

# Electrical & Computer Eng. Courses

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## Courses

### EE 5118. Laboratory for EE 5318.

EE 5118: Laboratory for EE 5318 Simulation, fabrication, and testing of MOS technology. Includes silicon oxidation, lithography, etching, thin film desposition, diffusion, and process integration. Corequisite: EE 5318 Prerequisite: EE 3329 with a grade of "C" or better.

**Department:** Electrical & Computer Eng.

**1 Credit Hour**

**3 Total Contact Hour**

3 Lab Hour

0 Lecture Hour

0 Other Hour

**Prerequisite(s):** (EE 3329 w/C or better)

### EE 5190. Special Topics Lab in ECE.

Special Topics Lab in ECE Laboratory study of a selected topic in Electrical and Computer Engineering.

**Department:** Electrical & Computer Eng.

**1 Credit Hour**

**3 Total Contact Hour**

3 Lab Hour

0 Lecture Hour

0 Other Hour

### EE 5191. Individual Studies.

Individual Studies (0-0-1) Individual variable-credit research, design or analysis on advanced phases of electrical engineering problems conducted under the direct supervision of a faculty member. A maximum of 3 credit hours may be applied towards the M.S. Degree. Restricted to majors: EE, COMP ENGR. Prerequisite: Department approval.

**Department:** Electrical & Computer Eng.

**1 Credit Hour**

**1 Total Contact Hour**

0 Lab Hour

0 Lecture Hour

1 Other Hour

### EE 5192. Clinical Rotations-Engineers.

This course facilitates the recognition of the importance of designing medical devices and biologics with the end-user in mind. Each rotation will include background in terms of theory and clinical application provided by a physician, including selected case studies, followed by "hands-on" experience (whenever possible) with technical personnel. Clinical rotations will be at the Foster School of Medicine, the William Beaumont Army Medical Center, and the US- Mexico Border Health Association. Prerequisites: Department approval; BIOL 6304; DRSC 5495; and MASE 6321 OR EE 6321 OR MME 5312 OR EE 5321 with a grade of C or better. Restricted to level of DR, GR.

**Department:** Electrical & Computer Eng.

**1 Credit Hour**

**3 Total Contact Hour**

0 Lab Hour

0 Lecture Hour

3 Other Hour

**Prerequisite(s):** (BIOL 6304 w/C or better ) AND (DRSC 5495 w/C or better ) AND (MASE 6321 w/C or better ) OR (EE 6321 w/C or better ) OR (MME 5312 w/C or better ) OR (EE 5321 w/C or better)

### EE 5300. Probability & Random Processes.

Probability and Random Processes (3-0) Random process fundamentals, including spectral analysis, special classes of random processes, linear systems response to random processes, and applications. Restricted to majors: EE, COMP ENGR, CS. Prerequisite: EE 3384 or EE 4384 or STAT 3330.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (EE 3384 w/C or better ) OR (EE 4384 w/C or better ) OR (STAT 3330 w/C or better)

**EE 5301. Computational Methods for EE.**

Computational Methods for Electrical Engineers (3-0) A broad coverage of the field of numerical methods emphasizing computer techniques as they apply to Electrical Engineering. Topics generally include numerical integration and differentiation, boundary-value and eigenvalue-value problems, finite-difference and finite-elements methods, and solutions to partial, parabolic and hyperbolic differential equations. Restricted to majors: CS, EE and EECE. Prerequisite: MATH 2326 or MATH 3326 and familiarity with MATLAB. .

