

## COURSES OF INSTRUCTION -ELECTRICAL ENGINEERING

- 1020. Electrical Engineering Projects and Tools:\*\*** 1 credit. Hands-on electrical engineering laboratory projects such as audio amplifiers, LEDs, digital logic, and electric motor measurements. Laboratory, 2 hours. **F, S**
- 1210. Circuit Modeling I\*\*.** 3 credits. Voltage, current, resistance, and impedance. Opamps. Phasors. Ohm's law, Kirchhoff's laws, superposition, and Thevenin's and Norton's theorems applied to the modeling of zero-order networks. Complex numbers and algebra. Lecture, 2.5 hours; laboratory, 1 hour. Prerequisite: Math 2640. **F, S**
- 2210. Circuit Modeling II\*\*.** 4 credits. Phasors and sinusoidal steady-state analysis and power. Resonant circuits. Mutual inductance. Transient response of linear networks with Laplace transform. Lecture, 3 hours; laboratory, 2 hours. Prerequisites: EE 1210 and Math 2740. **F, S**
- 2220. Signals and Systems\*\*.** 4 credits. Linear system modeling with differential equations, Laplace transforms, and convolution. Transfer functions, frequency response, and Bode plots. Lecture, 3.5 hours; laboratory, 1 hour. Prerequisite: EE 2210 and Math 2840. Corequisite: Math 3630. **F, S**
- 2950-2960. Electrical Engineering Cooperative Education.** 2 credits each. Work experience in industry under the direction and jurisdiction of the College of Engineering, Mathematics and Science. Prerequisites: sophomore standing and consent of cooperative education coordinator. **F, S**
- 2970. Electrical Engineering Internship.** 1 credit. Work experience in industry under the direction of the department chair and Cooperative Education Office of the College of Engineering, Mathematics and Science. Prerequisite: Consent of the department chair. Note: This program is separate and distinct from the Cooperative Education Program and is principally designed to cover the summer vacation period. At the department chair's discretion, it may be used to cover other exceptional work experiences. Prerequisite: sophomore standing.
- 3020. Analog Electronics\*\*.** 4 credits. Diode circuits. Biasing of semiconductor devices. Analysis and design of linear amplifiers. Use of opamps. Lecture, 3 hours; laboratory, 2 hours. Prerequisite: EE 2210. **F, S**
- 3130. Solid State Electronic Devices\*\*.** 4 credits. Physics of semiconductor devices. Energy band diagrams, Fermi levels, and Fermi-Dirac statistics. Metal-semiconductor and p-n junctions. Functioning of diodes, BJT's, FET's, and thyristors. Small signal equivalent circuits. Nonlinear modeling using computers. Lecture, 3 hours; laboratory, 2 hours. Prerequisites: EE 2210, Phys 3140, and Math 3630. **F, S**
- 3140. Electric and Magnetic Fields.** 4 credits. Electrostatics, magnetostatics, Maxwell's equations, plane waves, and transmission lines. Lecture, 4 hours. Cross offering: EP 3640. Prerequisites: EE 2220, Math 3630, and Phys 2640. **F, S**
- 3300. Controls Laboratory.** 1 credit. Laboratory projects applying the theoretical principles from EE 3310 to the control of electromechanical systems. Laboratory, 2 hours. Cross offering: ME 4310. Corequisites: EE 3310 or ME 4320. **F, S**
- 3310. Automatic Controls\*\*.** 3 credits. Analysis and synthesis of single-input, single output linear time-invariant systems are considered through classical Laplace transform methods such as root locus and frequency domain techniques. The computer simulations demonstrate practical application of the concepts. Lecture, 3 hours. Prerequisite: EE 2220. Corequisite: EE 3300. **F, S**
- 3410. Electric Power Engineering.** 4 credits. Introduction to electromechanics, generators, transformers, transmission lines, motors, and network analysis. Lecture, 3 hours; laboratory 2 hours. Prerequisite: Phys 2640 and either GE 2930 with grade of B or better or EE 2210. **F, S**
- 3770. Logic and Digital Design\*\*.** 4 credits. Introduction to digital logic. Boolean algebra. MSI and LSI. Combinational and sequential network design, prototyping, and testing. State machine design and implementation. Introduction to HDL and programmable logic devices. Lecture 3 hours; laboratory 2 hours. Prerequisite: EE 1210. **F, S**
- 3780. Introduction to Microprocessors\*\*.** 4 credits. Introduction to microprocessor assembly language programming. Fundamentals of microprocessor architecture, data representation, and arithmetic. System debugging. Interfacing and interrupts. Microprocessor-and microcontroller-based system design, testing, and implementation. Lecture 3 hours; laboratory 2 hours. Prerequisites: COSC 1430, EE 3770. **F, S**
- 3950-3960. Electrical Engineering Cooperative Education.** 2 credits each. Work experience in industry under the direction and jurisdiction of the College of Engineering, Mathematics and Science. Prerequisites: junior standing and consent of cooperative education coordinator.
- 3970. Electrical Engineering Internship.** 1 credit. Work experience in industry under the direction of the department chair and Cooperative Education Office of the College of Engineering, Mathematics and Science. Prerequisite: Consent of the department chair. Note: This program is separate and distinct from the Cooperative Education Program and is principally designed to cover the summer vacation period. At the department chair's discretion, it may be used to cover other exceptional work experiences. Prerequisite: junior standing.

