Electrical Engineering Courses

EE 210 - Digital Circuits
Hours: 3
This course introduces theory and design of digital logic circuits, including number systems, Boolean algebra, logic gates, combinational and sequential circuit design and analysis, Karnaugh maps, truth tables, logic optimization, arithmetic circuits, flip-flops, counters, memory and storage, synchronous and asynchronous state machines, and introduction to programmable logic. The course has an associated Laboratory experiments set, which will require the use of simulation software (e.g. Multisim and PSpice) and hardware equipment. Prerequisites: PHYS 2426 with a minimum grade of C or concurrent enrollment or COSC 1436 with a minimum grade of C.

EE 220 - Circuit Theory I
Hours: 3
This course introduces the theory and principles of DC/AC circuit analysis. Topics include electrical circuit laws, network theorems, operational amplifiers, RLC networks, topology of electrical networks, sinusoidal steady-state analysis, AC power analysis, multiphase circuits, magnetically coupled circuits, transformer, and introduction to frequency domain analysis. The course has an associated Laboratory experiments set, which will require the use of simulation software (e.g. Multisim and PSpice) and hardware equipment. Prerequisites: MATH 2320 with a minimum grade of C, MATH 2414 with a minimum grade of C, PHYS 2426 with a minimum grade of C.

EE 309 - Circuit Theory II
Hours: 3
This course is the second of two courses that addresses DC and AC circuit analysis. The topics include AC circuit analysis techniques, AC power concepts, polyphaser circuits, magnetically coupled circuits, application of Laplace transform in circuit analysis, bod plots, passive filters, and two-port networks. The course has an associated Laboratory experiments set, which will require the use of simulation software (e.g. Multisim and PSpice) and hardware equipment. Prerequisites: EE 220 with a minimum grade of C.

EE 310 - Digital Systems /Embedded Control
Hours: 3
This course introduces the hardware and software architecture of the AVR Microcontrollers and its applications. It also includes embedded system types, programming the microcontroller in assembly and C, serial and parallel data transfer, interfacing I/O devices. Practical applications using Arduino and other devices will be developed through Lab exercises and course project design. Prerequisites: EE 210 Digital Circuits with a minimum grade of C.

EE 320 - Electronics I
Hours: 3
This course is the first of two courses in the use of electronic devices in analog and digital circuits. The course covers characteristics of semiconductor devices; diodes, bipolar junction transistors (BJT), and field-effect transistors (FET). This course also covers diode applications, AC and DC analysis for BJT, models for electronic devices and circuit, analysis of diode, transistor, and FET amplifier circuits. The course has an associated Laboratory experiments set, which will require the use of simulation software (e.g. Multisim and PSpice) and hardware equipment. Prerequisites: EE 220 with a minimum grade of C.

EE 321 - Electronics II
Hours: 3
This course is the second of two courses that cope with electronic devices in analog and digital circuits. The topics include FET biasing and FET amplifiers, frequency response analysis of BJT and FET, and the characteristics and applications of operational amplifiers (op amps). The course also discusses the design features and operation principles of power amplifiers, in addition to selected topics on linear digital integrated circuits as well as feedback and oscillator circuits. The course has an associated Laboratory experiments set, which will require the use of simulation software (e.g. Multisim and PSpice) and hardware equipment. Prerequisites: EE 320 with a minimum grade of C.

EE 330 - Continuous Signals and Systems
Hours: 3
This course presents the theoretical and practical aspects of analog communication systems. Includes the signal analysis using Fourier series and Fourier transform; spectral and time domain considerations related analog modulation techniques such as Amplitude Modulation (AM) and Frequency Modulation (FM). AM and FM demodulation, Pulse Code Modulation (PCM), effects of noise on communication system performance, and signal and noise modeling using probabilistic descriptions. The course has an associated Laboratory experiments set, which will require the use of simulation software (e.g. MATLAB, LABVIEW) and hardware equipment. Prerequisites:EE 309 with a minimum grade of C, and MATH 2320 with a minimum grade of C.

EE 340 - Electromagnetics
Hours: 3
The course presents the principles of electromagnetic (EM) fields and their propagation, power and energy contents, and their properties in guided and unguided structures. It aims to bridge between circuit theory and the EM fields through detailed treatment of guided structure, particularly transmission lines. The course introduces Maxwell's equations for the general case of time-varying and dynamic EM fields. Characterization of electrostatics, magnetostatics and dynamic fields and their associated laws and principles are discussed, and the electric and magnetic boundary conditions are also explained in detail. The course is supported by simulation software (e.g. MATLAB, LABVIEW). Prerequisites: PHYS 2426 with a minimum grade of C, MATH 2320 with a minimum grade of C, MATH 2415 with a minimum grade C, EE 309 with a minimum grade of C.

EE 430 - Discrete Signals & Systems
Hours: 3
This course presents the theoretical and practical aspects of digital communication systems. Advance Pulse Code Modulation(PCM), line coding, matched filter, inter-symbol interference (ISI), equalization, signal space representation and correlation receiver, digital modulation techniques (ASK, FSK, PSK, DPSK, QAM, and M-ary), effects of noise on digital communication system performance, introduction to error correction and detection codes. The material is complemented by Laboratory experiments that address digital communication system design and applications, which will require the use of simulation software tools (e.g. Matlab/Simulink, LabView) and hardware equipment. Prerequisites: EE 330 with a minimum grade of C.

