Lecture: 4, Lab 0, Other 0

circuits, resonance, filters, Bode plots and magnetically coupled circuits.

Terms Offered: Summer, Fall, Winter, Spring

Prerequisites: EE-210 and (MATH-204 or MATH-102H or MATH-102X)

Fundamental DC and AC circuit analysis techniques are covered in this
introduction course. Topics include: circuit variables and elements;
resistors, inductors, and capacitors; and sinusoidal steady-state analysis
with power calculations.

Lecture: 3, Lab 0, Other 0

EE-211 Circuits I Lab 1 Credits
Corequisites: EE-210
Prerequisites: None

An introductory laboratory course designed to reinforce the fundamental
analysis techniques discussed in EE-210, Circuits I. Topics include: safe
use of laboratory equipment and experimental verification of analysis
techniques.

Lecture: 0, Lab 2, Other 0

EE-212 Applied Electrical Circuits 3 Credits
Corequisites: MATH-204, MECH-231L
Prerequisites: PHYS-224 and PHYS-225

Application of electrical circuit components are covered in this course.
Topics include: Ohm's law and Kirchhoff's laws; series and parallel
circuits; voltage and current division rules; node-voltage and mesh-
current methods; superposition; Thevenin's, and Norton's theorems;
first- and second-order R-L-C circuits; steady-state analysis and power
calculations for sinusoidally-varying (ac) sources; operational amplifiers;
and diodes. This course will not satisfy the requirements of an Electrical
or Computer Engineering degree.

Lecture: 3, Lab 0, Other 1

EE-240 Electromagnetic Fields and Applications 4 Credits
Prerequisites: PHYS-224 and PHYS-225

Terms Offered: Summer, Fall, Winter, Spring

Basics of electromagnetic fields and applications are studied. Topics
include: vector analysis; gradient, divergence, and curl; electrostatic
fields; electrostatic boundary-value problems; magnetostatic fields;
magnetic circuits; and Maxwell's equations for time-varying fields.

Lecture: 4, Lab 0, Other 0

EE-325 Principles of Microelectronics Processing 4 Credits
Corequisites: EE-320
Prerequisites: EE-210 and EE-211

The principles of semiconductor processing for modern integrated
circuits are covered in this introductory course. Topics include a
brief review of semiconductor devices and semiconductor circuit
families, modern CMOS technology and process flow, crystal growth,
semiconductor processing, thin film deposition oxidation, etching,
lithography and an introduction to clean room principles. Principles
of manufacturing process control and modeling for manufacturability
will be presented. Computed simulation will be extensively used where
appropriate.

Lecture: 4, Lab 0, Other 0

EE-336 Continuous-Time Signals and Systems 4 Credits
Prerequisites: (MATH-204 or MATH-204H) and EE-210

Minimum Class Standing: Sophomore
Terms Offered: Summer, Fall

Introductory continuous-time signals and systems are studied. Topics
include: definitions and properties of signals and systems, convolution,
and Fourier transform of continuous-time signals with applications.

Lecture: 4, Lab 0, Other 0

EE-338 Discrete-Time Signals and Systems 4 Credits
Prerequisites: (MATH-204 or MATH-204H) and EE-210

Minimum Class Standing: Sophomore
Terms Offered: Winter, Spring

Introductory discrete-time signals and systems are studied. Topics
include: definitions and properties of signals and systems, sampling,
convolution, difference equations, Z transform with applications, and the
Fourier transform of discrete-time signals with applications.

Lecture: 4, Lab 0, Other 0

EE-340 Electromagnetic Wave Propagation 4 Credits
Prerequisites: EE-240

Terms Offered: Winter, Spring

Advanced concepts of electromagnetic fields are studied. Topics
include: propagation of uniform plane waves in various material media;
transmission line analysis; electromagnetic wave propagation in
waveguides; and antennas.

Lecture: 4, Lab 0, Other 0
EE-342 Electrical Machines  4 Credits
Corequisites: EE-310
Prerequisites: EE-210 and EE-211 and EE-240
Terms Offered: Winter, Spring
Operating principles and design concepts of various types of electrical machines are studied. Topics include: magnetic circuits, single-phase and three-phase transformers; dc motors and generators; three-phase alternators; synchronous motors, induction motors and single-phase motors.
Lecture: 3, Lab 2, Other 0

EE-344 Fundamentals of Power Systems  4 Credits
Prerequisites: EE-210 and EE-211
Terms Offered: Winter, Spring
Basic structure of electrical power systems and characteristics of power transmission lines, transformers and generators are studied. Topics include: representation of power systems; symmetrical three-phase fault analysis; symmetrical components; unsymmetrical fault computations; and network analyzers.
Lecture: 3, Lab 2, Other 0

EE-346 High Voltage Generation and Measurement Techniques  4 Credits
Prerequisites: EE-210 and EE-211 and EE-240
Terms Offered: Summer, Fall
Insulation overvoltage-tests are studied. Topics include: generation of high, direct, alternating, and impulse voltages; voltage multiplier circuits; resonant test circuits; resistive, capacitive and mixed high-voltage dividers; sphere gaps; electrostatic voltmeters, Kerr Cell; and electrostatic coupling, interference, and grounding and safety.
Lecture: 3, Lab 2, Other 0

EE-348 Electromagnetic Compatibility  4 Credits
Prerequisites: EE-210 and EE-240
Terms Offered: Summer, Fall
Issues involved in designing electrical and electronic systems to achieve electromagnetic compatibility are studied. Topics include: interference sources; government regulations limiting conducted and radiated emissions; electric and magnetic field noise coupling; grounding; filtering; shielding; electrostatic discharge; spectral analysis of electromagnetic interference; design methods for minimizing radiated emissions from digital circuits; and measurements of system emissions and susceptibility.
Lecture: 4, Lab 0, Other 0

