ELECTRICAL ENGINEERING (EE)

EE 2400. Circuits I.
This course provides an introduction to the profession of Electrical Engineering and its specialties. Fundamental DC and sinusoidal steady-state circuit analysis techniques include Ohm’s law, power, Kirchhoff’s laws, and Thevenin and Norton equivalent circuits. Prerequisites: MATH 2471
4 Credit Hours. 3 Lecture Contact Hours. 2 Lab Contact Hours.
Grade Mode: Standard Letter

EE 2420. Digital Logic.
An introduction to fundamental computer technologies, including Boolean logic design, logic circuits and devices, and basic computer hardware are studied. Laboratories provide hands-on experience with electricity, combinational and sequential digital circuits, and computer hardware. Prerequisite: CS 1428 with a grade of “C” or higher
4 Credit Hours. 3 Lecture Contact Hours. 2 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

EE 3340. Electromagnetics.
Wave propagation, Maxwell’s equations, transmission lines, wave guides, and antennas. Prerequisites: MATH 3373 and PHYS 2435 with grades of "C" or higher. Co-requisite: EE 3300 or EE 3400
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

EE 3350. Electronics I.
Analysis and design of active device equivalent circuits with emphasis on transistors, switching circuits, and operational amplifiers. Prerequisites: EE 3300 or EE 3400
3 Credit Hours. 3 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

EE 3355. Solid State Devices.
Semiconductor materials, principles of carrier motion, operating principles and circuit models for diodes, bipolar transistors and field-effect transistors. Introduction to integrated circuits. Prerequisites: EE 3300 or EE 3400
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

EE 3370. Signals and Systems.
Frequency domain representation of signals and systems and frequency domain concepts for circuit analysis and design. Transfer function and frequency response, Laplace and z-transforms, Fourier series, Fourier transform, and sampling. Prerequisites: EE 3300 or EE 3400
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

EE 3400. Circuits II.
This course includes a brief review of EE 2400, transient analysis, application of Laplace transforms, Bode plots, and network principles. Materials learning in EE 2400 is extended and applied here. Prerequisites: EE 2400 and MATH 3323
4 Credit Hours. 3 Lecture Contact Hours. 2 Lab Contact Hours.
Grade Mode: Standard Letter

EE 3420. Microprocessors.
Introduction to microprocessors, principles of operation, assembly language programming, timing analysis, and I/O interfacing. Prerequisites: EE 2420
4 Credit Hours. 3 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Writing Intensive
Grade Mode: Standard Letter

EE 4321. Digital Systems Design Using HDL.
This course will cover the design of digital systems using HDL including implementation of custom microprocessor and peripheral architectures. Prerequisite: EE 3420 with a grade of "C" or higher
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

This course provides the necessary fundamental techniques to analyze and process digital images. It covers principles, concepts, and techniques of digital image processing and computer vision. Prerequisites: CS 1428 and EE 3420 with grades of "C" or higher
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

EE 4350. Electronics II.
Analysis and design of integrated circuits, feedback, and frequency response. Prerequisites: EE 3350
3 Credit Hours. 3 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

EE 4351. Fundamentals of Electroceramics.
Introduction to binary and ternary phase diagrams, non-centro-symmetric crystal structures and symmetry groups, nonlinear dielectrics (including ferroelectricity, piezoelectricity, pyroelectricity), nonlinear magnetics, oxide wideband gap semiconductors, detectors and sensors, brief introduction to MEMS, radhard electronics, and spintronics technology. Research oriented labs related to materials processing, characterization, fabrication, and testing. Prerequisite: ENGR 2300 or equivalent; Co-requisite: EE 3355; GPA of 2.25 or higher
3 Credit Hours. 3 Lecture Contact Hours. 3 Lab Contact Hours.
Grade Mode: Standard Letter

EE 4352. Introduction to VLSI Design.
Analysis of design of CMOS integrated circuits. Introduction to CAD tools for VLSI design. Prerequisites: CS 2420, EE 2420, and EE 3350 with grades of "C" or higher
3 Credit Hours. 3 Lecture Contact Hours. 1 Lab Contact Hour.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

EE 4353. Fundamentals of Advanced CMOS Technology.
Key concepts of advanced semiconductor technology including Moore’s law, transition from NMOS to CMOS, CMOS scaling, high-K gate dielectrics, metal electrodes, source/drain scaling technology, new channel materials replacing silicon, and three dimensional device structures. Prerequisite: EE 3355 with a grade of "C" or higher
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter
EE 4354. Flexible Electronics.
This course will cover the materials systems, processes, device physics and applications of flexible electronics. The materials range from amorphous and nanocrystalline silicon, organic and polymeric semiconductors to solution cast films of carbon nanotubes. Real device discussions include high speed transistors, photovoltaics, flexible flat-panel displays, medical image sensors, etc. Prerequisites: EE 3350, EE 3355, and EE 4350 with grades of “C” or higher, or permission of the instructor
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

