ELECTRICAL ENGINEERING (ECE)

ECE 101 Introduction to Electrical and Computer Engineering (2 Hours)
This course gives first year students a survey of the field of the electrical and computer engineering. It describes the different subareas within the electrical and computer engineering field and the analytical tools that will be utilized throughout the curriculum. The course discusses the curriculum, the available technical electives, and professional careers for ECE students.

ECE 212 DIGITAL LOGIC (3 Hours)
Prerequisite: MATH 111 or equivalent.
This is an introductory course to digital design. Topics include Digital Systems and Binary numbers. Boolean Algebra and Logic Gates, Gate-Level Minimization, Combinational Logic circuits and Synchronous Sequential Logic circuits.

ECE 220 CIRCUIT THEORY (3 Hours)
Prerequisite: PHY 211, Co-requisite: MATH 242.
This course introduces introduction to theory, analysis and design of electric circuits. Voltage, current, power, energy, resistance, capacitance, inductance. Ohm's law, Kirchhoff's laws, nodal and mesh analysis. The venin's and Northon's theorem, Superposition, operational amplifier, steady state in RCL circuits and transient analysis in RL and RC circuits.

ECE 252 ENGINEERING ANALYSIS (3 Hours)
Prerequisite: MATH 241.
This course introduces the principles and applications of engineering mathematics, differentiation of functions with multiple variables, coordinate systems, vectors and linear algebra, matrix inversion, complex variable theory, differenital equations.

ECE 312 COMPUTER ORGANIZATION & DESIGN (3 Hours)
Prerequisite: ECE 212, ECEL 212 and CSC 118.
This course provides an overview of digital logic design. It covers modeling and simulation of basic digital systems using a hardware desciprtive language. Topics include behavioral, data flow, and structural modeling.

ECE 315 SYNTHESIS WITH HARDWARE DL (3 Hours)
Prerequisite: ECE 212, ECEL 212, CSC 119 and CSCL 119.
This course provides an overview of digital logic design. It covers modeling and stimulation of basic digital systems using a hardware descriptive language. Topics include behavioral behavioral, data flow, and structural modeling.

ECE 320 CIRCUIT THEORY II (3 Hours)
Prerequisite: ECE 220, ECE 252 and MATH 368.
This course is a continuation of ECE 220 Circuit Theory I, covering phasor analysis, steady state power, complex network functionsk frequency response, and transformers.

ECE 330 ELECTRONICS (3 Hours)
Prerequisite: ECE 220 and ECE 252.
This course introduces fundamental concepts to electronics. Topiccs include diode, BJT, and FET circuits. It covers frequency response, biasing, current sources and mirrors, small-signed analysis, and design of operational amplifiers.

ECE 331 ELECTRONICS II (3 Hours)
Prerequisite: ECE, 330, ECEL 330 and ECE 320.
This course is a continuation of ECE 330 whihc focusing on characteristics and applications of both linear and digital integrated circuits; amplifiers, feedback analysis, frequency response, oscillators, amplifier stabilization, microprocessors, memory systems, and emphasis is on design.

ECE 335 SEMICONDUCTOR DEVICES (3 Hours)
Pre-requisites: PHY 212, PHYL 212 and MATH 368. This course applies the fundamentals of semiconductor physics to the understanding of electronic devices. Energy band models, electron and hole concentrations and transplat, p-n junctions, bipolar junction transistors, field effect devices, technology, scaling, and nanotechnology.

ECE 345 ELECTROMAGNETIC FIELDS (3 Hours)
Pre-requisites: ECE 220, PHY 212, MATH 368 and MATH 244. This course introduces fundamental cconcepts to electromagnetics. Concepts include Waves and phasors, Transmission lines, vector analysis, electrostatics and magnetostatics. Topics cover gradient, divergence, curl, laplacian, field intensity, charge and current distribution, Coulomb's law, Guess's law, electric and magnetic potential, conductors, dielectrics, capacitors, magnetic force and torques, Biot Savart law, and electric and magnetic boundary conditions.

ECE 351 SIGNALS AND SYSTEMS (3 Hours)
Pre-requisites: ECE 220, ECE 252 and MATH 368. This course introduces theoretical analysis of continuous-time signals and systems. Topics include time domain analysis using convolution integral, S-domain analysis using Laplace transform, real frequency domain analysis using Fourier series and Fourier transform, and relationship between time domain and frequency domain description. Topics also include brief introduction of the application of signals and systems in filter design, communications and control systems.

ECE 355 CONTROL SYSTEMS (3 Hours)
Pre-requisite: ECE 351. This course introduces fundamental principles of classical feedback control. Topics include using Laplace transform and partial fraction to solve linear ordinary differential equations, impulse response, transfer function, block diagram, signal flow graph and grain formula, state diagram and state variable analysis of linear systems, modeling of physical systems, analysis of stability of linear control systems, time-domain analysis of control systems and root-locus technique.

