

## Descriptions of Electrical Engineering Courses

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### **EENG 1210 Electrical Engineering Graphics (2-0)**

Introduction to Computer Aided Design (CAD) software for electrical engineers; fundamentals of computer graphics, schematic generation including line diagrams, two- and three-dimensional drawings; interfacing with electrical libraries and enterprise collaboration; generation of reports, bill of material, manufacturing instructions, design of electrical system housing.

Prerequisites: Math 1314 College Algebra or Equivalent.

### **EENG 1303 Object-Oriented Programming in Java (3-0)**

Introduction to object-oriented programming using the Java language. Primitive data types and expressions; application program interfaces; applets, debugging techniques and integrated development environments are covered. Students will learn to use existing classes; selection and iteration control structures; and data structures. Prerequisite: College Algebra or equivalent.

### **EENG 2105 Fundamentals of Circuit Analysis Laboratory (0-1)**

Laboratory experiments supporting theoretical principles presented in ENGR 2305 involving DC and AC circuit theory, network theorems, time, and frequency domain circuit analysis. Introduction to principles and operation of basic laboratory equipment; laboratory report preparation. Corequisite: ENGR 2305.

### **EENG 2401 Digital Circuits Design (3-1)**

Introduction to number system; Boolean algebra; logic operations; combinational logic circuit design; Karnaugh maps; sequential circuit design including registers and counters. Three hours of lecture and three-hour lab per week.

Prerequisite: PHYS 2326

### **EENG 3106 Electronic Circuit Analysis Laboratory I (0-1)**

Semiconductor devices; diode characteristics; diode circuits and applications: wave shaping and rectifier circuits; transistor biasing (bipolar junction transistors and field effect transistors); low frequency transistor amplifier design; multi-stage amplifier design. Corequisite: EENG 3306.

### **EENG 3303 Electromagnetic Fields (3-0)**

Vector analysis; static electric field; steady electric currents; static magnetic fields; time varying fields and Maxwell's equations; plane electromagnetic waves;

transmission lines; introduction to waveguides; introduction to antennas.  
Prerequisites: PHYS 2326, MATH 2415, and MATH 3320.

**EENG 3304 Electric Circuits II (3-0)**

Second-order circuits; AC circuits; AC power analysis; three-phase circuits; magnetically coupled circuits; frequency and filters; introduction to Laplace and Fourier transforms. Prerequisites: ENGR 2305, ENGR 2105.

**EENG 3306 Electronic Circuit Analysis I (3-0)**

Introduction to semiconductor devices; junction diode characteristics; analog diode circuits; Bipolar Junction Transistor (BJT) and Field Effect Transistor (FET) characteristics and models; transistor biasing and low frequency amplifier analysis and designs; multi-stage amplifiers, nonlinear (harmonic) distortion; transistor audio amplifiers. Prerequisites: ENGR 2305 and EENG 2401.

**EENG 3307 Microprocessors (3-0)**

Microprocessor/microcontroller architectures, instruction set, assembly and C language programming, addressing modes, input output ports, I/O programming, interrupts. Three hours of lecture per week with integrated laboratory sessions. Prerequisites: EENG 2401 and EENG 1303.

**EENG 3309 Electronic Circuit Analysis II (3-0)**

Operational amplifiers; frequency response of passive and active networks; feedback concepts and oscillators; small-signal analysis; load-line analysis; introduction to nonlinear electronic circuits; digital circuits. Prerequisite: EENG 3306.

**EENG 3314 Design Methodology in Electrical Engineering (3-0)**

The use of solid state components in power systems; rectifying devices; diode circuits and rectifiers; controlled rectifier circuits; AC voltage controllers; Thyristor commutation techniques; DC choppers; speed torque characteristics of motors and loads; starting, braking and transient analysis of electric motors; introduction to HVDC. Prerequisites: EENG 3306.

**EENG 3373 Engineering Probability and Statistics (3-0)**

Fundamental concepts of discrete and continuous random variables. Mean, variance and covariance for random variables. The creation and proper utilization of statistical decision models for engineering analysis and design.  
Pre-requisites: MATH 2415 Calculus III.