**4010. UHF Amplifier Design\*\*.** 1 credit. Scattering parameters, the Smith Chart, lumped-element impedance matching, transistor characterization, device stability, UHF CAD techniques and transistor bias techniques. Lecture, 0.5 hour; laboratory, 1 hour. Prerequisite: EE 3020.

**4020. UHF Oscillator Design\*\*.** 1 credit. Scattering parameters, the Smith Chart, transistor characterization, device destabilization, lumped-element impedance matching, UHF CAD techniques, output power prediction and transistor bias techniques. Lecture, 0.5 hour; laboratory, 1 hour. Prerequisites: EE 3020.

**4050. Advanced Analog Electronic Circuits\*\*.** 4 credits. Design of discrete and integrated electronic circuits used in communication systems, such as oscillators, modulators, low-noise amplifiers, and class AB, B, and C power amplifiers. Lecture, 3 hours; laboratory, 3 hours. Prerequisites: EE 3020 and EE 3130. **S**

**4310. Modern Control Systems\*\*.** 4 credits. State space modeling of systems, solution of state equations, controllability and observability, Liapunov stability, minimum realization, and state feedback design. Lecture, 3 hours; laboratory, 3 hours. Prerequisite: EE 3310. **S**

**4320. Digital Signal Processing\*\*.** 4 credits. Discrete time systems, frequency response of linear time invariant systems, Z transforms, discrete Fourier transform, FFT. Design of FIR and IIR digital filters. Lecture, 3 hours; laboratory, 3 hours. Prerequisite: EE 2220. **S**

**4350. Discrete Time Control Systems\*\*.** 4 credits. Z-transforms, sampling theory, analysis and design of digital control systems. Lecture, 3 hours; laboratory, 3 hours. Prerequisite: EE 3310. **F**

**4430. Power Electronics and Electrical Machines.** 4 credits. DC machines and DC machine control; power electronic switches, converter systems: AC to AC, AC to DC, DC to DC, and DC to AC; harmonics, real and complex power in power electronic systems. Lecture, 3 hours; laboratory, 3 hours. Prerequisites: EE 3020 and EE 3410. **F**

**4440. Electric Motor Drives.** 4 credits. Theory and operation of modern AC electric motor drives, multiple reference frame theory for three-phase AC system, dynamic modeling of induction machines, operation of the fully controlled three-phase power converters, speed and torque control of induction motors, the Voltage/Hertz control, permanent magnet synchronous motor drives, DC motor drives. Lecture 3 hours; laboratory 3 hours. Prerequisites: EE 3020, EE 3310, and EE 3410.

**4450. Power Systems Analysis and Design.** 4 credits. Power systems modeling, load flow, economic dispatch, stability, fault analysis, computer simulation and systems analysis. Lecture, 3 hours; laboratory, 3 hours. Prerequisite: EE 3410. **S**

**4610. Communication Systems\*\*.** 4 credits. Analysis and design of amplitude, angle, and pulse code modulation systems. Lecture, 3 hours; laboratory, 3 hours. Prerequisites: EE 2220, EE 3020, and EE 3770. **F, S**

**4620. Optical Systems\*\*.** 4 credits. Geometric and physical optics, lasers, light emitting diodes, optical detectors, optical signal processing, holography, nonlinear optics, integrated optics, optical fibers, optical communications systems. Lecture, 3 hours; laboratory, 3 hours. Cross Offering: EP 4140. Prerequisites: EE 3140, EE 4610 and Physics 3140, or consent of instructor. **S**

**4630. Advanced Communication Systems\*\*.** 4 credits. Probability theory, random signals, performance and design of CW and pulse modulation systems, information and coding theory. Lecture, 3 hours; laboratory, 3 hours. Prerequisite: EE 3610, EE 4610. **F**

**4720. Microcomputer Architecture and Interfacing\*\*.** 4 credits. Computer architecture including processor design, microprogrammed control, memory organization, interconnection structures, input/output, interface techniques, and parallel processing. Lecture, 3 hours; laboratory, 3 hours. Prerequisite: EE 3780. **F, S**

**4750. Advanced Digital Design\*\*.** 4 credits. Introduction to semi-custom integrated circuit design; design methodology (design entry, simulation, cell placement, and macro libraries); optimization of designs based on macro libraries; design for testability; logic simulation; placement and routing algorithms for gate arrays and standard cells; PLA-based programmable logic devices; programmable gate arrays; design projects using CAD systems. Lecture, 3 hours; laboratory, 3 hours. Prerequisites: EE 3140, and EE 3780. Corequisite: EE 3130. **F**

**4980. Current Topics in Engineering.** 1-4 credits. In-depth study of a current topic of interest to the engineering profession. The topic to be covered will be identified in the course title. Prerequisite: consent of instructor.

**4990. Independent Study.** 1-3 credits. Advanced study in area of specialization selected by student and approved by faculty member. Prerequisite: consent of department chairperson.

**\*\*NOTE:** This course may require the purchase of expendable supplies by the student.