EE 4355. Analog and Mixed Signal Design.
Operational amplifier design applications, feedback, offset, stability, and compensation. Introduction to random signals and noise, discrete time circuitry analog-to-digital converters, and digital-to-analog converters. Prerequisites: EE 3370 and EE 4350
3 Credit Hours. 3 Lecture Contact Hours. 2 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

EE 4358. Introduction to Microelectromechanical Systems.
This course will cover fabrication techniques for microelectromechanical devices and systems as well as provide an introduction to the design of micromechanical transducers. Co-requisite: MFGE 4392
3 Credit Hours. 3 Lecture Contact Hours. 1 Lab Contact Hour.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

Transmission of signals through linear systems, analog and digital modulation, filtering, and noise. Prerequisites: EE 3300, EE 3370, and IE 3320
3 Credit Hours. 3 Lecture Contact Hours. 1 Lab Contact Hour.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

EE 4372. Communication Networks.
Data communication concepts, protocols, algorithms, 7-layer OSI model, physical media, LAN architecture and components, Ethernet, FDDI, TCP/IP, and related standards. Prerequisite: EE 2400 and EE 3420
3 Credit Hours. 3 Lecture Contact Hours. 1 Lab Contact Hour.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

EE 4374. Introduction to Wireless Communication.
Principles, practice, and system overview of mobile systems. Modulation, demodulation, coding, encoding, and multiple access techniques. Prerequisites: EE 4370
3 Credit Hours. 3 Lecture Contact Hours. 1 Lab Contact Hour.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

EE 4375. Building a Smart Grid Architecture.
In this course, students will learn the current 20th-century power grid structure and the key elements required to transform it to a 21st-century Smart Grid. Topics include two-way power/data flow to monitor, control, manage and integrate traditional bulk generation and bulk/renewable/distributed generation. Prerequisite: EE 3370
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

EE 4376. Introduction to Telecommunications.
Fundamentals of telecommunications, telephone networks, switching and transmission systems, circuit and packet switching, cell processing, and queuing theory and applications. Co-requisite: EE 4370
3 Credit Hours. 3 Lecture Contact Hours. 1 Lab Contact Hour.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

EE 4377. Introduction to Digital Signal Processing.
Discrete systems, convolution, spectral analysis, and FIR and IIR filter design. Prerequisites: EE 3370
3 Credit Hours. 3 Lecture Contact Hours. 1 Lab Contact Hour.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

EE 4378. Data Compression and Error Control Coding.
Introduction to information theory, information content of messages, entropy and source coding, data compression, channel capacity data translation codes, and fundamentals of error correcting codes. Corequisite: EE 4370
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

EE 4390. Electrical Engineering Design I.
This course is a team-based design of a system or component, which will include oral presentations and written reports. Prerequisites: EE 3350, EE 3370, and EE 3420 with grades of “C” or higher. Co-requisites: EE 4352 or EE 4370. (WI)
3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.
Course Attribute(s): Lab Required|Writing Intensive
Grade Mode: Standard Letter

EE 4391. Electrical Engineering Design II.
Advanced team-based design of a system or component, which will include oral presentations and written reports. Prerequisites: EE 4390. (WI)
3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.
Course Attribute(s): Lab Required|Writing Intensive
Grade Mode: Standard Letter

EE 4399A. Dynamic Data Acquisition and Analysis.
Methods for acquiring and analyzing dynamic (time-varying) data. Frequency domain analysis, analog-to-digital conversion, windowing, and digital filtering taught in the context of various industrial applications. Prerequisite: EE 3370 Signals and Systems
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter

EE 4399B. Overview of Information Theory and Coding.
Fundamentals of Information Theory, Huffman coding, image encoding techniques, Hamming and BCH error control codes, Reed-Solomon coding, convolutional codes and the Viterbi decoding algorithm
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter
This course provides the necessary fundamental techniques to analyze and process digital images. It covers principles, concepts, and techniques of digital image processing and computer vision. Prerequisites: ED 3420, CS 2308, or approval of instructor. Restricted to students enrolled in the MS Engineering program
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

This course teaches development of embedded computing systems with strong resource constraints. Key concepts include managing constrained memory and processing speed limitations, and programming for soft and hard real-time constraints. Students will learn use of a Real-Time Operating System (RTOS). Prerequisites: EE 3420 and CS 3339, or equivalent, or approval of instructor. Restricted to students enrolled in the MS Engineering program
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

EE 5340. Smart Grid: an Application Development Platform.
In this course, students will learn how to develop real applications for the smart grid and model its performance with simulations and stochastic models. Topics include energy informatics, smart metering, home energy management, demand response, load disaggregation and APIs/OpenData. The mathematical tools used include: Optimization/Control, Machine Learning and Stochastic Processes. Prerequisite: EE 3370, EE 4340 or approval of instructor
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

