

ELECTRICAL ENGINEERING (ELECTENG)

ELECTENG 1020 Electrical Engineering Projects and Tools 1 Credit

Hands-on electrical-engineering laboratory projects such as audio amplifiers, LEDs, digital logic, and electric-motor measurements.

Components: Laboratory

ELECTENG 1210 Circuit Modeling I 3 Credits

Voltage, current, resistance, and impedance. Opamps. Phasors. Ohm's law, Kirchhoff's laws, superposition, and Thevenin's and Norton's theorems applied to the modeling of zero-order networks. Complex numbers and algebra.

Components: Laboratory, Class

Prereqs/Coreqs: P. "C-" or better in MATH 2640

ELECTENG 2210 Circuit Modeling II 4 Credits

Phasors and sinusoidal steady-state analysis and power. Resonant circuits. Mutual inductance. Transient response of linear networks with Laplace transform.

Components: Discussion, Class, Laboratory

Prereqs/Coreqs: P. "C-" or better in ELECTENG 1210 and MATH 2740

ELECTENG 2780 Logic and Digital Design 4 Credits

Introduction to digital logic. Boolean algebra. MSI and LSI. Combinational and sequential network design, prototyping, and testing. State machine design and implementation. Introduction to HDL and programmable logic devices.

Components: Laboratory, Discussion, Class

Prereqs/Coreqs: P. Sophomore Standing and "C-" or better in ((ELECTENG 1020 OR ENGRPHYS 1020) AND MATH 2640) OR ELECTENG 1210 OR COMPUTER 2430

ELECTENG 3020 Analog Electronics 4 Credits

Diode circuits. Biasing of semiconductor devices. Analysis and design of linear amplifiers. Use of opamps.

Components: Discussion, Class, Laboratory

Prereqs/Coreqs: P. "C-" or better in ELECTENG 2210

ELECTENG 3130 Solid State Electronic Devices 4 Credits

Physics of semiconductor devices. Energy band diagrams, Fermi levels, and Fermi-Dirac statistics. Metal-semiconductor and p-n junctions. Functioning of diodes, BJT's, FET's, and thyristors. Small signal equivalent circuits. Nonlinear modeling using computers.

Components: Discussion, Laboratory, Class

Prereqs/Coreqs: P. "C-" or better in ELECTENG 2210, PHYSICS 3140 and MATH 3630

ELECTENG 3140 Electric and Magnetic Fields 3 Credits

Electrostatics, magnetostatics, Maxwell's equations, plane waves, and transmission lines.

Components: Class

Cross Offering: ENGRPHYS 3640

Prereqs/Coreqs: P. "C-" or better in ELECTENG 2210, MATH 2840, MATH 3630 and PHYSICS 2340

ELECTENG 3210 Engineering Computation 3 Credits

Introduction to Matlab programming. Applications of Matlab to probabilistic analysis of communication systems, statistical analysis of product yields, matrix and state-space analyses of control systems and power systems, etc.

Components: Class

Prereqs/Coreqs: P. A grade of C- or better in MATH 3630 and ELECTENG 2210

ELECTENG 3220 Signals and Systems 4 Credits

Linear time invariant (LTI) systems. Convolution, differential equations, Fourier Series, Fourier Transforms (with applications, eg. filtering, modulation, sampling), Laplace transforms. Transfer functions, frequency response, and Bode plots.

Components: Laboratory, Discussion, Class

Prereqs/Coreqs: P. "C-" or better in ELECTENG 2210 and MATH 3630

ELECTENG 3320 Automatic Controls 4 Credits

Analysis and synthesis of single-input, single output linear time-invariant systems are considered through classical Laplace transform methods such as root-locus and frequency-domain techniques. The computer simulations demonstrate practical application of the concepts.

Components: Discussion, Laboratory, Class

Prereqs/Coreqs: P. "C" or better in ELECTENG 3220

ELECTENG 3410 Introduction to Electrical Machines and Power Systems 4 Credits

Introduction to electromechanics, generators, transformers, transmission lines, motors and network analysis.

Components: Laboratory, Discussion, Class

Prereqs/Coreqs: P. ELECTENG 2210 with a "C-" or better or GENENG 2930 with a "B" or better and PHYSICS 2340 with a "B" or better

ELECTENG 3780 Computer Architecture 4 Credits

Introduction to microprocessor assembly language programming. Fundamentals of microprocessor architecture, data representation, and arithmetic. System debugging. Interfacing and interrupts. Microprocessor- and microcontroller-based system design, testing, and implementation.