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (MATH 2326 w/C or better)

**EE 5302. Linear Systems Analysis.**

Linear Systems Analysis (3-0) The analysis of generalized linear systems through a state space approach. Relationships with frequency domain design. Modeling of physical systems. Controllability, observability, pole placement, and design of controllers and observers. Eigenstructures. Restricted to majors: EE, COMP ENGR, GRAD COMP ENGR.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Major Restrictions:**

Restricted to majors of CE, CEPH, EE

**EE 5303. EM Analysis Using FDTD.**

A course on the finite-difference time-domain method for rigorous analysis of electromagnetic devices. The course covers the detailed formulation and how to implement the method in MATLAB. Topics include MATLAB, data visualization, finite-differences, Yee algorithm, perfectly matched layer absorbing boundary condition, sources, Fourier transforms, and modeling of electromagnetic devices.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (MATH 2313 w/C or better AND MATH 2326 w/C or better ) AND (EE 3321 w/C or better)

**EE 5306. Antenna Theory.**

Antenna Theory (3-0) Fundamental theory of point sources; the antenna as an aperture; methods of analyzing and calculating characteristics of various types of antennas; self and mutual impedances of antennas; array of linear antennas; antenna measurement techniques. Restricted to majors: EE, COMP ENGR, GRAD COMP ENGR. Prerequisite: EE 3321.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (EE 3321 w/C or better)

**EE 5311. Semiconductor Device Physics.**

Semiconductor Device Physics (3-0) Advanced semiconductor principles and device building blocks, and their application to electronic devices. Topics include energy bands and gap, carrier statistics and transport, junctions and interfaces, and electronic devices. Restricted to majors: EE, COMP ENGR, GRAD COMP ENGR. Prerequisite: EE 3329 or equivalent with C or better.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (EE 3329 w/C or better)

**EE 5312. Advanced Optoelectronic Device.**

Advanced Optoelectronic Device (3-0) Theory and application of advanced photonic device including injection lasers, photodiodes, infra-red detectors, solar cells, electroluminescent displays. Restricted to majors: EE, COMP ENGR, GRAD COMP ENGR. Prerequisite: EE 5311.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (EE 5311 w/C or better)

**EE 5313. Modern Semiconductor Devices.**

Study of modern electronic devices that exploit functional properties of matter and advances in modern technologies. Devices covered include transistors, diodes and other modern devices. Prerequisite: EE 5311 w/C or better. Corequisite: Department approval required.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (EE 5311 w/C or better)

**EE 5318. Electronic Material Processing.**

EE 5318: Electronic Materials Processing (3-0) The science and technology of integrated device/circuit fabrication including the effect of defects. Includes silicon oxidation, lithography, etching, thin film deposition, diffusion, and ion implantation. Corequisite: EE 5118 Prerequisite: EE 3329 with a grade of "C" or better.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (EE 3329 w/C or better)

**Corequisite(s):** EE5118

**EE 5320. Nanoelectronics.**

Review of quantum mechanics of free and confined electrons including quantum wells, wires and dots. Study of modern electronic devices that possess dimensions at which the quantum mechanical behavior of matter is manifested including devices with single-, few- and many-electron phenomena.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (EE 5311 w/B or better)

**EE 5322. 21st Century Electromagnetics.**

A comprehensive study of the most advanced concepts in modern electromagnetics. Topics include dispersive and anisotropic materials, transmission lines, coupled-mode theory, periodic electromagnetic structures, gratings, guided-mode resonance, metamaterials, photonic crystals, transformation optics, spatially variant lattices, frequency selective surfaces, surface waves, and slow waves. Problems associated with interfacing CAD and MATLAB are also covered.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (EE 5320 w/B or better)

**EE 5323. Adv Digital Communications.**

Advanced Digital Communications (3-0) Source coding, generation, transmission, and detection of digital baseband and bandpass signals, optimum receivers, block and convolutional channel coding, adaptive equalization, encryption and decryption, and introduction to spread spectrum. Restricted to majors: EE, COMP ENGR, GRAD COMP ENGR. Prerequisite: EE 3384.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Major Restrictions:**

Restricted to majors of CEPH, EE, EECE

**Prerequisite(s):** (EE 3384 w/C or better)

**EE 5324. Stat Infer for Signal Analysis.**

Statistical Inference for Signal Analytics: Graduate-level introduction to the principles of statistical inference using probabilistic models in signal and information processing. The material in this course constitutes a common foundation for work in signal processing, statistical learning, pattern recognition, computer vision, control, and communication. Examples from these areas and current research trends will be discussed.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (EE 5300 w/B or better)

