

ENGINEERING-ELECTRICAL (EGE)

EGE193. Engineering Selected Topic. 3-12 Credits.

Selected topics courses are regularly scheduled courses that focus on a particular topic of interest. Descriptions are printed in the Schedule of Classes each semester. Selected topics courses may be used as elective credit and may be repeated for credit, provided that the topic of the course changes.

Restrictions:

- Must have the following level: Undergraduate

May be repeated for credit

EGE200. Circuit Analysis. 3 Credits.

Electrical circuit parameters; Kirchhoff's laws; circuit theorems; transient analysis of first and second-order circuits; sinusoidal excitation: phasor analysis, complex power; frequency response; resonance and filters; magnetically-coupled circuits and transformers; three-phase circuits.

Attributes:

- Critical Thinking Introductory

Restrictions:

- Must have the following level: Undergraduate
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)
 - Undeclared:Pre-Engineering (00EN)

Prerequisites:

- PHY202 Minimum Grade of C- and MAT359 Minimum Grade of C-
- EGE201 Minimum Grade of C*

* May be taken at the same time

May not be repeated for credit

EGE201. Circuits Laboratory. 1 Credit.

Computer simulation and hardware experimentation on equivalent resistance, nodal and mesh approaches. Thevenin theorem, maximum power transfer, step response of first and second order circuits, power factor correction, and resonant circuits.

Attributes:

- Information Mgmt Intro

Restrictions:

- Must have the following level: Undergraduate
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)
 - Undeclared:Pre-Engineering (00EN)

Prerequisites:

- PHY202 Minimum Grade of C- and MAT359 Minimum Grade of C-

Corequisites:

- EGE200

May not be repeated for credit

EGE293. Engineering Selected Topic. 1-12 Credits.

Selected topics courses are regularly scheduled courses that focus on a particular topic of interest. Descriptions are printed in the Schedule of Classes each semester. Selected topics courses may be used as elective credit and may be repeated for credit, provided that the topic of the course changes.

Restrictions:

- Must have the following level: Undergraduate

Prerequisites:

- PHY202 Minimum Grade of C-

May be repeated for credit

EGE295. Indep Study Elec Engineering. 1-12 Credits.

Selected research areas specific to faculty.

Restrictions:

- Must have the following level: Undergraduate

May be repeated for credit

EGE302. Antenna Laboratory. 1 Credit.

Measurement of the far field pattern and characteristics of wire antennas and arrays for VHF. Measurement of the field pattern and characteristics of reflector type antennas in the X-band, and of aperture type antennas and arrays in the X-band.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

Prerequisites:

- EGE445 Minimum Grade of C*

* May be taken at the same time

May not be repeated for credit

EGE303. Microwave Fundamentals Laboratory. 1 Credit.

Measurement of VSWR and wavelength in waveguides, stub tuners and matching, calibration of attenuators, time domain reflectometry and frequency domain network analyzer measurement. Prerequisite/ Corequisite: EGE342.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

Prerequisites:

- EGE342 Minimum Grade of C-

May not be repeated for credit

EGE306. Microwaves Circuits Laboratory. 1 Credit.

Design, build and test planar microwave devices such as power divider, coupler, filter, mixer, amplifier, and oscillator.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

May not be repeated for credit

EGE311. Signals and Systems. 3 Credits.

Continuous and discrete-time signals, systems, and their properties; linear time-invariant systems: convolution; system descriptions using differential and difference equations; Fourier series, Fourier Transform and their properties. Laplace transform and Z-transform.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGE200 Minimum Grade of C- or EGE 250 Minimum Grade of C-

May not be repeated for credit

EGE320. Electronics I. 3 Credits.

Op-amp as a device, semiconductors, diodes, Zener diodes, diode circuits, bipolar junction transistors: physics, biasing and amplification. Metal-oxide semiconductor field effect transistor: physics, biasing and amplification. Bipolar translator as a switch.

Attributes:

- Critical Thinking Intermediate

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGE200 Minimum Grade of C- or EGE 250 Minimum Grade of C-
- EGE322 Minimum Grade of C*

* May be taken at the same time

May not be repeated for credit

EGE321. Electronics II. 3 Credits.

Multistage amplifiers (direct coupled, capacitor coupled), differential amplifiers. Advance current sources. Applications of operational amplifiers. Frequency response of amplifiers. Tuned amplifiers. Oscillators Waveform generators. Feedback amplifiers, and stability of feedback amplifiers. Power amplifiers.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGE320 Minimum Grade of C-

Corequisites:

- EGE323

May not be repeated for credit

EGE322. Electronics I Laboratory. 1 Credit.

Laboratory exercises covering op-amps, characterization of diodes, BJT, and MOSFET, diode circuits, biasing and amplication of BJT and MOSFET, including simple current source.

Attributes:

- Information Mgmt Intrmd

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Corequisites:

- EGE320

May not be repeated for credit

EGE323. Electronics II Laboratory. 1 Credit.