Components: Discussion, Class, Laboratory

Prereqs/Coreqs: P. "C-" or better in COMPUTER 1430 and ELECTENG 2780

ELECTENG 3900 Introduction to Engineering Systems Design 2 Credits

This course provides the knowledge and skills necessary to translate needs and priorities into system requirements, and develop derived requirements, which together form the starting point for engineering of complex systems. Students will develop an understanding of the larger context in which requirements for a system are developed and learn about trade-offs between developing mission needs or market opportunities first versus assessing available technology first. Techniques for translating needs and priorities into an operational concept and then into specific functional and performance requirements will be presented. Students will assess and improve the usefulness of requirements, including such aspects as correctness, completeness, consistency, measurability, testability, and clarity of documentation. The course explores the role of techniques such as decision analysis, cost-benefit analysis, and risk assessment. Students will understand the limitations of the way that current systems engineering is practiced in terms of dealing with complexity, lifecycle uncertainty and other factors.

Components: Laboratory, Class

Prereqs/Coreqs: P. "C-" or better in ELECTENG 1210 and ELECTENG 2780

ELECTENG 3950 Electrical Engineering Cooperative Education 2 Credits

Work experience in industry under the direction of the College of Engineering, Mathematics and Science Cooperative Education and Internship Program. During co-op the student is expected to be away from his/her studies at UW-Platteville and work for an industry for a semester and summer. Credits do not fulfill graduation requirements.

Components: Field Studies

ELECTENG 3970 Electrical Engineering Internship 1 Credit

Work experience in industry under the direction of the department chair and College of Engineering, Mathematics and Science Cooperative Education and Internship Program. NOTE: This program is separate and distinct from the cooperative education program and is principally designed to cover the summer work experience. Internship is designed to provide experiential learning experience to the student during the summer period. Credits do not fulfill graduation requirements.

Components: Field Studies

Prereqs/Coreqs: P. Junior standing

ELECTENG 4040 Analog IC Design 4 Credits

Design of integrated electronic circuits such as operational amplifiers, oscillators, modulators, and A/D converters.

Components: Discussion, Laboratory, Class

Prereqs/Coreqs: P. "C-" or better in ELECTENG 3220 and ELECTENG 3020 and ELECTENG 3130

ELECTENG 4060 Electronic Communications 4 Credits

The overall goal of the course is to present the topics of analog and digital communication. Among the topics covered are: signal spectra, transceiver architecture, output amplifier, oscillators, AM and FM systems, base-band and pass-band digital communication.

Components: Discussion, Laboratory, Class

Prereqs/Coreqs: P. ELECTENG 3220 and ELECTENG 3020

ELECTENG 4260 Measurements and Instrumentation 4 Credits

The overall goal of the course is to present the topics of sensors and instrumentation, and their use within measurement systems, as an integrated and coherent subject. Among the topics covered are: measurement characteristics, error analysis, noise and interference in instrumentation systems, signal conditioning and filtering, transducers, sensor applications, data acquisition, and digital interfaces.

Components: Class, Laboratory, Discussion

Prereqs/Coreqs: P. 'C-' or better in (ELECTENG 3020, ELECTENG 3210, ELECTENG 3220) and senior standing

ELECTENG 4310 Modern Control Systems 4 Credits

Analysis and synthesis of linear-time invariant (LTI) continuous-time systems are considered using the techniques of matrix theory, linear algebra and Laplace transform. Among topics to be discussed are: Jacobian linearization technique; Concepts of Lyapunov stability; Kalman controllability and observability; Linear quadratic optimal control regulator; Duality; Static state feedback and observer-based compensation techniques.

Components: Laboratory, Class

Prereqs/Coreqs: P. "C-" or better in (ELECTENG 3210 and ELECTENG 3320)

ELECTENG 4320 Digital Signal Processing 4 Credits

Discrete time systems, sampling, Z transforms, discrete-time Fourier Transforms, discrete Fourier series, discrete Fourier transform, FFT, frequency response of linear time invariant systems. Design of FIR and IIR digital filters.

Components: Laboratory, Class

Prereqs/Coreqs: P "C-" or better in (ELECTENG 3220 and COMPUTER 1430)

ELECTENG 4350 Discrete Time Control Systems 4 Credits

Analysis and synthesis of discrete-time and sampled-data systems are considered using Z-transform methods, matrix theory, and linear algebra. Among the topics discussed are: Discrete equivalence of continuous-time transfer functions; Stability theory of discrete-time and sampled-data systems; Frequency-domain analysis and design of sampled-data systems; Digital control design using state-space methods.

Components: Discussion, Laboratory, Class

Prereqs/Coreqs: P "C-" or better in (ELECTENG 3210, ELECTENG 3320) and Senior Standing

ELECTENG 4360 Intelligent Control 4 Credits

This course introduces students to Intelligent Control and its applications. Principles of Artificial Intelligence, which includes Expert System, Fuzzy Logic, and Artificial Neural Networks are covered. The course includes project-based assignments.

Components: Class, Laboratory

Prereqs/Coreqs: P "C-" or better in ELECTENG 3320 or MECHENG 4330

ELECTENG 4430 Power Electronics 4 Credits

Power electronic switches, converter systems: AC-to-AC, AC-to-DC, DC-to-DC, and DC-to-AC; harmonics; real and complex power in power electronic systems..

Components: Laboratory, Class

Prereqs/Coreqs: P "C-" or better in ELECTENG 3020 and ELECTENG 3410

ELECTENG 4440 Electric Motor Drives 4 Credits

Theory and operation of modern AC electric motor drives, multiple reference frame theory for three-phase AC system, dynamic modeling of induction machines, operation of the fully controlled three-phase power converters, speed and torque control of induction motors, Voltage/Hertz control, permanent magnet synchronous motor drives, DC motor drives.

Components: Laboratory, Class

Prereqs/Coreqs: P "C-" or better in ELECTENG 3020 and ELECTENG 3320 and ELECTENG 3410

ELECTENG 4450 Power Systems Analysis and Design 4 Credits

Power systems modeling, load flow, economic dispatch, stability, fault analysis, computer simulation and systems analysis.

Components: Discussion, Laboratory, Class

Prereqs/Coreqs: P "C-" or better in (ELECTENG 3410 and ELECTENG 3210) and senior standing

ELECTENG 4720 Computer Organization and Design 4 Credits

Computer architecture including processor design, microprogrammed control, memory organization, interconnection structures, input/output, interfacing techniques, and parallel processing.

Components: Laboratory, Class

Prereqs/Coreqs: P "C-" or better in ELECTENG 3780

ELECTENG 4750 Advanced Digital Design 4 Credits

Introduction to semi-custom integrated circuit design; design methodology (design entry, simulation, cell placement, and macro libraries); optimization of designs based on macro libraries; design for testability; logic simulation; placement and routing algorithms for gate arrays and standard cells; PLA-based programmable logic devices; programmable gate arrays; design projects using CAD systems.

Components: Laboratory, Class

Prereqs/Coreqs: P a "C-" or better in ELECTENG 3780 and senior standing

ELECTENG 4900 Senior Design I 1 Credit

Senior design I provides students with experience in solving engineering problems working in groups on open-ended design problems. Students refine skills in information gathering, analysis of market and technical considerations, critical thinking of project/design scope and effective communication of project/design objectives. This course builds on previous knowledge and applies it to a global consideration of design criteria to a specific projects provided by relevant faculty. The engineering-based projects may be faculty initiated or sponsored and guided by regionally based industry.

Components: Laboratory, Class

Prereqs/Coreqs: P ELECTENG 3900

ELECTENG 4930 Senior Design II 3 Credits

Students continue the team-based project work begun in the prior term, ELECTENG 4900, Senior Design I. Product design methodology is employed, in the context of teamwork and communications, to move from product specifications to a functional engineering prototype, satisfying customer's requirements. Design trade-offs are reconciled, and students experience prototype testing and iteration. Oral and written communications are important elements, throughout the course, as are the techniques of project management.

Components: Laboratory, Class

Prereqs/Coreqs: P. ELECTENG 4900

ELECTENG 4940 Undergraduate Research 1-3 Credits

Introduction to research methods in electrical engineering, literature review, data analysis, and design.

Components: Research

Prereqs/Coreqs: P. Junior standing and permission of department chair

ELECTENG 4980 Current Topics in Engineering 1-4 Credits

In depth study of a current topic of interest to the engineering profession. The topic to be covered will be identified in the course title.

Components: Class

ELECTENG 4990 Independent Study 1-3 Credits

Advanced study in area of specialization selected by student and approved by faculty member.

Components: Independent Study