**EE 5325. Telemedicine & Imaging Informa.**

This course focuses on applications of point-of-care diagnostics for chronic disease management. It also introduces basic concepts in telemedicine. Students will gain the knowledge, understanding and practical preparation needed to implement a program to diagnose and treat patients in remote areas. Prerequisite: Department approval. Restricted to level of DR, GR.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**EE 5326. BME Dev Design & Regulation.**

This course introduces the regulatory requirements for the design, testing, and clinical implementation of medical devices and biologics. The first part covers the FDA regulatory process. The second part covers key legal and policy issues involved in a clinical organization: Health Insurance Portability and Accountability Act and Joint Commission on the Accreditation of Health Care Organizations rules on risk management, standards, regulations, compliance and ethics. Prerequisites: Department approval; MASE 6325 OR EE 6325 OR EE 5325 OR MME 5325 with a grade of C or better, may be taken concurrently. Restricted to level of DR, GR.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (MASE 6325 w/C or better ) OR (EE 6325 w/C or better ) OR (EE 5325 w/C or better ) OR (MME 5325 w/C or better)

**EE 5330. Data Communications.**

Data Communications (3-0) Study of modern telecommunication and data networks; packet and circuit switched networks; ATM; congestion control; mathematical modeling of networks; economics. Restricted to majors: EE, COMP ENGR, and GRAD COMP ENGR.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**EE 5333. Data Compression.**

The study of the theory and practice of modern lossless and lossy compression methods. Included will be an analysis of current international compression standards for speech, audio, and video, such as CELP, MP3, JPEG, and MPEG. This class has application in the area of communications, multimedia, and signal processing. Prerequisite: EE 3384, or equivalent, with a grade of "C" or better.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Major Restrictions:**

Restricted to majors of CS, EE

**Prerequisite(s):** (EE 3384 w/C or better)

**EE 5336. Adv Fiber Optic Communications.**

Advanced Fiber Optic Communications (3-0) In depth study of dispersion and attenuation in optical fibers, non-linear propagation effects, optical amplifiers, sources and detectors, wavelength division multiplexing, coherent systems, performance evaluation of fiber optic systems, and system design considerations. Restricted to majors: EE, COMP ENGR, and GRAD COMP ENGR.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Major Restrictions:**

Restricted to majors of CEPH, EE, EECE

**EE 5337. Computational Electromagnetics.**

Computational Electromagnetics A course covering many of the most popular methods used in modern computational electromagnetics. Methods include transfer matrix method, finite-difference, frequency-domain, finite-difference, time-domain, beam propagation method, plane wave expansion method, rigorous coupled-wave analysis, method of lines, slice absorption method, finite element method, and optimization. Prerequisites: MATH 2313, MATH 2326, EE 3321 or Departmental Approval.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (MATH 2313 w/C or better AND MATH 2326 w/C or better ) AND (EE 3321 w/C or better)

**EE 5341. Systems Engineering Fundamtl.**

Students will learn key concepts, processes, and key process activities to be carried out by systems engineers.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**EE 5342. Systems Engineering Mgmt.**

Students will learn techniques and tools for systems engineering management. Topics include technical management, organizational environments, and technical team structures, time and cost estimates and cost control, resource allocation and resource management. Students propose project studies, with the approval of the professor, to be developed in phases as the course progresses.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**EE 5343. Requirements Engineering.**

Methodologies, approaches, and techniques associated with requirements analysis and definition; process for defining requirements including feasibility study, requirements elicitation, formal specification, modeling, validation, verification, and documentation.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (EE 5341 w/C or better)