Laboratory exercises covering the multistage amplifier, direct coupled amplifier, difference amplifier, op-amp applications, frequency response, oscillator, waveform generator, power amplifier, and frequency response.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Corequisites:

- EGE321

May not be repeated for credit

EGE331. Computer Simulation. 3 Credits.

Problem Solving and Engineering Methods, Algorithm Development, MATLAB Interactive Environment, MATLAB Programming Elements, Control Structures, Arrays and Matrix Operations, Plotting and Graphing, Recursion, Fundamentals of Database, Developing tables using Excel, Importing and exporting Excel tables to MATLAB.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

Prerequisites:

- EGE200 Minimum Grade of C-* or EGE 250 Minimum Grade of C-*

* May be taken at the same time

May not be repeated for credit

EGE340. Applied Electromagnetics. 3 Credits.

Transmission line theory. Graphical solutions using Smith Chart. Impedance matching. Transients on lossless lines. Electrostatics, capacitance and electric energy. Magnetostatics, Inductance and magnetic energy. Maxwell's equations, the wave equation, and uniform plane waves.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGE200 Minimum Grade of C- or EGE 250 Minimum Grade of C-
- MAT353 Minimum Grade of C-

May not be repeated for credit

EGE342. Microwave Fundamentals. 3 Credits.

Review of Maxwell's equations, propagation of plane waves, reflection and transmission of plane waves, transmission line analysis, strip lines and microstrip lines, waveguide analysis, microwave networks.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGE340 Minimum Grade of C-

May not be repeated for credit

EGE350. Electric Energy Systems. 3 Credits.

Electric energy generation by using resources such as fossil fuels, nuclear, wind, water, and waves. Power plant equipment, such as boilers, reactors, turbines, generators, transformers and switchgear. Electric power transmission, distribution, utilization and conversion to other energy forms.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

Prerequisites:

- EGE340 Minimum Grade of C-

Corequisites:

- EGE351

May not be repeated for credit

EGE351. Electric Energy Systems Laboratory. 1 Credit.

Experimental verification of material studied in EGE350 such as single phase and three phase circuit, two watt meter method for measurement of three phase power, in balanced and unbalanced circuits, characteristics of single phase and three phase transformers, synchronous generators, electric power transmission, and distribution, three phase and single phase induction motors.

Attributes:

- Writing Intensive

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

Corequisites:

- EGE350

May not be repeated for credit

EGE393. Engineering Selected Topics. 3-12 Credits.

Selected topics courses are regularly scheduled courses that focus on a particular topic of interest. Descriptions are printed in the Schedule of Classes each semester. Selected topics courses may be used as elective credit and may be repeated for credit, provided that the topic of the course changes.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman

May be repeated for credit

EGE399. Modular Course. 1-3 Credits.**Restrictions:**

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman

May be repeated for credit

EGE412. Communication Systems. 3 Credits.

Signal analysis, signal transmission. Digital communication systems. Amplitude modulation; angle modulation.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

Prerequisites:

- EGE311 Minimum Grade of C-

May not be repeated for credit

EGE413. Communication Systems Laboratory. 1 Credit.

AM communication circuits. FM communication. SSB communication circuits. RF power transmitting. Phase-locked loop circuits, frequency synthesis, time division multiplexing (sampling, PCM, DM), frequency division multiplexing, amplitude shift keying, phase shift keying, frequency shift keying.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

Prerequisites:

- EGE412 Minimum Grade of C- or EGE 312 Minimum Grade of C-

May not be repeated for credit

EGE416. Control Systems. 3 Credits.

Feedback and robustness; transfer function, block diagram and signal-flow graph: Mason's gain formula; stability: Routh-Hurwitz array; steady-state error; state-space: relation to transfer function, state-diagram; design of PID controllers; design of state-feedback controllers.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

Prerequisites:

- EGE311 Minimum Grade of C- or EGM312 Minimum Grade of C-

May not be repeated for credit

EGE417. Digital Control Systems. 3 Credits.

Analysis and design of control systems that use digital controllers. Representation of digital systems with difference equations and the Z-transform; Representation of Hybrid control systems (digital controller-analog plant); Stability analysis; Design of digital controller algorithms; Verification of digital controller design via MATLAB simulation.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

Prerequisites:

- EGE416 Minimum Grade of C-

May not be repeated for credit

EGE418. Control Systems Laboratory. 1 Credit.

Simulation and hardware experiments on the following topics: plant parameter identification, robustness, steady-state error, transient duration, absolute and relative stability. Verification via simulation of controller design in the same time domain and in the frequency domain.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

Prerequisites:

- EGE416 Minimum Grade of C-*

* May be taken at the same time

May not be repeated for credit

EGE421. Microelectronic Technology. 3 Credits.