**EENG 3380 Signals and Systems (3-0)**

Types of signals; types of systems; properties of systems; convolution; Fourier series, Fourier transforms; Laplace transforms; Difference equations; Z-transform; Discrete-time systems; applications and design concepts.

Prerequisites: ENGR 2305, MATH 2415, and MATH 3320.

**EENG 4110 Electric Power Systems Laboratory (0-1)**

Laboratory experience to accompany EENG 4310. Co-requisite: EENG 4310.

**EENG 4302 Digital Systems (2-1)**

Hardware description language such as VHDL; design of digital systems using VHDL; digital systems design using FPGAs and software simulation. Two hours of lecture per week and one three-hour lab per week. Prerequisite: EENG 1303 and EENG 2401.

**EENG 4310 Electric Power Systems (3-0)**

Magnetic circuits; principles of electromagnetic energy conversion; fundamentals of power systems modeling and design; power flow analysis. Prerequisites: EENG 3303 and EENG 3309.

**EENG 4312 Instrumentation Systems (3-0)**

Data acquisition of both analog and digital signals; analysis of sensor data; characterization of signal noise; Internet of Things (IoT) devices and introduction to various buses. EENG 3307.

**EENG 4320 Computer Architecture and Design (3-0)**

Introduction to computer architecture, RISC/CISC architectures, instruction set design, data path, ALU and control unit design, pipelining of Instruction execution, memory, cache and I/O design; virtual memory concepts Three hours of lecture per week. Prerequisite: EENG 3307

**EENG 4325 Communication Theory (3-0)**

Analog and Digital modulation techniques, effects of noise in modulation, signal to noise ratio, digital data transmission, probability of error, bandwidth requirements and sampling theorem. Prerequisite: EENG 3373, EENG 3380

**EENG 4330 Electric Machines (3-0)**

Rotating electric machines and their magnetic field interactions are considered. Electrical circuit models are used to quantify machine and power system interactions. Power, torque, speed, and performance of various DC and AC

machines are calculated. Introduction to synchronous and induction machines. Prerequisite: ENGR 2305, and ENGR 2403.

**EENG 4335 Direct Generation Methods (3-0)**

The conversion of energy directly into electricity without the usual electric machines are considered. Different forms of energy storage are studied. Technologies considered include solar panels, heat transfer, chemical and fuel cells. Prerequisite: ENGR 2305.

**EENG 4340 Control Systems (3-0)**

Introduction to control system, modeling of systems, state variable analysis, feedback control and performance, stability, Root locus, Nyquist diagrams and Bode plots, frequency response of the system. The computer as a simulation tool for control system design and analysis is introduced. Prerequisites: ENGR 2302 and MATH 3320, EENG 3380.

**EENG 4380 Special Topics in Electrical Engineering (3-0)**

Occasionally offered special topics as course in Electrical Engineering to be used as a senior-level elective course. Prerequisites: Specified by the instructor

**EECS4391 Independent Study in Electrical Engineering (3-0)**

Instructor specified and directed independent study course in electrical engineering. Work or study should be equivalent to an average of 3 hours student effort per week. Final report is required. Prerequisites: Senior standing and consent of the instructor

**EENG 4460 Senior Design (4-0)**

A capstone design course that builds on previous course work, including all stages of the design process taking into account myriad realistic constraints such as manufacturability, sustainability, economic, environmental, safety, use of applicable standards and reliability issues. Oral presentation, written report and demonstration at the senior design expo. Prerequisites: EENG 3307, EENG 3314, and EENG 4309.

**ENGR 2305 Fundamentals of Circuit Analysis Laboratory (3-0)**

Define voltage, current, electrical energy & power, and the basic circuit elements. Kirchoff's Laws and systematic formulation of circuit analysis; mesh and nodal analysis; Thevenin and Norton's Theorems; operational amplifiers & storage elements; first order circuits; AC steady-state circuit analysis using phasors. Complex power in ac systems.