**EE 5344. Integratn, Verifictn, Validatn.**

Integration, verification, and validation (IV&V) process and the recommended activities at each of the different program phases. Includes verification planning, verification methods and validation methods during development, during launching and operations of the product/system; test bed requirements and unitary test, subsystem tests and integration test data collection analysis and systems requirement validation. Test reporting and modification of change request processes that need to be initiated.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (EE 5341 w/C or better)

**Corequisite(s):** EE5345

**EE 5345. Practicum in Elect & Comp Eng.**

Practicum in Electrical Engineering and Computer Engineering Internship experience in electrical or computer engineering under the supervision of an ECE faculty member and a technical supervisor. The practicum is designed to provide ECE students with the opportunity to integrate the knowledge and skills developed during their academic program in a structured, supervised, real world professional setting. Requires a project proposal approved by the faculty member before enrolling in the course and a final report.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**NaN Total Contact Hours**

0 Lab Hours

Lecture Hours

3 Other Hours

**Major Restrictions:**

Restricted to majors of EE, EECE, ELCE

**EE 5352. Med Diag & Therapct Instrmntn.**

EE 5352: Medical Diagnostic and Therapeutic Instrumentation (3-0) Principles, applications, and design of medical, diagnostic, therapeutic, clinical laboratory instrumentation and imaging systems used in modern hospitals and clinics. Integration of concepts and techniques from human physiology, electronics, digital signal processing, and systems engineering to analyze and design biomedical instruments. Electrical safety aspects in medical instrumentation and medical environment. Prerequisite: EE 4385 with a grade of "C" or better or departmental approval.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Major Restrictions:**

Restricted to majors of EE, EECE

**Prerequisite(s):** (EE 4385 w/C or better)

**EE 5353. Biomed Signal & Image Process.**

EE 5353: Biomedical Signal and Image Processing (3-0) Principles, methods, and algorithms for processing biomedical signals. Application of advanced DSP techniques to a number of problems in biomedical research and clinical medicine. Topics include biomedical data acquisition, filtering, feature extraction, modeling, and imaging, with examples from cardiology, neuro- physiology, muscular-physiology, and medical imaging. Prerequisite: EE 4383 with a grade of "C" or better or departmental approval.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Major Restrictions:**

Restricted to majors of EE, EECE

**Prerequisite(s):** (EE 4383 w/C or better)

**EE 5357. Biomechatronics.**

Biomechatronics is an interdisciplinary study of biology, neurosciences, mechanics, electronics and robotics. The study focuses on the interactivity of biological organs (including the brain) with electromechanical devices and systems. The course will cover topics including but not limited to the human muscle, skeleton, and nervous system, with the goals of assisting or enhancing human motor control that can be lost or impaired by disease, trauma, or other defects. Corequisite: Department approval.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**EE 5360. Computer Vision.**

Computer Vision (3-0) Fundamental concepts associated with the construction of meaningful descriptions of physical objects from images; including image segmentation, two-dimensional and three-dimensional representations, knowledge representation, matching and inference. Restricted to major: EE, COMP ENGR, and GRAD COMP ENGR. Prerequisite: Department approval.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Major Restrictions:**

Restricted to majors of CEPH, EE, EECE

**EE 5366. Fuzzy Logic & Engineering.**

EE 5366: Fuzzy Logic and Engineering Underlying philosophy of the theory of fuzzy sets and its applications in engineering. Fuzzy logic, fuzzy reasoning and rules, and fuzzy systems. Decision-making in the realm of vague qualitative and imprecise data. Current models, simulation tools, hardware implementations and their applications will also be covered. Prerequisite: Departmental approval.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Major Restrictions:**

Restricted to majors of EE

**EE 5369. CMOS Digital Circuit Design.**

EE 5369: CMOS Digital Circuit Design (3-0) Analysis and design of digital integrated circuits in CMOS technology. Discussion of different models for MOS transistors and how to use them to analyze circuit performance. Analysis of logic families and styles including complementary static logic, dynamic, and pass-transistor. Topics include sizing for minimum delay, noise and noise margin, power dissipation, and cost. A significant circuit design is assigned as a final project such as DRAM memory or Phase Lock Loop. Prerequisite: Departmental approval.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Major Restrictions:**