Miller indices, Crystal growth, Major steps in the fabrication of microelectronic devices (diffusion ion implantation, thermal oxidation, film deposition (physical and chemical), etching, lithography, contacts and interconnections and yield.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

Prerequisites:

- EGE320 Minimum Grade of C-

May not be repeated for credit

EGE422. Electronic Design Automation Lab. 1 Credit.

Principles of electronic design, schematic design, electronic packaging technologies, PCB materials, PCB Layout, PCB Assembly, PCB manufacturing processes, principles of 3D modeling, 3D modeling of electronic components and enclosures.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

Prerequisites:

- EGC331 Minimum Grade of C*

* May be taken at the same time

May not be repeated for credit

EGE423. Solid State Devices. 3 Credits.

This course introduces the basics of semiconductor physics and modeling and devices such as pn junction diode, bipolar transistor, metal-semiconductor contacts, field effect transistor (MESFET and MOSFET), optical (solar cell LED, laser diode), power and microwave devices.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

Prerequisites:

- EGE320 Minimum Grade of C-

May not be repeated for credit

EGE424. Microelectronic Technology Lab. 1 Credit.

This course introduces students to various processing involved in fabrication of integrated circuits such as thermal oxidation, film deposition, lithography, cleaning and etching, rapid thermal processing and characterization.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

Prerequisites:

- EGE320 Minimum Grade of C-
- EGE 436 Minimum Grade of C*

* May be taken at the same time

May not be repeated for credit

EGE435. VLSI Design. 3 Credits.

Introduction to MOS devices and circuits (N-MOS, CMOS), MOS transistor theory. Integrated system processing technology and design rules (N-MOS and CMOS), circuit characterization and performance estimation, N-MOS and CMOS circuits and logic design. Interfacing. Introduction to VLSI design tools. Testability analysis. Microarchitecture of VLSI systems. Chip design projects? .

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

Prerequisites:

- EGC 230 Minimum Grade of C- or EGC220 Minimum Grade of C-
- EGE320 Minimum Grade of C-

May not be repeated for credit

EGE441. Transmission Line Theory. 3 Credits.

Analysis and design of short, medium, and long transmission lines. Bundled conductors, skin effect, proximity effect, and geometric mean distance. Ferranti effect. Standing waves and traveling waves.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - BS Computer Engineering/MS EE (266)
 - BS Elec. Engineering/MS EE (267)
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

Prerequisites:

- EGE340 Minimum Grade of C-

May not be repeated for credit

EGE445. Antenna Systems. 3 Credits.

Antenna parameters, wire antennas, arrays of wire antennas, aperture and printed circuit type antennas, reflectors and feeds.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

Prerequisites:

- EGE340 Minimum Grade of C-

May not be repeated for credit

EGE446. Antenna Systems Laboratory. 1 Credit.

Measurement of the far field pattern and characteristics of wire antennas and arrays for VHF. Measurement of the field pattern and characteristics of reflector type antennas in the X-band, and of aperture and printed circuit type antennas and arrays in the X-band.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

Prerequisites:

- EGE445 Minimum Grade of C*

* May be taken at the same time

May not be repeated for credit

EGE451. Electromechanical Energy Conversion. 3 Credits.

Advanced topics in electromechanical energy conversion and drives. Transformers. Induction machines, three phase and single phase, Synchronous machines, Electric drives, Induction generators.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGE350 Minimum Grade of C-

May not be repeated for credit

EGE452. Electric Power Systems. 3 Credits.

Energy courses, transmission line parameters, transmission line modeling, power flow analysis, voltage frequency control, power system protection.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Engineering (EGG)
 - Mechanical Engineering (521)

Prerequisites:

- EGE350 Minimum Grade of C-

May not be repeated for credit

EGE455. Electromechanical Energy Conversion Laboratory. 1 Credit.

Operation of single and three phase transformers. Characteristics of single phase and three phase induction motors. Characteristics of three phase synchronous machines. Characteristics of various types of direct current machines.

Restrictions:

- Must not be enrolled in the following class: Freshman
- Must be enrolled in the following field(s) of study (major, minor or concentration):
 - Computer Engineering (518)
 - Electrical Engineering (517)
 - Mechanical Engineering (521)

Prerequisites:

- EGE451 Minimum Grade of C*

* May be taken at the same time

May not be repeated for credit

EGE493. Engineering Selected Topics. 12 Credits.

Selected topics courses are regularly scheduled courses that focus on a particular topic of interest. Descriptions are printed in the Schedule of Classes each semester. Selected topics courses may be used as elective credit and may be repeated for credit, provided that the topic of the course changes.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman

May be repeated for credit

EGE494. Fieldwork Engineering. 1-12 Credits.

Complete a prearranged and supervised industry-based project and submit a final technical report.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman

May be repeated for credit

EGE495. Indep Study Elec Engineering. 1-12 Credits.

Selected research areas specific to faculty.

Restrictions:

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman

May be repeated for credit