

## **ENGINEERING COURSES**

### **ENGR 130 INTRODUCTION TO ENGINEERING**

This course introduces engineering to engineering and physics students. It covers engineering ethics, teamwork, communication skills, and problem-solving Skills. This course covers quantitative topics including fundamental units and conversions, basic statistics, graphical analysis of data, and computing using Excel and MATLAB. Prerequisite: None.

### **ENGR 321 ENGINEERING PROFESSIONAL DEVELOPMENT (DESIGNATED SERVICE-LEARNING COURSE)**

This course will cover skills necessary to successfully navigate the job market or pursue advanced studies. Topics include the importance of professional licensure and certification, strategies for selecting graduate school and managing the application process, interviewing etiquette, professional development timelines, engineering ethics, and social responsibility. Prerequisite: STEM 221 or Permission of Instructor.

### **ENGR 331 ENGINEERING ECONOMICS**

Students will learn the fundamentals of economics related to engineering decision making. Concepts to be covered include manpower, resource, equipment and process selection, costs, cost/benefit analyses, project risk and uncertainty, replacement decisions, and making economic comparisons that include current and projected revenue costs. This course will focus heavily on calculation-based analyses that will include capital costs, revenue, taxes, appreciation, depreciation, replacement costs, one-time costs, recurring costs, and project scheduling. Prerequisite: Junior or Senior Status.

## **ELECTRICAL AND COMPUTER ENGINEERING COURSES**

### **EE 231 CIRCUITS I.**

Linear circuit analysis and design course. Topics include fundamental concepts of charge, current, voltage and power; passive and active circuit elements, phasers and impedances; mesh and nodal analysis; Thevenin's and Norton's Theorems; source transformations, and AC power calculations. Prerequisite: MATH 143.

### **EE 211L CIRCUITS I LAB**

Students will use equipment such as oscilloscope, function generator, digital meter, and power supply to measure AC and DC voltages and currents in circuits designed with resistors, capacitors and inductors. They also use Multisim to implement and verify the design of circuits containing resistors, capacitors and inductors and make comparison between analytical and measurement results and justify discrepancies between theory and measurements. Co-requisite: EE 231.

### **EE 232 CIRCUITS II**

A continuation of Circuit Analysis I. Additional topics; Transient Response for RL, RC, and RLC circuits, Laplace Transforms and Circuit Theory, Passive and Active Filter Types, Operational Amplifiers, and Fourier Series Analysis. Prerequisite: EE 231.

### **EE 212L CIRCUITS II LAB**

Students will use equipment such as oscilloscope, function generator, digital multimeter, and power supply to measure frequency response and transient analysis in circuits designed with resistors, capacitors, and inductors. They also use Multisim to implement and verify the frequency response and transient analysis in circuits designed with resistors, capacitors and inductors and make comparison between analytical and measurement results and justify discrepancies between theory and measurements. Co-requisite: EE 232.

### **EE 233 ELECTRONICS I**

Intro to solid state devices: the p-type and the n-type junctions; Diodes and applications; BJT Biasing and small signal analysis; BJT amplification; CMOS Biasing and small signal analysis, CMOS amplification; Switching circuits using Diodes, BJT, and CMOS circuits. Prerequisites: MATH 143; EE 231.

**EE 213L ELECTRONICS I LAB**

Students will use equipment such as oscilloscope, function generator, digital multimeter, and power supply to measure voltages and currents in circuits designed using diodes, BJT, and JFET devices. They will use Multisim to implement and verify the design of electronic circuits containing diode, BJT and JFET devices and make comparison between analytical and measurement results and justify discrepancies between theory and measurements. Co-requisite: EE 233.

**EE 330 SYSTEMS AND SIGNALS**

Analysis of linear systems: classical and modern; Systems and differential equations; Fourier series and transform; Laplace transform and its applications; transfer functions and impulse response; Introduction to analogue filter design. Prerequisites: MATH 144; EE 232.

**EE 331 INSTRUMENTATIONS AND MEASUREMENTS**

In this course students will be introduced to the International Systems of Units (SI) and use appropriate measurement method and instrument in collecting data. They will also use basic instrumentation equipment such as oscilloscope, function generator, digital multimeter, power supply, and computer – based data acquisition software, to acquire data for further computer processing. Basic operations of instrumentation sensors will be covered. Prerequisite: EE 334

**EE 332 DIGITAL SIGNAL PROCESSING  
(DESIGNATED SERVICE-LEARNING COURSE)**

Discrete-time systems; Difference equations; Z-transform; Discrete time Fourier transform; and discrete Fourier transform; Frequency spectrum and sampling theorem. Digital filter design; Realization and implementation of Digital filters; Discrete - time systems; design of digital filters; Introduction to random signals and power spectral estimation. Prerequisite: EE 330.

**EE 333 ELECTROMAGNETICS**

Basic concepts of electrostatics and magneto static; boundary conditions for dielectric and magnetic materials; Poisson's and Laplace's equations; time-varying fields and Maxwell equations; plane wave propagation in Free space; dielectrics and conductors; transmission lines. Prerequisite: PHYS 244. Corequisite: MATH 241.

**EE 334 ELECTRONICS II**

Theory and Application of linear integrated circuits. Topics include ideal and real operational amplifiers, Frequency response and compensation, active filters, comparators, and wave for generators. Prerequisite: EE 233.

