Electrical Engineering Online

**EEO 231 Introduction to Semiconductor Devices**
The principles of semiconductor devices. Energy bands, transport properties and generation recombination phenomena in bulk semiconductors are covered first, followed by junctions between semiconductors and metal-semiconductor. The principles of operation of diodes, transistors, light detectors, and light emitting devices based on an understanding of the character of physical phenomena in semiconductors. Provides background for subsequent courses in electronics.

**Prerequisites:** AMS 361 or MAT 303; PHY 127 or 132/134 or 142

**3 credits**

**EEO 301 Signals and Systems**
Provides an introduction to continuous-time and discrete-time signals and linear systems. Topics covered include time-domain descriptions (differential and difference equations, convolution) and frequency-domain descriptions (Fourier series and transforms, transfer function, frequency response, Z transforms, and Laplace transforms).

**Prerequisites:** Differential Equations and Circuits I

**3 credits**

**EEO 306 Random Signals and Systems**
Random experiments and events; random variables, probability distribution and density functions, continuous and discrete random processes; Binomial, Bernoulli, Poisson, and Gaussian processes; system reliability; Markov chains; elements of queueing theory; detection of signals in noise; estimation of signal parameters; properties and application of auto-correlation and cross-correlation functions; power spectral density; response of linear systems to random inputs.

**Prerequisite:** ESE 305

**3 credits**

**EEO 311 Electronics Circuits II**
Diffrential and multistage amplifiers with bipolar junction transistors (BJT) and field-effect transistors (FET). Biasing in integrated circuits and active loads. Frequency response of common-emitter (common-source), common-base (common-gate), common-collector, and common-drain single BJT (FET) stages. Frequency response of differential-pair, cascode, and multistage circuits. Selection of coupling and by pass capacitors. Analog integrated circuits. Metal-Oxide-Semiconductor (MOS) digital circuits with emphasis on CMOS, LEC/LAB

**Prerequisite:** Electronics Circuits I

**3 credits**

**EEO 315 Electronics Circuits I**
Introduction to electronics, concentrating on the fundamental devices (diode, transistor, operational amplifier, logic gate) and their basic applications; modeling techniques; elementary circuit design based on devices.

**Prerequisite:** Circuits and Digital Logic

**3 credits**

**EEO 323 Electromagnetics**
Fundamentals of electromagnetic fields, Maxwell's Equations, plane waves, reflections. Application to transmission lines, propagation, electromagnetic sensors and transducers. **Prerequisite:** Courses in circuits, signals, and vector calculus

**Prerequisite:** Calculus III, Physics I and II, Circuits I

**3 credits**

**EEO 340 Nanotechnology, Engineering and Science**
The course is targeted at undergraduate students on their early stage of education. Through the examples, exercises, and educational Java applets the course will cover electromagnetic waves and quantum mechanics including the quantum-mechanical origin of the electrical and optical properties of materials and nanostructures, chemically-directed assembly of nanostructures, biomolecules, traditional and nontraditional methods of nanolithography, interactions between electronic and optical properties, as well as the forefront topics such as organic heterostructures, nanotubes, and quantum computing.

**Prerequisites:** Physics I, II, Calculus III

**3 credits**

**EEO 352 Electronics Laboratory I**
Electronics Laboratory I provides students with a hardware-based learning environment for hands-on experimentation with computer-based instrumentation and the construction, diagnosis, characterization of a variety of analog and digital electronic circuits. Devices used include resistors, capacitors, diodes, SCR, MOSFET, BJT, opamp, and digital ICs. Students also practice how to communicate effectively through writing reports.

**Prerequisite:** Circuits I

**3 credits**

**EEO 353 Electronics Laboratory II**
Electronics Laboratory II provides students with an advanced hardware-based learning environment for hands-on experimentation with computer-based instrumentation and the construction, diagnosis, characterization of a variety of analog and digital electronic circuits. Devices used include resistors, capacitors, diodes, SCR, MOSFET, BJT, opamp, and digital ICs. Students also practice how to communicate effectively through writing reports.

**Prerequisite:** Circuits, Electronics Laboratory I

**3 credits**

**EEO 363 Fiber Optic Communications**
Design of single and multi-wavelength fiber optic communications systems. Topics include analysis of optical fibers, optical transmitters and receiver design, optical link design, single-wavelength fiber optic networks with analysis of FDDI and SONET/SDH, and wavelength division multiplexing.

**Prerequisite:** ESE 372

**3 credits**

**EEO 401 RF Microwave Circuits**
This course introduces the concepts of impedance matching in radio frequency (RF) circuits, Sparameters and S-matrix, and Smith Chart. Also, it deals with the theory and principle of various RF components such as transmission lines, waveguides, couplers, and resonators. Students learn how to design and analyze those components using analytical formulas and numerical simulation tools.

**Prerequisite:** Circuits I

**3 credits**

**EEO 415 Intro to Microelectromechanical Systems**
This course is designed as an elective for senior students. Silicon-based integrated MEMS promise reliable performance, miniaturization and low-cost production of sensors and actuator systems with broad applications in data storage, biomedical systems, inertial navigation, micromanipulation, optical display and microfluid jet systems. The course covers such subjects as materials properties, fabrication techniques, basic structure mechanics, sensing and actuation principles, circuit and system issues, packaging, calibration and testing.

**3 credits**

**EEO 425 Electrical Devices**
This class is a survey of energy conversion and electrical machine systems, with the foundation being in machines and related topics. Topics include but are not limited to magnetic circuits, per unit analysis, and ac and dc machines, including both motors and generators.