EE-391 EE Special Topics  4 Credits
Prerequisites: None
Lecture: 4, Lab 0, Other 0

EE-399 EE Independent Study  4 Credits
Prerequisites: None
Lecture: 0, Lab 0, Other 0

EE-420 Electronics II  4 Credits
Prerequisites: EE-310 and EE-320 and EE-321
Terms Offered: Winter, Spring
Advanced concepts of electronic engineering are studied. Topics include: nonlinear circuits; active filters; differential and multistage amplifiers; pulse and switching circuits; integrated circuits; and electronic system design.
Lecture: 3, Lab 2, Other 0

EE-421 Energy Storage Sys w/ EV App  4 Credits
Prerequisites: EE-210 or EE-212
Terms Offered: Winter/Spring
The purpose of this course is to introduce the basics of energy storage systems. We will look at several competing energy storage concepts and management systems. The emphasis is on rechargeable Li-ion batteries for EV applications. The course will focus on the fundamentals of Li-ion batteries with respect to the physical principles of operation, design, manufacturing, modeling and state estimation. Students are required to complete research projects and independent review of research topics with approval of the instructor.
Lecture: 4, Lab 0, Other 0

EE-424 Power Electronics and Applications  4 Credits
Prerequisites: EE-310 and EE-320 and EE-321
Terms Offered: Winter, Spring
Speed control and dynamic representation of electric motors are studied. Topics include: characteristics of iodes; diacs; thyristors; and MOSFET's; thyristor gate firing circuits; operating principles of AC/DC, DC/DC and DC/AC converter circuits; and computer-aided state-space analysis of the dynamic response of the converter circuits.
Lecture: 3, Lab 2, Other 0

EE-427 Semiconductor Device Fundamentals  4 Credits
Prerequisites: EE-320
Terms Offered: Winter, Spring
Basic semiconductor theory for solid-state devices, diode theory, and applications of theory for transistors are studied. Topics include: energy bands, carrier statistics, equilibrium carrier concentrations, carrier transport, electrostatic devices, diode I-V characteristics, optical device applications, microwave device effects, and BJT, JFET, MESFET and MOSFET transistor models.
Lecture: 4, Lab 0, Other 0

EE-430 Communication Systems  4 Credits
Prerequisites: EE-310 and EE-320 and (MATH-258 or MATH-408) and (EE-336 or EE-338)
Terms Offered: Summer, Fall
The study of methods used in electronic communication systems. Topics include: Fourier Transforms; analysis of distortion over a communication channel; autocorrelation of deterministic and random signals; energy and power spectral density; amplitude modulation; frequency modulation; phase modulation; digital line coding and modulation; communication circuitry.
Lecture: 4, Lab 0, Other 0

EE-432 Feedback Control Systems  4 Credits
Prerequisites: EE-310 and EE-336
Terms Offered: Summer, Fall
Time and frequency domain representations of control systems are studied. Topics include: stability criteria; root locus methods; frequency response techniques, s-plane design methods. Design and evaluation of control systems are supplemented with computer aided control system design software.
Lecture: 3, Lab 2, Other 0
EE-434 Digital Signal Processing  4 Credits
Prerequisites: ECE-101 and EE-338
Terms Offered: Winter, Spring
Basic principles, design and applications of digital signal processing systems are presented. Topics include: review of discrete-time signals and systems, the z-transform, discrete-time Fourier analysis, the Discrete Fourier Transform, the Fast Fourier Transform, digital filter structures, FIR filters, and IIR filters. This course includes extensive use of MATLAB and experimental design projects using real-time signal processors.
Lecture: 3, Lab 2, Other 0

EE-444 Computational Methods in Power Systems  4 Credits
Prerequisites: EE-344
Terms Offered: Summer, Fall
Matrix analysis of power system networks is studied. Topics include: power flow study of large scale interconnected power systems using Gauss-Seidel and Newton-Raphson methods; computer-aided short circuit analysis of large systems; economic operation of power networks; transient stability analysis; overvoltage calculations; and fundamentals of power system protection.
Lecture: 4, Lab 0, Other 0

EE-490 Senior Electrical Engineering Design Project  4 Credits
Corequisites: EE-432
Prerequisites: CE-320 and EE-240 and EE-310 and EE-320 and EE-321 and EE-336 and EE-338
Minimum Class Standing: Senior
Terms Offered: Summer, Fall
Students will design, implement, document, and present a device or system as a significant capstone project. The project will emphasize electrical engineering, but will be multidisciplinary.
Lecture: 2, Lab 4, Other 0

EE-530 Digital Control Systems  4 Credits
Prerequisites: (EE-338 and EE-432)
Terms Offered: Winter, Spring
Control of continuous-time processes using computer-based controllers is studied. Topics include: design of control algorithms for implementation on digital computers; modeling of discrete-time systems; application of z-transforms; stability analysis; root locus analysis; controller design via conventional techniques; state-space analysis and modeling; and design of control systems using state-space methods. Implementation of real-time digital controllers is performed in the lab.
Lecture: 3, Lab 2, Other 0

EE-582 Robot Dynamics and Control  4 Credits
Corequisites: EE-432
Prerequisites: None
Terms Offered: Summer, Fall
Principles of robot analysis, design, and operation are presented. Topics include: coordinate systems, kinematics and robot dynamics; feedback, feedforward, and adaptive methods for arm control; vision and intelligence; and mobile robots.
Lecture: 4, Lab 0, Other 0