ELECTRICAL ENGINEERING TECHNICAL ELECTIVES

A. PROFESSIONAL EMPHASIS (24 Credits Required)

Each student shall complete a total of 24 credits from the list below, as follows:

1. At least one emphasis, consisting of one of: EE 4260, EE 4350, EE 4450, or EE 4750 from the chosen emphasis and at least 4 more credits at the 4000 level from that emphasis area.

2. At least one more course from the above list outside of the chosen emphasis.

The following are the list of courses in each emphasis.

Communications and Electronics: EE 3130; EE 4040; EE 4060; EE 4430; EE 4980*; EE 4990*.

Computers: EE 3780; EE 4720; EE 4750; EE 4980*; EE 4990*.

Controls: EE 3320; EE 4310; EE 4320; EE 4350; EE 4980*; EE 4990*.

Power and Energy: EE 3410; EE 4430; EE 4440; EE 4450; EE 4980*; EE 4990*.

*NOTE: Only by approval of the chairperson.

A. ENGINEERING SCIENCE ELECTIVES (6 Credits Required)

GE 2130, Statics (3 credits)
GE 2220, Dynamics (2 credits) or GE 2230 Dynamics (3 credits)
GE 2340, Mechanics of Materials (4 credits)
GE 2630, Basic Thermoscience (3 credits) or ME 2630 Thermodynamics* (3 credits)
MSNT 3940, Principles and Applications of Nanotechnology (4 credits)

*NOTE: Only by approval of the ME chairperson.
### COURSES OF INSTRUCTION - ELECTRICAL ENGINEERING

**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. Laboratory, 2 hours. F, S


**2220. Signals and Systems**: 4 credits. Linear system modeling with differential equations, Laplace transforms, and convolution. Transfer functions, frequency response, and Bode plots. Lecture, 3.5 hours; laboratory, 1 hour. Prerequisite: EE 2210 and Math 2840. Corequisite: Math 3630. F, S

**3020. Analog Electronics**: 4 credits. Diode circuits. Biasing of semiconductor devices. Analysis and design of linear amplifiers. Use of opamps. Lecture, 3 hours; laboratory, 2 hours. Prerequisite: EE 2210. F, S


**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 analysis of control systems and power systems, etc. Prerequisites: Math 2840, EE 2220. F, S

**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. Lecture 3 hours, laboratory 2 hours. Prerequisite: EE 2220. F, S

**3410. Electric Power Engineering**: 4 credits. Introduction to electromechanics, generators, transformers, transmission lines, motors, and network analysis. Lecture, 3 hours; laboratory 2 hours. Prerequisite: Phys 2340 and GE 2930 with grade of B, or better, OR EE 2210. F, S

**3770. 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. Lecture 3 hours; laboratory 2 hours. Prerequisite: C- or better in EE 1210 or EE 1020 and Computer 3230. F, S

**3780. Introduction to Microprocessors**: 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. Lecture 3 hours; laboratory 2 hours. Prerequisites: COSC 1430, EE 3770. F, S

**3950. Electrical Engineering Cooperative Education**: 4 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. Minimum cumulative GPA of 2.50 is recommended for participation. F, S

**3970. Electrical Engineering Internship**: 1 credit. Work experience in industry under the direction of the 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. Summer

**4040. Analog IC Design**: 4 credits. Design of integrated electronic circuits such as operational amplifiers, oscillators, modulators and A/D converters. Lecture, 3 hours, laboratory 3 hours. Prerequisites: EE 2220, EE 3020, and EE 3130. F Odd Years

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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. Lecture, 3 hours; laboratory, 3 hours. Prerequisites: EE 2220 and EE 3020.  

4260. **Measurement 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. Lecture, 3 hours; laboratory, 3 hours. Prerequisites: EE 2220 and EE 3020.  

4310. **Modern Control Systems**. 4 credits. State space modeling of systems, solution of state equations, controllability and observability, Liapunov stability, minimum realization, and state feedback design. Lecture, 3 hours; laboratory, 3 hours. Prerequisite: EE 3320.  

4320. **Digital Signal Processing**. 4 credits. Discrete time systems, frequency response of linear time invariant systems, Z transforms, discrete Fourier transform, FFT. Design of FIR and IIR digital filters. Lecture, 3 hours; laboratory, 3 hours. Prerequisite: EE 2220.  

4350. **Discrete Time Control Systems**. 4 credits. Z-transforms, sampling theory, analysis and design of digital control systems. Lecture, 3 hours; laboratory, 3 hours. Prerequisite: EE 3320.  

4430. **Power Electronics and Electrical Machines**. 4 credits. DC machines and DC machine control; 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. Lecture, 3 hours; laboratory, 3 hours. Prerequisites: EE 3020 and EE 3410.  

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 fully controlled three-phase power converters, speed and torque control of induction motors, Voltage/Hertz control, permanent magnet synchronous motor drives, DC motor drives. Lecture 3 hours; laboratory 3 hours. Prerequisites: EE 3020, EE 3320, and EE 3410.  

4450. **Power Systems Analysis and Design**. 4 credits. Power systems modeling, load flow, economic dispatch, stability, fault analysis, computer simulation and systems analysis. Lecture, 3 hours; laboratory, 3 hours. Prerequisite: EE 3410.  

4720. **Microcomputer Architecture and Interfacing**. 4 credits. Computer architecture including processor design, microprogrammed control, memory organization, interconnection structures, input/output, interface techniques, and parallel processing. Lecture, 3 hours; laboratory, 3 hours. Prerequisite: EE 3780.  

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. Lecture, 3 hours; laboratory, 3 hours. Prerequisites: EE 3140 and EE 3780. Corequisite: EE 3130.  

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. Prerequisite: consent of instructor.  

4990. **Independent Study**. 1-3 credits. Advanced study in area of specialization selected by student and approved by faculty member. Prerequisite: consent of department chairperson.  

**NOTE:** This course may require the purchase of expendable supplies by the student.