EE 5350. Advanced Electronic Circuit Design.
This course includes low and high power RF amplifier design techniques, oscillators, FM demodulators, limiters, and mixer design. Additional topics include circuit design to minimize intermodulation and other forms of distortion, and RD and high-speed analog circuits with emphasis on digital-friendly applications. Prerequisite: EE 4350 or equivalent, or approval of instructor. Restricted to students enrolled in the MS Engineering program
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

EE 5355. Electronic Materials and Devices.
This course covers theoretical concepts applicable to the understanding of unique properties exhibited by electronic materials, especially by dielectrics, oxide semiconductors, ferroelectrics, pyroelectrics, piezoelectrics, magnetic, and multifunctional and multiferroic materials. The various microelectronic devices and modern novel technologies based on these materials are emphasized. Prerequisite: EE 3350, or equivalent, with a grade of B or higher, or approval of instructor. Restricted to students enrolled in the MS Engineering program
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

EE 5360. Thin Film Technology.
This course covers the theoretical and practical aspects of thin film technology in modern devices. The design and fabrication of thin film heterostructures is discussed. Growth and nucleation of epitaxial thin films with diverse properties and devices with combined properties will be emphasized. Prerequisite: EE 3350 or equivalent, with a grade of B or higher, or approval of instructor. Restricted to students enrolled in the MS Engineering program
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

EE 5372. Advanced Networking.
This course develops important theoretical and application topics related to advanced networking. Theoretical topics are introduced using mathematical treatments, including queuing theory and some random processes. The course includes applications of these topics to communications networks, and focuses on architectures, applications and technologies which affect modern computer and data networks. Restricted to students enrolled in the MS Engineering program
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

EE 5374. Introduction to Wireless Communication.
This course teaches principles and practices in designing and analyzing cellular and other wireless communication systems. Topics include RF propagation modeling, fast and slow fading, modulation, demodulation, coding, and multiple access techniques. Prerequisite: EE 4370. Restricted to students enrolled in the MS Engineering program
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

EE 5375. Smart Grid: an Application Development Platform.
In this course, students will learn how to develop real applications for the smart grid and model its performance with simulations and stochastic models. Topics include energy informatics, smart metering, home energy management, demand response, load disaggregation and APIs/OpenData. The mathematical tools used include: Optimization/Control, Machine Learning and Stochastic Processes. Prerequisites: EE 3370, EE 4340 or approval of instructor
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter
This course develops the theory and applications of random processes using mathematical treatments, including elementary discrete and continuous time linear systems theory, elementary probability, and transform theory. Topics include applications of random processes to information and communication theory, estimation and detection, control, signal processing, and stochastic systems theory. Prerequisite: ENGR 5310 or equivalent, or approval of instructor. Restricted to students enrolled in the MS Engineering program
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

EE 5385. Optoelectronic Devices.
This course introduces the student to the concepts, physical operations, and design criteria of state-of-the-art optoelectronic devices and systems used in research, technology, medicine, communication, and other modern applications. Prerequisites: EE 3355, EE 4350, or equivalent, with a grade of C or higher; or approval of instructor. Restricted to students enrolled in the MS Engineering program
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

EE 5398A. Antenna Theory, Design and Applications.
This course covers the basic theory, design and applications of antennas. The topics include antenna radiation, fundamental parameters of antennas, linear wire antennas, loop antennas, antenna arrays, long-periodic antennas, horn antennas, microstrip antennas and modern nano-antennas. Restricted to students enrolled in the MS Engineering program.
Prerequisite: EE 3340 or EE 3370 (or an equivalent) with a grade of "C" or higher, or Instructor's approval
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter

EE 5398B. Electronic Materials and Beyond for Sustainable Energy.
This course covers the basic science and technology for sustainable energy from the view of materials, where electronic materials are highly emphasized. The topics include solar cells, thermoelectrics, batteries, supercapacitors, artificial photosynthesis, fuel cells, biomass and nuclear energy. Restricted to students enrolled in MS Engineering program.
Prerequisite: EE 3355 or equivalent, with a grade of "B" or higher
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter

EE 5398C. Multimedia Signal Processing.
This course covers theory and applications of digital signal processing to multimedia signals, including speech, audio, image, and video. Key concepts and algorithms are discussed first, followed by a review of relevant industry standards. Hardware architectures and real-time implementation concepts appropriate for multimedia signals are also included. Restricted to students enrolled in MS Engineering program.
Prerequisites: EE 3370 (or equivalent) and EE 4377 or EE 4323 (or an equivalent), or Instructor's approval
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter

EE 5398D. Electroceramics.
This course covers binary and ternary phase diagrams, non-centrosymmetric crystal structures and symmetry groups, nonlinear dielectrics (ferroelectricity, piezoelectricity, pyroelectricity), nonlinear magnetics, oxide wideband gap semiconductors, detectors and sensors, introduction to MEMS, radhard electronics, and spintronics technology. Labs and additional research-oriented instruction are related to materials processing, characterization, fabrication, and testing. Restricted to students enrolled in the MS Engineering program. Prerequisite: EE 3355 with a grade of B or higher, or Instructor's Approval
3 Credit Hours. 3 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter