

# Electrical and Computer Engineering (ECE)

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## Courses

### ***ECE 1100 Foundations of Electrical and Computer Engineering: 1 semester hour.***

Survey and history of the electrical and computer engineering professions. F

### ***ECE 1199 Experimental Course: 1-6 semester hours.***

The content of this course is not described in the catalog. Title and number of credits are announced in the Class Schedule. Experimental courses may be offered no more than three times with the same title and content. May be repeated.

### ***ECE 2200 Electrical Circuits I: 3 semester hours.***

Passive circuit elements. DC circuits. Voltage and current circuits. Circuit laws, theorems and node and loop analysis. Transients in RLC circuits. Computer-aided circuit analysis. PREREQ: MATH 1170 and MATH 2240. PRE-or-COREQ: ECE 2200L. F

### ***ECE 2200L Electrical Circuits I Laboratory: 1 semester hour.***

Laboratory course emphasizing basic electrical measurement methods and simulation related to DC circuits, operational amplifiers, and RLC transient phenomena. PRE-or-COREQ: ECE 2200. F

### ***ECE 2205 Principles of Electrical Circuits: 3 semester hours.***

Ohm's and Kirchhoff's laws; analysis of DC and AC circuits, first-order transient circuits, introduction to OP-AMPs and DC motors. Non-ECE majors only. PRE-or-COREQ: MATH 1175 and PHYS 2212. F

### ***ECE 2250 Introduction to Digital Systems: 3 semester hours.***

Number systems; Boolean algebra fundamentals; system reduction, combinational and sequential logic. PREREQ: ECE 1100. PRE-or-COREQ: ECE 2250L. F

### ***ECE 2250L Introduction to Digital Systems Laboratory: 1 semester hour.***

Laboratory experience in the construction of basic digital logic circuits and state machines. PRE-or-COREQ: ECE 2250. F

### ***ECE 2299 Experimental Course: 1-6 semester hours.***

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### ***ECE 3300 Electrical Circuits II: 3 semester hours.***

AC circuits, impedance and admittance. Design of passive and active filters. Three-phase circuits. Laplace transforms. Computer-aided circuit analysis. PREREQ: ECE 2200 and MATH 2240. PRE-or-COREQ: ECE 3300L and MATH 1175. S

### ***ECE 3300L Electrical Circuits II Laboratory: 1 semester hour.***

Laboratory experience emphasizing AC circuits. Includes impedance, admittance, frequency response, and computer-aided circuit analysis. PRE-or-COREQ: ECE 3300. S

### ***ECE 3310 Signals and Systems: 3 semester hours.***

Linear time-invariant systems, continuous and discrete; Fourier series, Fourier transforms; discrete Fourier transforms; Laplace transforms, z-transforms; state-space analysis. PREREQ: ECE 3300. PRE-or-COREQ: MATH 3360. F

### ***ECE 3320 Introduction to Electronics: 3 semester hours.***

Introduction to semiconductor theory, diodes, bipolar junction transistors and amplifiers, metal-oxide-semiconductor field effect transistors and amplifiers, and frequency response. PREREQ: CHEM 1111. PRE-or-COREQ: ECE 3300. S

### ***ECE 3340 Electromagnetics: 3 semester hours.***

Vectors and fields, electrostatics, magnetostatics, electrodynamics, Maxwell's equations, boundary value problems, plane and guided waves. PREREQ: ECE 3300, MATH 2275, and PHYS 2212; MATH 3360 recommended. F

### ***ECE 3360 Software Methodology and Tools for Electrical and Computer Engineering: 3 semester hours.***

Introduction to electrical engineering problem solving methods. Typical numerical and analytical problems in electrical engineering are examined. Introduction to mid or low-level procedural compiled languages and their applications to interface with hardware. PREREQ: CS 1181. F

### ***ECE 3399 Experimental Course: 1-6 semester hours.***

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### ***ECE 4400 Advanced Circuit Theory: 3 semester hours.***

Methods of analog electrical circuit analysis and synthesis. Topics include signal flow graphs, multi-port networks, simulation techniques, and topological methods for formulation of network equations. PREREQ: ECE 3300. D

### ***ECE 4410 Automatic Control Systems: 3 semester hours.***

Continuous-time control systems using both frequency-domain and state-space techniques. Topics include design methodology, performance specifications, analysis and design techniques. PREREQ: MATH 3360; and ECE 3310 or ME 4405. S

### ***ECE 4411 Applied Engineering Methods: 3 semester hours.***

Applied discrete and continuous probability, random variables, probability distributions, sampling, data description, parameter estimation, hypothesis testing, inference, correlation and linear and multiple regression. PREREQ: MATH 1175. S

### ***ECE 4412 Communication Systems: 3 semester hours.***

Basic principles of analysis and design of modern analog and digital communication systems, including transmission and reception. PREREQ: ECE 3310, ECE 3320 and ECE 4411. S

### ***ECE 4419 Digital Control Systems: 3 semester hours.***

Analysis and design of digital control systems, Z-transforms, transient response, stability, root locus, frequency response, design, state-space and state feedback. PREREQ: ECE 4410 D

### ***ECE 4420 Advanced Electronics: 3 semester hours.***

Introduction to operational amplifiers and their applications, current mirrors, active loads, differential amplifiers, feedback and stability, filters, oscillators, Schmitt triggers, power amplifiers and voltage regulators. PREREQ: ECE 3320. PRE-or-COREQ: ECE 4420L. S

### ***ECE 4420L Advanced Electronics Laboratory: 1 semester hour.***

Transistor biasing, amplifiers and other basic analog circuit designs. PRE-or-COREQ: ECE 4420. S

### ***ECE 4421 Introduction to VLSI Systems: 3 semester hours.***

Photolithography, CMOS Fabrication, MOSFET Operation, CMOS passive elements, design rules and layout, CAD tools for IC design, inverters, static logic and transmission gates, dynamic logic. PREREQ: ECE 2250, ECE 2250L, and ECE 3320. D

***ECE 4422 Mixed Signal Design and Synthesis: 3 semester hours.***

Analog IC design, Passive components, parasitic elements, component matching, IC layout techniques, amplifiers, current sources, comparators, op amps, noise, switched capacitor circuits. Includes lab work using design automation tools. PREREQ: ECE 4421. D

***ECE 4423 Semiconductor Processing and Fabrication: 3 semester hours.***

Silicon semiconductor processing and basic integrated circuit fabrication. Physics, chemistry and technology in basic processing steps in production of integrated circuits. PREREQ: ECE 4421 and PHYS 2212. D

***ECE 4424 Semiconductor Devices: 3 semester hours.***

Operating principles of basic building blocks of modern silicon-based semiconductor devices to include p-n junctions, field effect transistors and bipolar junction transistors. PREREQ: ECE 4421 and PHYS 2212. D

***ECE 4428 Advanced Semiconductor Devices: 3 semester hours.***

Review of semiconductor band theory. Opto-electronics, quantum mechanics, heterojunctions, power and microwave semiconductor devices. PREREQ: ECE 4424 or equivalent. D

***ECE 4442 Principles of Power Electronics: 3 semester hours.***

Introduction to steady state converter modeling and analysis. Principles of converter dynamics and control including controller design. PREREQ: ECE 3320. PREREQ-or-COREQ: ECE 4410. D

***ECE 4450 Advanced Digital Logic Design: 3 semester hours.***

Apply modern tools for behavioral and RTL modeling of digital logic circuits. Cover the systematic design of advanced digital systems using FPGA design flow, including functional verification, test-bench generation, timing analysis and design verification of combinational and sequential circuits including finite state machine for datapath control. PREREQ: ECE 2250 and ECE 2250L. S

***ECE 4451 Embedded Systems Engineering: 2 semester hours.***

Integration of algorithms, software and hardware to design real-time and embedded systems for signal processing and control. PREREQ: ECE 4460 or CS 1337. COREQ: ECE 4451L. S

***ECE 4451L Embedded Systems Engineering Laboratory: 1 semester hour.***

Design and implement embedded signal processing and control systems through the integration of algorithms, software, and hardware. PREREQ: ECE 4460 or CS 1337. COREQ: ECE 4451. S

***ECE 4460 Advanced Computer Architecture: 3 semester hours.***

Study of complete computer systems. Topics include: pipelining, parallel processing, hardware-software interfaces, interrupts, and performance measurement. PREREQ: ECE 2250, ECE 2250L, and ECE 3360 or CS 1337. F

***ECE 4460L Advanced Computer Architecture Laboratory: 1 semester hour.***

Design, modeling and simulation of a RISC processor. Implementation of the processor using FPGAs. PRE-or-COREQ: ECE 4460. F

***ECE 4470 Digital Signal Processing: 3 semester hours.***

Discrete, fast Fourier and Z-transforms, correlation, convolution, finite and infinite impulse response digital filter design, spectral analysis and adaptive digital filters. Includes projects. PREREQ: MATH 3360 and ECE 3310. S

***ECE 4481 Independent Problems: 1-3 semester hours.***

Students are assigned to, or request assignment to, independent problems on the basis of interest and preparation. May be repeated for a maximum of 6 credits. PREREQ: Permission of instructor. D

***ECE 4493 ECE Internship: 1-3 semester hours.***

For ECE students who have an approved internship. A final report is required including a discussion of the following elements: detailed description of internship project, project management skills developed, engineering design performed. May be repeated for a maximum of 6 credits. PREREQ: Approval of internship application. D

***ECE 4495 Capstone Design Project I: 3 semester hours.***

Current topics in Electrical and Computer Engineering. Initial selection of Senior Design projects. PREREQ: Permission of instructor and successful completion of all required ECE and CS courses numbered less than 4000 and ENGL 3307. F

***ECE 4496 Capstone Design Project II: 3 semester hours.***

Conceptual design of multidisciplinary projects. Design, analysis, and implementation of senior projects proposed and defined in ECE 4495. PREREQ: ECE 4495. S

***ECE 4499 Experimental Course: 1-6 semester hours.***

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