

# ELECTRICAL ENGINEERING (EEEN)

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## **EEEN 1201** Intro to Elec Engineering **2 SCH (1-3)**

Introduction to electrical engineering and its role in society. Electrical engineering skills, tools and techniques applied to problem solving and academic and professional survival strategies. Introduction to electrical circuits, electrical measurements, digital logic and ethics. Includes a writing component as well as use of computers (spreadsheets, tables, graphing and simulations). For students planning to pursue a career in electrical engineering or computer science.

Fee: \$5.00

## **EEEN 2323** Network Analysis I **3 SCH (3-0)**

Introduction to linear network analysis techniques. Phasor analysis and sinusoidal steady-state response. Single-phase and polyphase circuits.

Prerequisites: MATH 2414; Corequisites: PHYS 2326/PHYS 2126 and MATH 3320.

## **EEEN 2340** Digital Logic Design **3 SCH (3-0)**

Hardware implementation of arithmetic and logical functions, organization and design of digital systems. Prerequisites: CSEN 2304.

## **EEEN 3212** Circuits and Electronics Lab **2 SCH (1-3)**

Laboratory course to correlate with circuits and electronics. Prerequisite: credit for or registration in EEEN 3325.

Fee: \$5.00

## **EEEN 3321** Network Analysis II **3 SCH (3)**

Two-port networks, Fourier analysis, time domain response, transient response and Laplace transform techniques. Prerequisites: EEEN 2323, CSEN 2304 and MATH 3320.

## **EEEN 3324** Electromagnetics **3 SCH (3-0)**

Vector analysis, electrostatics, steady magnetic fields. Maxwell's equations, uniform plane waves, circuit concepts, propagation and radiation.

Prerequisites: PHYS 2326/PHYS 2126 and MATH 3320.

## **EEEN 3325** Electronics I **3 SCH (3-0)**

Solid state fundamentals. Nonlinear devices and networks. Fabrication of integrated circuits. Two-port models. Prerequisites: EEEN 2323 and PHYS 2326/PHYS 2126.

## **EEEN 3331** Circuits and Electromag Devices **3 SCH (3-0)**

General network analysis, steady-state AC/DC circuits. Energy conversion and applications. Prerequisite: PHYS 2326/2126.

## **EEEN 3333** Linear Systems and Signals **3 SCH (3-0)**

Signal representation, sampling and quantization, Laplace and z-transforms, transfer functions and frequency response, convolution, stability, Fourier series, Fourier transforms and applications. Prerequisite: EEEN 3321.

## **EEEN 3334** Random Signals **3 SCH (3-0)**

Probability, random variables, white noise and band-limited system, narrowband Gaussian process, pseudorandom signals and random signal response of linear systems. Prerequisite: MATH 2414.

## **EEEN 3449** Microprocessor Systems **4 SCH (3-3)**

Basic computer structure, the instruction set, addressing modes, assembly language programming, assembly language subroutines, arithmetic operations, programming in C, implementation of C procedures, elementary data structures, input and output and a survey of microprocessor design.

Prerequisites: EEEN 2340.

Fee: \$5.00

## **EEEN 4224** Elec & Compu Eng Proj Lab (WI) **2 SCH (6)**

Participation in engineering design activity. Prerequisite: EEEN 4252.

Fee: \$5.00

## **EEEN 4252** Advanced Laboratory **2 SCH (1-3)**

Capstone design project development to completion over two semesters in EEEN 4252 and EEEN 4224. The design project will take into account global, societal, environmental and economic constraints to solve or analyze practical electrical engineering problems. Students first research and develop a Capstone Design Project proposal in EEEN 4252 and then complete the design in EEEN 4224. The two-course sequence is normally taken in the final academic year prior to graduation. Prerequisites: EEEN 3212, EEEN 3333, EEEN 3449 and communication elective.

Fee: \$5.00

## **EEEN 4310** Intro to VLSI Circuit Design **3 SCH (3-0)**

Introduction to design and fabrication of micro-electronic circuits via Very Large Scale Integrated circuitry (VLSI); structured design methods for VLSI systems, use of computer-aided design (CAD) tools and design projects of small to medium scale integrated circuits. Prerequisites: EEEN 3325 and EEEN 2340.

