ENGINEERING, ELECTRICAL (ENEE)

ENEE 2012 Circuits I and Laboratory (4 Credits)
An introduction to electrical circuit analysis, design and evaluation. Emphasis on definitions of basic variables, passive circuit components and the ideal operational ampliphier. DC analysis of circuits and d circuit theorems are stressed. AC signals are introduced. Computer analysis software integrated throughout the course. Cross-listed with PHYS 2011. Prerequisites: PHYS 1213 or PHYS 1214, MATH 1953.

ENEE 2022 Circuits II (4 Credits)
AC analysis of linear circuits to include circuit theorems via classical and transform techniques. Emphasis is placed on the Laplace transform, including use of pole-zero and Bode diagrams to analyze and design circuits, including multiple filters (single pole cascade, Butterworth, Chebychev), and step response circuits. Phasor applications to sinusoidal steady state analysis and AC power. Computer analysis software is used as an aid to circuit analysis. Laboratory program practicing time and frequency domain analysis and design techniques on step response and filter problems. Applications to instrumentation and circuits. Prerequisites: ENEE 2012, MATH 2070.

ENEE 2211 Electronics (4 Credits)
Circuit behavior of semiconductor devices. Bipolar and field-effect transistors and their models; basic physical explanation of the functioning of these devices; large- and small-signal analysis of practical circuits; electronic design using both hand and computer methods of calculation and design; biasing methods for amplifier circuits; power supplies and current-source circuits. Design laboratory. Prerequisites: ENEE 2022.

ENEE 2223 Advanced Electronics (4 Credits)
High-frequency transistor models and determination of parameters; Laplace and Fourier analyses of common amplifier circuits; design and analysis of broad-band amplifiers and multistage amplifiers. Basis feedback topologies; Nyquist, root-locus and Bode plot investigations of stability; introduction to amplifier noise; active filter design; sinusoidal oscillators. Prerequisite: ENEE 2211.

ENEE 2611 Engineering Electromagnetics (4 Credits)
The study of Maxwell's equations and their experimental and theoretical foundations. Topics include Static electromagnetic fields, time-varying electromagnetic fields, wave propagation, transmission lines, and antennas. Prerequisites: PHYS 1213 or PHYS 1214. Corequisite: ENGR 3611 or ENGR 3621.

ENEE 3011 Physical Electronics (4 Credits)
The basic physical concepts of electronics, electrons and holes in semiconductors, transport and optical processes. Concentration on device concepts, including material synthesis and device processing, P-N junction diodes, junctions with other materials, bipolar transistors, field effect transistors (JFET, MESFET, MOSFET) and optoelectronic effect transistors (JFET, MESFET, MOSFET) and optoelectronic devices (lasers, detectors). Prerequisites: CHEM 1010 or CHEM 1610, PHYS 1213 or PHYS 1214 or permission of instructor.

ENEE 3030 Optoelectronics (4 Credits)
The active and passive optical elements. Includes principles of light, optical sources (LED, LASER, Fiber Laser), optical fibers, photodetectors (APD, PIN, MSM) and practical optical transmitter and receivers. Laboratory. Cross listed with ENEE 4030. Prerequisite: ENEE 3011 or ENEE 2211 or permission of instructor.

ENEE 3035 Photonics (4 Credits)
Theory and techniques for the application of the optical electromagnetic spectrum from infrared to ultraviolet to engineering problems in communications, instrumentation and measurement. May include lasers, optical signal processing, holography, nonlinear optics, optical fiber communications, optical behavior of semiconductors, and similar topics in modern optics, depending on the interests and requirements of the students. Cross-listed with ENEE 4800. Prerequisite: ENEE 2611 or instructor's permission.

ENEE 3111 Signals & Systems (4 Credits)
Introduces continuous time and discrete time linear system analysis, Fourier series, Fourier transforms and Laplace transforms. Specific engineering tools for discrete time linear system analysis include discrete time convolution, Z-transform techniques, discrete Fourier transform and fast Fourier transform (DFT/FFT), and the design and analysis of analog and digital filters for real-world signal processing applications. Graduate students may have additional class requirements. Prerequisites: ENEE 2022, MATH 2070.

ENEE 3130 Principles of Communication Systems (3 Credits)
Introduction to the theory and analysis of communication systems. Emphasis on analog systems; application of probability and statistics, modulations and demodulations; noise and signal-to-noise ratio analysis; the measure of information, channel capacity, coding and design factors. Prerequisites: ENEE 3111, ENGR 3611 or permission of instructor.

ENEE 3141 Digital Communications (3 Credits)
Introductory course on modern digital communication systems. The basic communication system theory, probability and random processes, baseband digital data transmission, coherent and non-coherent digital modulation techniques and analysis of bit error probability. Bandwidth efficiency and transmission of digital data through band-limited channels. Prerequisites: ENEE 3111, ENGR 3611 or permission of instructor.

ENEE 3620 Optical Fiber Communications (4 Credits)
A comprehensive treatment of the theory and behavior of basic constituents, such as optical fibers, light sources, photodetectors, connecting and coupling devices, and optical amplifiers. The basic design principles of digital and analog optical fiber transmission links. The operating principles of wavelength-division multiplexing (WDM) and the components needed for its realization. Descriptions of the architectures and performance characteristics of complex optical networks for connecting users with a wide range of transmission needs (SONET/SDH). Discussions of advanced optical communication techniques, such as soliton transmission, optical code-division multiplexing (optical CDMA) and ultra-fast optical time-division multiplexing (OTDM). Laboratory. Cross listed with ENEE 4620. Prerequisite: ENEE 3030 or permission of instructor.

ENEE 3641 Introduction to Electromagnetic Compatibility (4 Credits)
The study of the design of electronic systems so that they operate compatibly with other electronic systems and also comply with various governmental regulations on radiated and conducted emissions. Topics may include Electromagnetic Compatibility (EMC) requirements for electronic systems; non-ideal behavior of components; radiated emissions and susceptibility; conducted emissions and susceptibility; shielding and system design for EMC. Cross listed with ENEE 4640. Prerequisites: ENEE 2611 and ENEE 2223.

ENEE 3670 Introduction to Digital Signal Processing (4 Credits)
Introduction to the theory and applications of Digital Signal Processing. Special attention is paid to the fast Fourier transform and convolution and to the design and implementation of both FIR and IIR digital filters. Prerequisite: ENEE 3111.

ENEE 3810 Topics Electrical Engineering (1-5 Credits)
Various topics in electrical engineering as announced. May be taken more than once. Prerequisite: varies with offering.

ENEE 3991 Independent Study (1-5 Credits)
Topics in electrical engineering investigated under faculty supervision. May be taken more than once. Students must obtain and complete an Independent Study form from the Office of the Registrar. Prerequisite: permission of instructor.