Restricted to majors of EE

**EE 5370. Operating Systems.**

Operating Systems (3-0) Fundamental concepts as they apply to multiprogrammed, multi-user operating systems within distributed computer systems. Topics include an overview of the kernel, file systems, process control and scheduling, interprocess communication, memory management, and I/O. The internal algorithms of a contemporary operating systems are examined. Restricted to major: EE, COMP ENGR, and GRAD COMP ENGR. Prerequisite: CS 4375 or EE 4374.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (CS 4375 w/C or better ) OR (EE 4374 w/C or better)

**EE 5371. Digital Signal Processing.**

Digital Signal Processing (3-0) A course emphasizing the theory behind the following: The Discrete Fourier Transform (DFT) and its role in the representation, analysis, and processing of periodic and finite-duration signals; Fast Fourier Transform (FFT) algorithms for efficient computation of the DFT; sample rate change and other basic multirate signal processing systems; FIR and IIR digital filter design procedures. Restricted to majors: EE, COMP ENGR, and GRAD COMP ENGR. Prerequisite: EE 4383 or department approval.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Major Restrictions:**

Restricted to majors of CEPH, EE, EECE

**Prerequisite(s):** (EE 4383 w/C or better)

**EE 5372. Image Processing.**

Image Processing (3-0) A course covering the following topics: point, algebraic, and geometric operations on digital images; two-dimensional digital filtering and Fourier transforms; image enhancement, segmentation, restoration, and compression techniques. Restricted to majors: EE, COMP ENGR, and GRAD COMP ENGR. Prerequisite: EE 5371 or department approval.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Major Restrictions:**

Restricted to majors of CEPH, EE, EECE

**Prerequisite(s):** (EE 5371 w/C or better)



**EE 5373. Intro to Remote Sensing Syst.**

Introduction to imaging principles and system performance parameters for optical systems used in multi/hyperspectral remote sensing. Study and evaluation of existing and proposed ground-based, airborne, and satellite remote sensing platforms. Introduction to the end-to-end information processing chain including algorithms, methodologies and tools for information extraction and management in multi/hyperspectral remote sensing. Discussion of research trends in the area.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**EE 5376. Computer Architecture I.**

Computer Architecture I (3-0) Processor Design, microprogramming, memory architecture including memory hierarchy, cache and virtual memory, and pipelines. An introduction to multiprocessor configurations. Restricted to majors: EE, COMP ENGR, and GRAD COMP ENGR. Prerequisites: EE 4342 and EE 3376 or equivalent.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Major Restrictions:**

Restricted to majors of CEPH, EE, EECE

**Prerequisite(s):** (EE 3376 w/C or better AND EE 4342 w/C or better)

**EE 5378. Advanced VLSI Design.**

Advanced VLSI Design (3-0) Important issues related to design of CAD tools for VLSI chip layout, testing and simulation. Topics include area-time optimization, floor-plan and functional block placement, routing and functional testing for large systems. Restricted to major: EE, COMP ENGR, and GRAD COMP ENGR. Prerequisite: EE 4375.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Major Restrictions:**

Restricted to majors of CEPH, EE, EECE

**Prerequisite(s):** (EE 4375 w/C or better)

**EE 5379. Network Protocols.**

Network Protocols (3-0) The theory and application of protocols such as TCP, IP, Sockets, and RPCs that are employed in computer network communications. Concentrates on network protocols that are employed from the network, transport, and process layers of the simplified 4-layer model for computer communications. Restricted to majors: EE, COMP ENGR, and GRAD COMP ENGR. Prerequisite: EE 5370 or department approval.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Major Restrictions:**