ECE 360 EMBEDDED MICROPROCESSOR SYSTEM (3 Hours)
Prerequisite: ECE 312.
This course covers the architecture, operation, and applications of microprocessors. Topics include microprocessor programming, address decoding, interface to memory, interfacing to parallel and serial input/output, interrupts, and direct memory access. Course project is to design, build, and program a simple microprocessor-based system.

ECE 412 COMPUTER ARCHITECTURE (3 Hours)
Prerequisite: ECE 312.
This course covers computer architecture design issues. Topics include organization of CPU, processor systems design, computer arithmetic, memory system organization and architecture, interfacing and communication, performance, and multiprocessing.

ECE 430 DIGITAL VLSI DESIGN (3 Hours)
Prerequisite: . ECE 212, ECEL 212, ECE 330 and ECEL 330. This course introduces principles of the design and layout of Very Large Scale Integrated (VLSI) circuits with concentrations on the Complementary Metal-Oxide-Semiconductor (CMOS) technology. Topics include MOS transistor theory and CMOS technology, characterization and performance estimation of CMOS gates. Course projects involve layout designs and simulations using computer-aided design tools.

ECE 431 Digital System Testing and Design for Testability (3 Hours)
Prerequisite: ECE 330 and ECE 212
This course introduces fundamental techniques for detecting defects in VLSI circuits. Topics include fault models, fault detection, and schemes for designing systems to be easily testable and with self-test capability.

ECE 435 POWER ELECTRONICS (3 Hours)
Prerequisite: ECE 331.
This course introduces students to Switch-mode power electronics. Topics include Switch-mode DC power supplies and Switch-mode converters for DC and AC motor drives, wind/photovoltaic inverters, and interfacing power electronics equipment with utility system, power semiconductor devices, magnetic design, and electro-magnetic interference.

ECE 440 COMMUNICATION SYSTEMS (3 Hours)
Prerequisite: MATH 243 and MATH 307.
This course introduces students to analog and digital modulation techniques. Topics include random processes, power special density, effects of nosie on, and bandwidth requirements of, different modulation schemes.

ECE 441 COMPUTER NETWORKS (3 Hours)
Prerequisite: ECE 312 and ECE 351.
This course introduces students to network protocols and network architectures. Topics include characteristics and principles related to Wide Area Network(WAN), and network devices and their relationship with network protocols and architectures. It also provides methods for characterizing and analyzing communications systems performance.

ECE 451 DIGITAL SIGNAL PROCESSING (3 Hours)
Pre-requisite: ECE 351. This course introduces theoretical analysis of discrete-time signals and systems. Topics include sampling continuous-time signals and reconstructions of continuous-time signals from samples: z-transforms; signal flow graphs; spectral analysis of signals and systems using Fourier series and Fourier transform: the discrete Fourier transform; the fast Fourier transform algorithm; finite and infinite impulse response (FIR/IIR) filter design techniques, and applications in digital control systems and digital communications.

ECE 480 POWER SYSTEM ANALYSIS (3 Hours)
Pre-requisite: ECE 320. This course introduces students to AC power systems. Topics include large power system networks, mathematics and techniques of power flow analysis, transient stability analysis, and use of power system simulation program.

ECE 481 ELECTRIC MACHINES (3 Hours)
Pre-requsities: ECE 320. This course introduces students to the principles and applications of electric machines. Topics include integrated discussion of DC motors, transformers, and AC machines. Application include electric transportation, process control, and energy conservation.

ECE 490 SENIOR DESIGN PROJECTS I (3 Hours)
Prerequisities: ECE 330 and ECE 360. This course is based on group design projects. Students work in teams to develop proposals for their selected projects. Topics include engineering professionalism, ethics, design methodology, project management, development of specifications, and evaluation of alternatives. Students make oral presentation and submit written reports on their proposed projects.

ECE 491 SENIOR DESIGN PROJECTS II (3 Hours)
Prerequisite: ECE 490.
In this course students complete the design projects proposed in ECE 490-Senior Design Projects I. Students perform the design synthesis, analysis, construction, testing, and evaluation of their team projects. Topics include engineering professionalism, ethics, and safety. Students make oral presentation and submit final reports documenting their results.

ECE 492 SPCL STDS N ELEC & COMPU ENGIN (1-4 Hours)
Prerequisite: Junior/Senior standing in Electrical and Computer Engineering and consent of Chair.
Special Studies in Electrical and Computer Engineering. This course is based on individual projects and problems selected by instructors and individual students. It is open to junior/seniors in Electrical and Computer Engineering only. No more than four credit hours of ECE 492 can be applied toward the degree.

ECE 493 SPCL TPCS N ELECTRL & COMPU EN (1-4 Hours)
Prerequisite: Junior/Senior standing in Electrical and Computer Engineering and consent of Chair.
Special Topics in Electrical and Computer Engineering. This course includes lectures on recent topics of special interests to students in various areas of Electrical and Computer Engineering. It is designed to test new experimental courses in Electrical and Computer Engineering. No more than four credits of ECE 439 can be applied toward the degree.