**EE 314L ELECTRONICS II LAB**

Students will use equipment such as oscilloscope, function generator, digital multimeter, and power supply to measure AC and DC voltages and currents in amplifier circuits designed with BJT, and JFET transistors. They will use Multisim to implement and verify the design of electronic circuits containing the BJT, and JFET transistors and make comparison between analytical and measurement results and justify discrepancies between theory and measurements. Co-requisite: EE 334.

**EE 427 SENIOR DESIGN PROJECT I  
(DESIGNATED SERVICE-LEARNING COURSE)**

Planning, design, construction and/or management of an engineering project that handles contemporary engineering problems under the supervision of one or more faculty members. The course allows the student to apply the knowledge attained from the various courses of the undergraduate program to prepare the proper approach of solution to his or her project problem. One lecture per week. Prerequisite: Graduating Senior.

**EE 428 SENIOR DESIGN PROJECT II  
(DESIGNATED SERVICE-LEARNING COURSE)**

Continuation of EE 427. Students are expected to complete their chosen design project. It is required that the student submit a well written report and to defend his or her project in front of faculty and students. Two lectures per week. Prerequisite: EE 427.

**EE 431 COMMUNICATION SYSTEMS  
(DESIGNATED SERVICE-LEARNING COURSE)**

Spectral analysis and signal transmission channel design; amplitude, Frequency, phase, and pulse modulation systems; Frequency - division and time - division multiplexes systems; digital communication; noise and its effects in modulation systems. Prerequisite: EE 330.

**EE 433 ELECTRIC ENERGY AND POWER SYSTEMS**

Mechanical and Electromagnetic Fundamentals; Three-Phase circuits; transformers; AC machinery fundamentals, synchronous machines, parallel operation of synchronous generators; induction motors, DC motors; transmission lines; power system representation and equations; introduction to power-flow studies; Symmetrical Faults, Unsymmetrical faults and computer- based projects will be assigned. Prerequisite: EE 333.

**EE 434 CONTROL SYSTEMS  
(DESIGNATED SERVICE-LEARNING COURSE)**

Control system analysis and design: classical and modern; transfer functions, state-space techniques; time domain analysis and design; Frequency domain analysis and design; stability analysis; prototyping. Prerequisite: EE 330.

**EE 435 APPLIED ELECTROMAGNETICS**

Electromagnetic theory applied to problems in the areas of waveguides, radiation, electro-optics and electromagnetic interference and electromagnetic compatibility. This course introduces transmission lines and their application, plane wave propagation, satellite communication systems and radar sensors. Prerequisite: EE 333.

**EE 439 SPECIAL TOPICS IN ELECTRICAL ENGINEERING**

The course covers advanced topics in systems and signals, communication systems and digital signal processing. Prerequisite: Graduating Senior.

**CE 231 DIGITAL CIRCUITS  
(DESIGNATED SERVICE-LEARNING COURSE)**

Basic concepts of the binary system; logic gates; combinational and sequential logic design and analysis. Students will be introduced to the design using Spice and Hardware. Prerequisite: MATH 138.

**CE 211L DIGITAL CIRCUITS LAB**

Students will use Digital Circuit Design Trainers with combinational and sequential digital logic integrated components to design and test logic circuits. They will also use Multisim with combinational and sequential digital logic integrated components to design and test logic circuits and make comparison between analytical and measurement results and justify discrepancies between theory and measurements. Co-requisite: CE 231.

**CE 332 EMBEDDED SYSTEMS  
(DESIGNATED SERVICE-LEARNING COURSE)**

Microprocessor architecture, instruction set and operation; assemblers and assembly language programming; write, assemble, link, execute, and debug programs running on a single board microcomputer; interface the single board microcomputer to a variety of peripheral devices using serial and parallel communications; interrupt control; measure the execution times of programs running on a single board microcomputer. Prerequisite: CE 231.

**CE 427 SENIOR DESIGN PROJECT I  
(DESIGNATED SERVICE-LEARNING COURSE)**

Planning, design, construction and/or management of an engineering project that handles contemporary engineering problems under the supervision of one or more faculty members. The course allows the student to apply the knowledge attained from the various courses of the undergraduate program to prepare the proper approach of solution to his or her project problem. One lecture per week. Prerequisite: Graduating Senior.

**CE 428 SENIOR DESIGN PROJECT II  
(DESIGNATED SERVICE-LEARNING COURSE)**

Continuation of CE 427. Students are expected to complete their chosen design project. It is required that the student submit a well written report and defend his or her project in front of faculty and students. Two lectures per week. Prerequisite: CE 427.

**CE 436 VLSI SYSTEM DESIGN  
(DESIGNATED SERVICE-LEARNING COURSE)**

This course focuses on the design and synthesis of Very Large Scale Integrated (VLSI) chips using CMOS technology for complex digital systems using integrated circuit cells as building blocks and employing hierarchical design methods. Commercial design software will be used for laboratory exercises. An overview of VLSI computer-aided design (CAD) tools and theoretical concepts in VLSI architectures and algorithms will also be discussed. Prerequisites: EE 233; CSC 337.

**CE 439 SPECIAL TOPICS IN COMPUTER ENGINEERING**

Course covers advanced topics in embedded systems and VLSI system design. Prerequisite: Graduating Senior.