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 deposition, diffusion, and process integration.
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.
3 Credit Hours
3 Total Contact Hours
3 Lab Hours
0 Lecture Hours
0 Other Hours

Major Restrictions:
Restricted to majors of EE,EECE,ELCE

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.
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.
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 5194. Graduate Research.
Graduate Research (0-0-1) Individual variable credit research in electrical or computer engineering. Cannot be used to satisfy minimum degree requirements. Grade of P or F. Restricted to majors: EE, COMP ENGR.
1 Credit Hour
1 Total Contact Hour
0 Lab Hour
0 Lecture Hour
1 Other Hour

Major Restrictions:
Restricted to majors of EE,EECE
EE 5197. Medical Device Practicum.
The use of structured techniques for client needs identification will be taught. Student teams will follow a structured process for the concept generation design of a biomedical device. Students will consult experts, perform patent searches, and conduct competitive benchmarking as part of external searches for solutions.

1 Credit Hour
3 Total Contact Hour
0 Lab Hour
0 Lecture Hour
3 Other Hour

Prerequisite(s): (MASE 6192 w/C or better AND MASE 6327 w/C or better)

EE 5291. Individual Studies.
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 three credit hours may be applied towards the M.S. degree.

2 Credit Hours
2 Total Contact Hours
0 Lab Hours
0 Lecture Hours
2 Other Hours

EE 5294. Graduate Research.
Graduate Research (0-0-2) Individual variable credit research in electrical or computer engineering. Cannot be used to satisfy minimum degree requirements. Grade of P or F.

2 Credit Hours
2 Total Contact Hours
0 Lab Hours
0 Lecture Hours
2 Other Hours

Major Restrictions:
Restricted to majors of EE,EECE

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.

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 3484 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.

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.

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.

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.

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.

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.

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 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.
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 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.
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.
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 5321. BME for Global Health.
Graduate level course that provides an overview of the role of engineering technological advances to improve human health. The following points will be emphasized throughout the semester: What are the challenges in healthcare delivery in remote locations; How are we paying for healthcare delivery? What is the role of engineering to solve healthcare problems; and how do new healthcare technologies move from the lab to the bedside.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours

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, surfaces waves, and slow waves. Problems associated with interfacing CAD and MATLAB are also covered.
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
Prerequisite(s): (EE 5320 w/B or better)
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.

**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. Statistical Detection/Estimate.
Statistical Detection and Estimation (3-0) Application of statistical decision theory and estimation theory to problems of communication systems, including radar and sonar. Narrowband signals, gaussian derived processes, hypothesis testing, detection of signals, and estimation of signal parameters.

**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 5300 w/C 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.

**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.

**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.

**3 Credit Hours**
**3 Total Contact Hours**
0 Lab Hours
3 Lecture Hours
0 Other Hours
EE 5332. Coding and Error Correction.
Coding and Error Correction (3-0) Topics to be discussed: Galois Fields, channel capacity and coding, linear channel codes, convolutional codes, performance analysis of some well-known codes, a few decoding techniques, and modulation and coding trade-offs.

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.

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.

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.

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)

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

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.

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.

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.

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.

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 5351. Physiological Systms Measurmnts.
EE 5351: Physiological Systems and Measurements (3-0) A unified and systems approach of the functions of the human body. Origin and processing of biomedical signals to extract clinical information.

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

Prerequisite(s): (EE 4385 w/C or better)
EE 5352. Med Diag & Therapctc Instrmnt.
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.
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: 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.
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 5354. Tomographic Imaging.
EE 5354: Tomographic Imaging (3-0) Study of physical and mathematical principles used in tomography. Topics include mathematical model for tomography with non-diffracting as well as diffracting sources. Radon transform, Fourier transform, Hilbert transform. Algorithms for image reconstruction from projections, filtered back-projection algorithm, algebraic reconstruction algorithms. Problems associated with data acquisition in computed tomography such as finite beam width, aliasing artifacts, and noise.
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 5355. Contmp Topics in Bioelectmgnmt.
EE 5355: Contemporary Topics in Bioelectromagnetism (3-0) The laws and principles of electromagnetism as they relate to biology, followed by an in depth introduction to a specific applied area of biomedical research. Such areas may vary with the semester of offering and may include topics such as electrocardiography, magnetocardiography, encephalography, and tomography.
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 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.

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.

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.

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.

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.

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)
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.

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.

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.

3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours

EE 5374. Advanced Digital Syst Design I.
Advanced Digital System Design I (3-0) Modern logic design methodologies of large digital systems with standard SSI, MSI and LSI, including PLD's and microprocessors. Emphasis is placed on the use of multilevel digital simulation and hardware language description.

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 4342 w/C or better)

EE 5375. ASIC Design and Test.
Emphasis on the principles and techniques of testability design and testing of digital logic circuits, including test pattern generation and fault simulation.

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.

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 5377. Computer Architecture II.
Computer Architecture II (3-0) Advanced topics in computer architecture parallel and distributed processing.

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 5376 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.

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)

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.

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.

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.

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.

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.

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.

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)
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.

3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours

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

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.

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.

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.

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.