## **EEEN 4329** Communications Engineering **3 SCH (3-0)**

Transmission of information. Probability, stochastic process and spectral analysis. Sampling, quantization, decision theory, coding and decoding.

Digital communication system and secure communications. Introduction to DSP. Prerequisites: EEEN 3333 and EEEN 3334.

**EEEN 4335 Special Problems 1-3 SCH (1-3)**

Individual solution of selected problems in electrical engineering conducted under direct supervision of a faculty member. May be repeated for up to 6 hours. Prerequisite: consent of instructor.

**EEEN 4336 Selected Topics 1-3 SCH (1-3)**

One or more topics of electrical engineering. May be repeated when topic changes. Prerequisite: consent of instructor.

**EEEN 4340 Power Electronics 3 SCH (2-3)**

Classical and modern design and analysis methods of power electronic circuits and the feedback control designs of power electronic converters and related laboratory experiments. Topics include diode rectifiers, thyristor converters, DC-DC converters and associated controls, DC/AC inverters, power-factor correction and control, isolated switch-mode power supplies, applications of power electronic converters and related hardware and virtual laboratory experiments. Prerequisite: EEEN 3325 or consent of instructor.

**EEEN 4342 Electronic II 3 SCH (3-0)**

Analysis and design of analog electronic circuits; differential, multistage and power amplifiers; frequency response; feedback and stability. Prerequisite: EEEN 3325.

**EEEN 4343 Microprocesr Based Contrl Syst 3 SCH (3-0)**

Design of micro-controller based real-time control systems. Application of theoretical principles in electrical engineering to control small-scale systems, such as a mobile robot incorporating sensors, actuators and intelligence. Controller design; signal conditioning and drive circuits for interfacing with various sensors and actuators; ; programming and programmable logic controllers. Prerequisites: EEEN 3333 and EEEN 3449.

**EEEN 4344 Computer Architectr and Design 3 SCH (3-0)**

Basic computer organization, data representation and arithmetic, instruction sets and addressing modes, assembly language, data path and control, memory, input and output and communication. Prerequisites: EEEN 3449 or CSEN 2330, EEEN 2340.

**EEEN 4354 Linear Control Systems 3 SCH (2-3)**

Analysis and design techniques for linear feedback control systems. Controller functions and compensation, applications to serve and process control problems. Prerequisite: EEEN 3333.

**EEEN 4355 Digital Systems Engineering 3 SCH (2-3)**

Principles in digital system design and testing, digital integrated circuits, digital system design with PLDS and FPGAS, introduction to an HDL, memory, microprocessors and design for testability. Prerequisites: EEEN 3325 and EEEN 2340.

Fee: \$5.00

**EEEN 4357 Wireless Sensor Networks 3 SCH (3-0)**

Foundations of wireless sensor networks, localization, routing, optimization, security, energy-aware systems and algorithms, design/analysis and applications of wireless sensor networks. Prerequisites: Completed General Education natural sciences requirement.

**EEEN 4358 Embedded Systems 3 SCH (2-3)**

System level embedded design exploring hardware/software co-design, Linux sysfs, bash shell, firmware partitioning, I/O interfaces, IP cores, system specifications to hardware-software implementation and synthesis. Prerequisites: EEEN 3449 and EEEN 4355.

**EEEN 4360 Robotics II 3 SCH (3-0)**

Multidisciplinary development to robotics, combining concepts from electrical engineering, mechanical engineering and computer science. Topics include sensing, communication, localization, planning and navigation. Prerequisite: MEEN 4355 or consent of instructor.

**EEEN 4362 Image Proc and Biometrics 3 SCH (3-0)**

Basic image processing: intensity transformations, spatial and frequency domain filters, image restoration, and compression. Biometric applications: fingerprint and facial recognition; biometric issues: privacy, legal concerns, testing, and standards. Prerequisite: EEEN 3333 or consent of instructor.

**EEEN 4422 Electric Drives 4 SCH (3-3)**

Introduction to power electronic converters for motor drives and controls, single and three phase transformers, DC motors and generators, feedback control design of DC motor drives, PMAC drives, synchronous generators, induction motor drives, speed and vector control of induction motor drives. Laboratory experiments to identify electric machine parameters and characteristics, and DC/AC motor drive controls, by designing and conducting experiments using digital computers. Prerequisite: EEEN 3321.

Fee: \$5.00