Restricted to majors of CEPH, EE, EECE

**Prerequisite(s):** (EE 5370 w/C or better)

**EE 5380. Energy Sustainability.**

This course will provide understanding of conventional and sustainable energy production and utilization that will serve as a foundation for Renewable Energy Systems in the context of the current energy infrastructure. In this course, the various alternative energy sources available, including renewable energy (hydroelectric, solar, wind, nuclear, biomass, and geothermal) will be analyzed. Each energy source's pros and cons based on our needs, availability, and environmental impact aspects will be discussed.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (EE 3385 w/C or better)

**EE 5381. Applied Photovoltaics.**

Applied Photovoltaics Semiconductors have emerged as the most promising material class of materials that can convert sunlight directly into electrical energy. This course presents the fundamental principles of the solar energy conversion process and the most common cell technologies are discussed. This course will also cover a range of fundamental problems and the relationship between the physics, material science, and technology aspects of solar cell development.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Major Restrictions:**

Restricted to majors of EE, EECE, ELCE

**EE 5383. Smart Grid Fundamentals.**

The aim of this course is to provide basic concepts and principles of Smart Grid. This course will provide the working definition, the functions, the design criteria and techniques and technology needed for building Smart Grid. The focus will be on the motivation for the Smart Grid development and analytical tools for Smart Grid design and developmental strategies based on various community constraints and energy needs.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (EE 3385 w/C or better)

**EE 5384. Control of Electric Power.**

The course introduces the students to Flexible AC Transmission Systems (FACTS), High Voltage Direct Current (HVDC) power transmission systems, and electric drives and applications.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (EE 3338 w/C or better AND EE 3385 w/C or better)

**EE 5386. High Frequency Power Converter.**

The course introduces the concept of high-frequency resonant switching converters, and the design, control, and applications of high frequency resonant switching converters.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (EE 3338 w/C or better AND EE 3385 w/C or better)

**EE 5388. Power System Operations.**

The course will provide a perspective on today's modern power system structure and train the students to look at technical issues of power system operations simultaneously with the economic aspects. Starting with a background sketch of the power industry and power system basics, this course will focus on topics related to power system deregulation, wholesale energy markets, power market structure and operations, power system economics, short-term planning issues, forecasting techniques in electric energy system including wind & solar energy issues as well as scheduling and risk management.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (EE 3385 w/C or better)

**EE 5389. Radar Signal Processing.**

Radar Signal Processing (3-0) Modern signal processing techniques for high range-resolution radar systems. One-and two-dimensional signals, high resolution radar, synthetic aperture radar, inverse synthetic aperture radar, radar tomography, ultrawideband radar. Restricted to major: EE, COMP ENGR, and GRAD COMP ENGR. Prerequisite: EE 4389.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Prerequisite(s):** (EE 4389 w/C or better)

**EE 5390. Special Topics Electrical Engr.**

Special Topics in Electrical Engineering (3-0) Advanced topics of contemporary interest in electrical or computer engineering. May be repeated for credit when topic varies. Restricted to majors: EE and EECE. Prerequisite: Instructor approval.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Major Restrictions:**

Restricted to majors of EE, EECE

**EE 5391. Individual Studies.**

Individual Studies (0-0-3) Individual variable-credit research, design or analysis on advanced phases of electrical or computer engineering problems conducted under the direct supervision of a faculty member. A maximum of three credit hours may be applied toward the MS degree. Restricted to majors: EE and EECE. Prerequisite: Permission of the Graduate Advisor.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours

**Major Restrictions:**

Restricted to majors of EE, EECE

**EE 5392. Research Methods.**

Techniques, tools, and skills needed to conduct, evaluate, document, and disseminate research in Electrical Engineering. Students will produce and defend a written research proposal in a specific area of interest. Corequisite: Department approval required.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**EE 5394. Graduate Research.**

Graduate Research (0-0-3) Individual variable credit research in electrical or computer engineering. Cannot be used to satisfy maximum degree requirements. Grade of P or F. Restricted to majors: EE and COMP ENGR. Prerequisite: Department approval and graduate standing.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours

**Major Restrictions:**

Restricted to majors of EE, EECE

**EE 5396. Graduate Projects.**

Graduate Projects (0-0-3) Individual research, design or analysis on advanced phases of electrical or computer engineering problems conducted under the direct supervision of a faculty member. Restricted to majors: EE and EECE. Prerequisite: Instructor approval. . .