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.
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.
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.
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).
3 Credit Hours
3 Total Contact Hours
0 Lab Hours
0 Lecture Hours
3 Other Hours

EE 5399. Thesis.
Thesis (0-0-3).
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 5494. Graduate Research.
Graduate Research (0-0-4) Individual variable credit research in electrical or computer engineering. Cannot be used to satisfy minimum degree requirements. Grade of S or U.
4 Credit Hours
4 Total Contact Hours
0 Lab Hours
0 Lecture Hours
4 Other Hours

Major Restrictions:
Restricted to majors of EE,EECE
EE 5594. Graduate Research.
Graduate Research (0-0-5) Individual variable credit research in electrical or computer engineering. Cannot be used to satisfy minimum degree requirements. Grade of S or U.
5 Credit Hours
5 Total Contact Hours
0 Lab Hours
0 Lecture Hours
5 Other Hours

Major Restrictions:
Restricted to majors of EE, EECE

EE 5694. Graduate Research.
Graduate Research (0-0-6) Individual variable credit research in electrical engineering or computer engineering. Cannot be used to satisfy minimum degree requirements. Based on pass/fail grading mode.
6 Credit Hours
6 Total Contact Hours
0 Lab Hours
0 Lecture Hours
6 Other Hours

EE 6192. Clinical Rotations-Engineers.
This course facilitates the recognition of the importance of designing medical devices and biologics with 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.
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 6193. Doctoral Clinical Research.
The PhD. student is matched with a research clinician and will "shadow" the clinician throughout the course. The following activities are conducted: direct observation of procedures (diagnostic and interventional), development of Institutional Review Board protocols, clinical data analysis, and interaction with the company sponsoring a device/drug trial.
1 Credit Hour
3 Total Contact Hour
3 Lab Hour
0 Lecture Hour
0 Other Hour

Prerequisite(s): (BIOL 6305 w/C or better ) AND (DRSC 5495 w/C or better ) AND (MASE 6321 w/C or better)

EE 6194. Graduate Research.
Individual variable credit research in electronic and computer engineering.
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.

1 Credit Hour
1 Total Contact Hour
0 Lab Hour
1 Lecture Hour
0 Other Hour

EE 6197. Medical Device Practicum.
The use of structured techniques for client needs identification will be taught. Student teams will follow a structured process for the concept generation design of a biomedical device. Students will consult experts, perform patent searches, and conduct competitive benchmarking as part of external searches for solutions.

1 Credit Hour
3 Total Contact Hour
0 Lab Hour
0 Lecture Hour
3 Other Hour

Prerequisite(s): (MASE 6192 w/C or better AND MASE 6327 w/C or better)

EE 6294. Graduate Research.
Individual variable credit research in electronical and computer engineering.

2 Credit Hours
2 Total Contact Hours
0 Lab Hours
0 Lecture Hours
2 Other Hours

EE 6311. Semiconductor Device Physics.
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.

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 6313. 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.

3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours

Prerequisite(s): (EE 6311 w/C or better)

EE 6321. BME for Global Health.
Graduate level course that provides an overview of the role of engineering technological advances to improve human health. The following points will be emphasized throughout the semester: What are the challenges in healthcare delivery in remote locations; How are we paying for healthcare delivery? What is the role of engineering to solve healthcare problems; and how do new healthcare technologies move from the lab to the bedside.

3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours
EE 6325. 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.

3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours

EE 6326. 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: MASE 6325 OR EE 6325 OR EE 5325 OR MME 5325 w/C or better, may be taken concurrently. Department approval also required.

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 6351. Physiological Sys & Meas.
A unified and integrated approach to the functions of the human body from cellular to system level. Origin and processing of biomedical signals to extract clinical information.

3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours

EE 6352. Medical Diag & Therap Devices.
Principles, applications and design of medical, diagnostic, therapeutic, clinical laboratory instrumentation 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.

3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours

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

EE 6357. 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. This course involves the study of movements, movement coordination and muscle functioning in order to understand the basic requirements of various orthotic and prosthetic medical aids. The study of biomechatronics as an interdisciplinary course will take into account the biology, mechanical and the electrical aspects of the human body.

3 Credit Hours
3 Total Contact Hours
0 Lab Hours
3 Lecture Hours
0 Other Hours

Prerequisite(s): (EE 4385 w/C or better)
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.  
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.  
3 Credit Hours  
3 Total Contact Hours  
0 Lab Hours  
0 Lecture Hours  
3 Other Hours

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.  
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.  
3 Credit Hours  
3 Total Contact Hours  
0 Lab Hours  
0 Lecture Hours  
3 Other Hours

EE 6398. Dissertation.  
Dissertation for doctoral students.  
3 Credit Hours  
3 Total Contact Hours  
0 Lab Hours  
0 Lecture Hours  
3 Other Hours

EE 6399. Dissertation.  
Dissertation for doctoral students.  
3 Credit Hours  
3 Total Contact Hours  
0 Lab Hours  
0 Lecture Hours  
3 Other Hours

EE 6494. Graduate Research.  
Individual variable credit research in electrical and computer engineering.  
4 Credit Hours  
4 Total Contact Hours  
0 Lab Hours  
0 Lecture Hours  
4 Other Hours
EE 6594. Graduate Research.
Individual variable credit research in electrical and computer engineering.
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.
6 Credit Hours
6 Total Contact Hours
0 Lab Hours
0 Lecture Hours
6 Other Hours