

Electrical Engineering

Courses

EENG 1108 Object-Oriented Programming: 3 semester hours

Prerequisite: CMP SCI 1250 or equivalent programming experience. Introduction to programming concepts using object-oriented programming (OOP). Topics include classes, objects, encapsulation, inheritance, polymorphism, data structures, recursion, and algorithms. Laboratory work emphasizes solving engineering problems using C++/Java.

EENG 2310 Circuit Analysis I: 3 semester hours

Prerequisite(s): MATH 1900, PHYSICS 2111/PHYSICS 2111L and concurrent enrollment in MATH 2020. This course introduces basic circuit analysis techniques. Topics include Ohm's Law, Kirchhoff's Laws, nodal and mesh analysis, Thevenin and Norton equivalents, superposition, first- and second-order circuits, and sinusoidal steady-state analysis. Laboratory sessions emphasize hands-on circuit design, measurement, and use of simulation software.

EENG 2320 Circuit Analysis II: 3 semester hours

Prerequisite(s): EENG 2310. Continuation of Circuit Analysis I. Topics include AC power analysis, three-phase circuits, magnetically coupled circuits, frequency response, resonance, two-port networks, Fourier analysis, and filters. Laboratory exercises focus on advanced circuit simulation, instrumentation, and experimental validation.

EENG 2800 Digital Circuit Design with Verilog/VHDL: 4 semester hours

Prerequisite(s): EENG 1108 or consent of instructor. An introduction to digital logic circuits and hardware description languages. Topics include Boolean algebra, logic gates, combinational and sequential logic design, finite-state machines, memory devices, programmable logic devices, and FPGA implementation. Laboratory emphasizes digital circuit design using Verilog/VHDL and FPGA platforms.

EENG 3300 Engineering Electromagnetics: 3 semester hours

Prerequisite(s): MATH 2000 and PHYSICS 2112. This course introduces engineering applications of electromagnetic fields. Topics include vector analysis, electrostatics, magnetostatics, Maxwell's equations, wave propagation, transmission lines, waveguides, and antenna fundamentals.

EENG 3310 Electronic Circuits I and PCB Design: 4 semester hours

Prerequisite(s): EENG 2320. Study of electronic devices and basic circuit applications. Topics include semiconductor physics, diodes, bipolar junction transistors (BJTs), field-effect transistors (FETs), biasing techniques, and small-signal models. Laboratory includes SPICE simulation, breadboarding, and printed circuit board (PCB) design and fabrication.

EENG 3320 Electronic Circuits II: 3 semester hours

Prerequisite(s): EENG 3310. Continuation of Electronic Circuits I. Topics include amplifier design, frequency response, feedback, operational amplifiers, oscillators, power amplifiers, and introduction to analog integrated circuits. Laboratory emphasizes amplifier testing, simulation, and practical implementation.

EENG 3410 Electromechanical Energy Conversion: 4 semester hours

Prerequisite(s): EENG 2320. Study of electromagnetic principles applied to electromechanical devices. Topics include transformers, DC machines, induction motors, synchronous machines, power electronics basics, and energy conversion efficiency. Laboratory involves motor/generator testing, measurement of performance characteristics, and simulations.

EENG 3500 Signals and Systems: 3 semester hours

Prerequisite(s): MATH 2020. Study of continuous- and discrete-time signals and systems. Topics include convolution, Fourier series, Fourier transform, Laplace transform, z-transform, sampling, and system response. Applications to communications, control systems, and digital signal processing.

EENG 3800 Communications Systems: 3 semester hours

This course introduces analog and digital communication systems. Topics include Fourier analysis of signals, modulation techniques (AM, FM, PM, PCM, ASK, PSK, QAM), sampling theory, noise analysis, error detection/correction, and introduction to wireless communication.

EENG 3900 Microprocessor System Design with C/C++: 3 semester hours

Prerequisite(s): EENG 2800. This course focuses on microprocessor and microcontroller-based system design. Topics include instruction set architecture, assembly language, C/C++ programming for embedded systems, input/output interfaces, interrupts, memory systems, and real-time applications. Laboratory emphasizes hands-on programming and interfacing with hardware.

EENG 4100 Computer Architecture: 3 semester hours

Prerequisite(s): EENG 3900. This course explores the structure and organization of computer systems. Topics include CPU architecture, instruction set design, pipelining, memory hierarchy, input/output subsystems, multiprocessors, and performance optimization. Laboratory includes assembly language programming and computer system simulation.

EENG 4108 Artificial Intelligence and Deep Learning: 3 semester hours

Prerequisite(s): Senior standing in Electrical Engineering. This course introduces machine learning, neural networks, and deep learning applications in electrical engineering. Topics include supervised and unsupervised learning, convolutional and recurrent neural networks, reinforcement learning, and AI applications in signal processing, image recognition, and robotics. Laboratory involves Python/TensorFlow projects.

EENG 4300 Advanced Digital System Design with FPGA: 4 semester hours

Prerequisite(s): EENG 2800. Advanced digital system design using field-programmable gate arrays (FPGAs). Topics include system-level modeling, finite-state machine implementation, digital signal processing applications, high-level synthesis, and system-on-chip concepts. Laboratory emphasizes FPGA prototyping with Verilog/VHDL.

EENG 4410 Control Systems: 3 semester hours

Prerequisite(s): EENG 3500. Introduction to analysis and design of feedback control systems. Topics include system modeling, time- and frequency-domain analysis, stability criteria, root locus, Bode and Nyquist plots, PID controllers, and state-space methods. Laboratory emphasizes MATLAB/Simulink and hardware-in-the-loop experiments.

EENG 4980 Senior Design I: 2 semester hours

Prerequisite(s): Senior standing in Electrical Engineering. The first course in a two-semester capstone sequence. Students work in teams to propose, plan, and begin development of a significant engineering design project. Emphasis on project definition, feasibility analysis, research, design planning, and ethics.

EENG 4990 Senior Design II: 2 semester hours

Prerequisite(s): EENG 4980. Continuation of Senior Design I. Students complete, test, and present their projects. Emphasis on implementation, evaluation, professional documentation, teamwork, and oral/written presentation of engineering results.

EENG 4998 Special Topics in Electrical Engineering: 3 semester hours

Prerequisite(s): Senior standing or consent of instructor. This course covers advanced topics in electrical engineering selected from specialized areas of electrical engineering such as power systems, digital signal processing, robotics, advanced communications, VLSI, or renewable energy systems. May be repeated for credit provided the subject is different.