EE 433 - Digital Signal Processing
Hours: 3
This course presents the fundamental concepts and techniques of digital signal processing (DSP). Time domain operations and techniques include difference equations and convolution summation. This course also covers Z transform methods, frequency- domain analysis of discrete-time signals and systems, discrete Fourier transform, and fast Fourier transform. FIR and IIR filter design techniques. This course emphasizes the frequency response of discrete-time systems and its relationship to analog systems. The course has an associated Laboratory experiments set, which will require the use of simulation software (e.g. MATLAB, LABVIEW) and hardware equipment. Prerequisites: EE 321 with a minimum grade of C, EE 330 with a minimum grade of C.

EE 435 - Control Systems
Hours: 3
This course teaches approaches to analyze and interpret dynamic engineering systems to implement proper feedback control methods that can achieve proper design performance. It covers various topics including transient response analysis and systems stability and damping. It also presents frequency and time domains techniques to analyze and design various dynamic control systems, such as root locus, frequency response analysis, and PID controllers, and state space representation and its applications. The material is complemented by Laboratory experiments that treat control systems for various applications using simulation software tools (e.g. Matlab/Simulink, LabView) and hardware equipment. Prerequisites: EE 321 with a minimum grade of C and EE 330 with a minimum grade of C.

EE 440 - Electric Machinery
Hours: 3
This course studies the design and the performance of electrical machines during the steady state and transients. The topics covered include the operational principles of direct current electrical machines, single phase and three phase circuits, voltage regulation, transformers, motors, and generators. This course also provides an introduction about electric power system. The course has an associated Laboratory experiments set, which will require the use of simulation software (e.g. MATLAB, LABVIEW) and hardware equipment. Prerequisites: EE 340 with a minimum grade of C, EE 321 Electronics II with a minimum grade of C.

EE 452 - Antenna Theory and Design
Hours: 3
This course presents an advanced material that specifically deals with time-varying electromagnetic (EM) waves and their transmission, propagation, and reflection in dielectric media, conducting media, and guided/unguided structures. The course presents the principles and applications of EM wave radiation and various antenna elements and antenna arrays. The course describes some practical applications of the covered topics, such as satellite systems, target detection, and radar. Prerequisites: EE 340 with a minimum grade of C.

EE 454 - Power Electronics
Hours: 3
The course presents the principles of design, analysis and control of solid-state power electronics devices. The covered topics include power computations, RLC transients, power semiconductor devices and switches. The course also addresses DC-DC converter topologies, buck converters, boost and buck/boost converters, and feedback control of DC-DC Converters. Moreover, it discusses voltage mode and current mode control, AC voltage controllers, DC power supplies, AC-DC rectification, PWM rectifiers, fly-back converters, DC-AC single phase inversion, and 3-phase inverters. The material is supported by experiments work using of simulation software (e.g. Matlab/Simulink, PSpice). Prerequisites: EE 321 with a minimum grade of C.

EE 456 - Internship
Hours: 3
The course is designed to develop field experience for Electrical Engineering students. The completion of this program is achieved through internship in industry and other field experience organizations approved by the Electrical Engineering program. The course is structured to help graduating seniors gain practical engineering experience in the real-world environment. Students will practice communication skills, engineering project management, critical thinking, and technical problem-solving methods to execute engineering projects in an industry standard. A technical written project report and final presentation are required at the end of internship. Prerequisites: Department Consent.

EE 470 - Senior Capstone Design Project I
Hours: 3
This course represents the first part of the senior engineering capstone design project. In this course, student will work in groups and will be engaged in a preliminary engineering design process including: design constraints, interaction with clients, identification of engineering problems, development of a design proposal, identification of design criteria, cost estimating, planning, and scheduling. Prerequisites: Senior Classification, EE Majors only. Course must be scheduled in the fall semester prior to the final spring semester before graduation and Instructor's consent.

EE 471 - Senior Capstone Design Project II
Hours: 3
This is the second part of the senior engineering capstone design project. This course requires completing the capstone senior design projects from concept through problem statement, project analysis, final design, prototype, technical report, project demo, and final oral presentation. Students will work in groups and apply the skills and knowledge they have acquired to demonstrate their mastery of the discipline through a successfully working porotype project. Prerequisites: Senior Classification, EE Majors only. Course must be scheduled the final spring semester of graduation and Instructor's consent.

EE 489 - Independent Study
Hours: 1-3
This course aims to give students the opportunity to pursue a specialized topic in their chosen field of study. The course can be in form of directed study, research problems, special problems or special projects. The faculty advisor and students meet to agree on the details of the study plans. After an approved area of study has been selected, weekly meetings with the course adviser are required. A final written report and oral presentation are required at the end of the term.

EE 490 - Honors Thesis
Hours: 3
Individualized instruction/research at an advanced level in a specialized content area under the direction of a faculty member

EE 491 - H Honors Readings
Hours: 3
Individualized instruction/research at an advanced level in a specialized content area under the direction of a faculty member

EE 497 - Special Topics
Hours: 3
This course allows for studying emerging topics in electrical engineering that are not present in the curriculum. Topics of mutual interest to faculty and students can be explored with the approval of the department chairperson. This is an organized course and must contain regular schedule, student course work, and regular classroom meetings. The course may be associated with Laboratory work. It may be repeated when topic varies.