

# ENGINEERING, ELECTRICAL (ENEE)

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## **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 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. Prerequisites: ENEE 2012, MATH 2070.

## **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 3111, 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 4030 Optoelectronics (4 Credits)**

Optical fibers: structures, waveguiding, and fabrication; attenuation and dispersion; optical sources (LED, LASER, Fiber laser); power launching and coupling; photodetectors (APD, PIN, MSM); and practical optical transmitter and receivers. Cross listed with ENEE 3030.

## **ENEE 4141 Digital Communications (4 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.

## **ENEE 4620 Adv Optical Fiber Comm (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 who have 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). Advanced Project. Cross listed with ENEE 3620. Prerequisite: instructor permission.

## **ENEE 4630 Optical Networking (4 Credits)**

This course provides a technical overview of optical networking. It gives students a solid understanding of optical networking field principles and practice. Underlying principles are reviewed along with common optical solutions and practices. It explains and provides practical tips on how to design and implement Networks. Examples are used to demonstrate key concepts of ATM, SONET/SDH and DWDM implementation. Prerequisite: ENEE 3011 or instructor approval.

## **ENEE 4640 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. Final Project. Cross listed with ENEE 3641.

**ENEE 4800 Advanced Topics (EE) (1-5 Credits)**

Various advanced topics in electrical engineering as announced. May be taken more than once. Cross-listed with ENEE 3035.

**ENEE 4950 ECE Graduate Assessment (0 Credits)**

This class does not meet. All graduate (MS and PhD) ECE students will enroll in this class during their last quarter. All required assessment materials will be uploaded online in Canvas Assignments to meet the course requirements. Students will receive Canvas course announcements and or emails from the instructor notifying the students of what are required to be uploaded. The purpose is to collect data for the assessment and continuous improvement of the graduate programs.

**ENEE 4991 Independent Study (1-10 Credits)**

**ENEE 4995 Independent Research (1-16 Credits)**

**ENEE 6991 Ph.D Independent Study (1-10 Credits)**

**ENEE 6995 Independent Research (1-16 Credits)**