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours

**EE 5397. Graduate Projects.**

Graduate Projects (0-0-3) Individual research, design or analysis on advanced phases of electrical or computer engineering problems conducted under the direct supervision of a faculty member. Prerequisites: EE 5396 and instructor approval. . .

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours

**Prerequisite(s):** (EE 5396 w/P or better)

**EE 5398. Thesis.**

Thesis (0-0-3)

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours

**EE 5399. Thesis.**

Thesis (0-0-3) Prerequisite: EE 5398.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours

**Prerequisite(s):** (EE 5398 w/P or better)

**EE 6194. Graduate Research.**

Individual variable credit research in electrical and computer engineering. Prerequisite: Doctoral standing and department approval.

**Department:** Electrical & Computer Eng.

**1 Credit Hour**

**1 Total Contact Hour**

0 Lab Hour

0 Lecture Hour

1 Other Hour

**EE 6195. Doctoral Seminar.**

Doctoral Seminar (1-0) Conferences and discussions of various topics in Electrical and Computer Engineering by faculty, graduate students, and speakers from industry and other institutions. Required once of all Doctoral students prior to graduation. Students are required to attend a certain number of University professionally related lectures, as specified by the instructor. Restricted to major: Grad COMP ENGR and Doctoral standing.

**Department:** Electrical & Computer Eng.

**1 Credit Hour**

**1 Total Contact Hour**

0 Lab Hour

1 Lecture Hour

0 Other Hour

**EE 6294. Graduate Research.**

Individual variable credit research in electrical and computer engineering. Prerequisite: Doctoral standing and Department approval.

**Department:** Electrical & Computer Eng.

**2 Credit Hours**

**2 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

2 Other Hours

**EE 6390. Special Topics.**

Special Topics (3-0) Advanced topics of contemporary interest in computer systems engineering. May be repeated twice for credit when topic varies.

Prerequisites: doctoral candidacy and department approval.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**Major Restrictions:**

Restricted to majors of CEPH

**EE 6391. Individual Studies.**

Individualized study projects in electrical engineering and/ or related areas under supervision of a member of the faculty. A maximum of three credit hours may be applied towards the Ph.D. degree.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours

**EE 6392. Research Methods.**

Techniques, tools, and skills needed to conduct, evaluate, document, and disseminate research in Electrical Engineering. Doctoral students will produce and defend a written research proposal in a specific area of interest. Corequisite: Department approval.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

3 Lecture Hours

0 Other Hours

**EE 6394. Graduate Research.**

Individual variable credit research in electrical and computer engineering. Prerequisite: Doctoral standing and department approval.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours

**EE 6398. Dissertation.**

Dissertation for doctoral students. Prerequisite: Doctoral standing and department approval.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours

**EE 6399. Dissertation.**

Dissertation for doctoral students. Prerequisite: Department approval.

**Department:** Electrical & Computer Eng.

**3 Credit Hours**

**3 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

3 Other Hours

**EE 6594. Graduate Research.**

Individual variable credit research in electrical and computer engineering. Prerequisites: Doctoral standing and department approval.

**Department:** Electrical & Computer Eng.

**5 Credit Hours**

**5 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

5 Other Hours

**EE 6694. Graduate Research.**

Individual variable credit research in electrical and computer engineering. Prerequisites: Doctoral standing and department approval.

**Department:** Electrical & Computer Eng.

**6 Credit Hours**

**6 Total Contact Hours**

0 Lab Hours

0 Lecture Hours

6 Other Hours