estuarial, and coastal regions.

ECE551 Power Electronics
Hours 3

Detailed study on the theory and operation of power electronic converters and systems. Overview of enabling power semiconductor switching devices. Introducation to feedback control of converters. Machine drives fundamentals.

Prerequisite(s): ECE 332 and ECE 350

ECE552 Power Electronics Laboratory
Hours 1

Laboratory experience in three phase power systems and electric machinery. Laboratory experience on the theory and operation of power electronic converters, systems and machine drives.

Prerequisite(s): ECE 350 and ECE 332

Prerequisite(s) with concurrency: ECE 551

ECE553 Power Systems
Hours 3

Basic power systems concepts and per unit quantities; transmissions line, transformer and rotating machine modeling; power flow; symmetrical component of power systems; faulted power system analysis.

Prerequisite(s): ECE 350

ECE554 Power Systems Laboratory
Hours 1

Test and analysis of power systems and machine devices and the design of systems using devices.

Prerequisite(s): ECE 350

Prerequisite(s) with concurrency: ECE 553

ECE555 Electromechanical Systems
Hours 3

Static and dynamic modeling, analysis, and simulation of mechanical, electrical, hydraulic, and mixed systems. MATLAB and SIMULINK model development and simulation.

Prerequisite(s): ECE 225 and MATH 238

ECE562 Semiconductor Optoelectronics
Hours 3

Elemental and compound semiconductors; fundamentals of semiconductors physical properties, solid state physics, optical recombination and absorption, light emitting diodes, quantum well lasers, quantum dots lasers, blue lasers, semiconductor modulators, photodetectors, semiconductor solar cells and semiconductor nanostructure devices.

Prerequisite(s): PH 253

ECE563 Magnetic Materials & Devices
Hours 3

Diamegnetism and Paramagnetism, Ferromagnetism, Antiferromagnetism, Ferrimagnetism, magnetic anisotropy, domains and the magnetization process, fine particles and thin films, magnetization dynamics.

Prerequisite(s): ECE 340

ECE575 Control System Analysis
Hours 3

Classical and modern feedback control system analysis and methods, including stability, root locus, Bode plot, frequency response, and computer analysis.

Prerequisite(s): ECE 370

ECE576 Control Systems Lab
Hours 1

This course will provide students with practical and experimental analysis and design of feedback control systems and components, including electrical, mechanical, and electromechanical systems.

Prerequisite(s): ECE 370

Prerequisite(s) with concurrency: ECE 575

ECE579 Digital Control Systems
Hours 3

Frequency and time domain methods in discrete time control systems; sampling of continuous-time signals, stability, transform design techniques, state variable analysis, and design techniques.

Prerequisite(s): MATH 237 and ECE 370 and ECE 475

ECE580 Digital Systems Design
Hours 3

Digital systems design with hardware description languages, programmable implementation technologies, electronic design automation design flows, design considerations and constraints, design for test, system on a chip designs, IP cores, reconfigurable computing and digital system design examples and applications.

Prerequisite(s): ECE 383 and CS 101 Corequisite: ECE 581

ECE581 Digital Systems Design Lab
Hours 1

Logic design and simulation via hardware description languages, use of electronic design automation tools, and CPU design.

Prerequisite(s): ECE 383 and CS 101 Corequisite: ECE 580

ECE582 Comp Visn Dig Image Proc
Hours 3

Introduction to computer vision and digital image processing with an emphasis on image representation, transforms, filtering, compression, boundary detection, and pattern matching.

Prerequisite(s): MATH 355 and CS 124

ECE583 Introduction to Machine Learning
Hours 3

Machine learning studies methods that allow computers to learn from the data and act without being explicitly programmed. This course provides an introduction to machine learning and covers various supervised and unsupervised learning techniques, methods of dimensionality reduction, and assessment of learning algorithms.

Prerequisite(s): MATH 355 or consent of instrcutor

ECE584 Computer Architecture
Hours 3

Computer architectures, computer design, memory systems design, parallel processing concepts, supercomputers, networks, and multiprocessing systems.

Prerequisite(s): ECE 383 and CS 101

ECE586 Embedded Systems
Hours 3

Integration of microprocessors into digital systems. Includes hardware interfacing, bus protocols and peripheral systems, embedded and real-time operating systems, real-time constraints, networking and distributed process control.

Prerequisite(s): ECE 383 and CS 101 Corequisite: ECE 587

ECE587 Embedded Systems Laboratory
Hours 1

Design and implementation experience with microcontrollers, interfacing, digital control systems, bus protocols and peripheral systems, real-time constraints, embedded and real-time operating systems, distribution process control.

Prerequisite(s): ECE 383 Corequisite: ECE 586

ECE588 Computational Intelligence
Hours 3

Computational Intelligence is a discipline that relies on biologically inspired computation to solve real-world problems that otherwise are infeasible or impossible to solve using classical engineering approaches. The course will cover the fundamental techniques of computational intelligence and study practical applications in real-world engineering problems.

Prerequisite(s): MATH 355 or consent of instructor.

ECE593 Special Topics
SP

Hours 1-5

Advanced topics of a specialized nature.

Special Topics Course

ECE598 Non-Thesis Research
Hours 1-6

No description available

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ECE599 Thesis Research
Hours 1-12

No description available

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ECE637 Fund Solid State Engineering
Hours 3

Fundamentals of solid state physics and quantum mechanics are covered to explain the physical principles underlying the design and operation of semiconductor devices. The second part covers applications to semiconductor microdevices and nanodevices such as diodes, transistors, lasers and photodetectors incorporating quantum structures.

Prerequisite(s): PH 253

ECE662 Advanced Nanoscience
Hours 3

Advanced quantum physics; basics of nanotechnology, molecular and nanoelectronics; fundamentals in nanophotonics; interaction of light and matter; nanostructure characterization; bionanotechnology.

Prerequisite(s): PH 253

ECE693 Special Topics
SP

Hours 1-9

Advanced topics of a specialized nature.

Special Topics Course

ECE695 Graduate Research Seminar
Hours 1

This course exposes the faculty, researchers, and students in the ECE department to current research in all areas of Electrical and Computer Engineering. This seminar series focuses on science, technology, and innovation topics studied through the embedded systems, electromechanical and energy systems, devices and materials, and electromagnetics foci within the department. The seminar speakers will be invited from the ECE faculty and graduate students, national research laboratories, other universities, and industry.

ECE697 PhD Instructional Training and Practicum
Hours 1-2

This course provides Ph.D. students with pedagogical instruction, mentoring, and practical experience related to teaching and mentoring in a higher education environment. Does not count toward Ph.D. coursework requirements.

ECE698 Non-Dissertation Research
Hours 1-12

Independent study; general research activities; no credit toward Ph.D.; no substitution for ECE 699. This course serves as an introduction to Ph.D.-level research prior to Ph.D. candidacy. It involves early-stage research activities to prepare students for more focused dissertation research taken as ECE 699 once admitted to Ph.D. candidacy.

ECE699 Dissertation Research
Hours 1-12

This independent research course partially fulfills required doctoral level research dissertation hours toward the Ph.D. in Electrical and Computer Engineering. The course is conducted under the guidance of the Ph.D. advisor. Materials covered will be of an advanced nature aimed at providing doctoral students with an understanding of the latest research and current developments within the field. Discussion and advisor guidance will be focused on readings of research articles and development of research methodology, with the aim of producing an original research contribution that represents a novel development in the field, or a novel perspective on a pre-existing topic in the field.