ELEC 4200 DIGITAL SYSTEM DESIGN (3) LEC. 2. LAB. 3. Pr. ELEC 2210 and ELEC 2220. Hierarchical, modular design of digital systems, computer-aided digital system modeling, simulation, analysis, and synthesis; design implementation with programmable logic devices and FPGAs.

ELEC 4800 INSTRUMENTATION ENGINEERING (3) LEC. 2. LAB. 3. Pr. ELEC 3040 or ELEC 3050. Study and application of sensors, instrumentation and computer technology to research and industrial process control.

ELEC 4810 LONG TERM TECHNOLOGY DEVELOPMENT AND PROJECT MANAGEMENT (1-2) LAB. Pr. ELEC 2120. Departmental approval. Students participate in ongoing electrical, computer, or wireless engineering design projects and competitions while learning project management and organization strategies. May be repeated for up to three credit hours.

ELEC 4960 SPECIAL PROBLEMS (1-3) IND. Departmental approval. Course may be repeated with change in topics.

ELEC 4970 SPECIAL TOPICS IN ELECTRICAL ENGINEERING (1-5) LEC. Departmental approval. Course may be repeated with change in topics.

ELEC 4980 SPECIAL PROJECTS IN ELECTRICAL ENGINEERING (1-3) IND. Departmental approval. Course may be repeated with change in topics.

ELEC 4997 HONORS THESIS (1-6) IND. Pr. Honors College. Departmental approval. Directed research and writing of honors thesis. Course may be repeated for a maximum of 6 credit hours.

ELEC 5100 WIRELESS COMMUNICATION SYSTEMS (3) LEC. 3. Pr. ELEC 3400. Introduction to mobile cellular radio and wireless personal communications, mobile radio propagation, modulation techniques, multiple access techniques, wireless systems and standards.

ELEC 5110 WIRELESS NETWORKS (3) LEC. 3. Pr. ELEC 3400. Introduction to wireless broadband, satellite communication, wireless local area networks, Bluetooth and Home RF standards and Internet protocol and wireless access.

ELEC 5120 TELECOMMUNICATION NETWORKS (3) LEC. 3. Pr. ELEC 3400. Principles and building blocks of telecommunication systems, including switched telephone networks, voice and data networks, transmission technologies, and switching architectures.

ELEC 5130 RF DEVICES AND CIRCUITS (3) LEC. 3. Pr. ELEC 3700. Introduction to RF semiconductor devices and circuits targeted for wireless applications.

ELEC 5150 INFORMATION SECURITY (3) LEC. 3. Departmental approval. Emerging protocols, standards and technologies of information security; design of information network security using firewalls, virtual private networks and secured applications.

ELEC 5190 INTRODUCTION TO DIGITAL AND ANALOG IC DESIGN (3) LEC. 3. Pr. ELEC 3700. Digital IC design using the Verilog, analog and mixed signal IC design using industry standard tools; emphasis on front-end design skills.

ELEC 5200 COMPUTER ARCHITECTURE AND DESIGN (3) LEC. 3. Pr. ELEC 4200. Structural organization and hardware design of digital computers; register transfers; micro-operations, control units and timing; instruction set design; input/output devices, multiprocessors, automated hardware design aids.

ELEC 5210 INFORMATION NETWORKS AND TECHNOLOGY (3) LEC. 3. Pr. ELEC 2220 or COMP 3350. Architectures, protocols, standards and technologies of information networks; design and implementation of information networks based on requirements; applications of information networks for data, audio and video communications.

ELEC 5220 PARALLEL PROCESSING (3) LEC. 3. Pr. ELEC 2220 or COMP 3350. Hardware components of multiprocessor systems including processor, inter-connection, memory and control architectures; software elements of parallel processing.


ELEC 5250 COMPUTER AIDED DESIGN OF DIGITAL CIRCUITS (3) LEC. 3. Pr. ELEC 2220 or COMP 3350. Computer-automated design of digital logic circuits, using discrete gates, programmable logic devices, and standard cells; hardware description languages, circuit simulation for design verification and analysis, fault diagnosis and testing.

ELEC 5260 EMBEDDED COMPUTING SYSTEMS (3) LEC. 3. Pr. ELEC 2220 or COMP 3350. The design of systems containing embedded computers. Microcontroller technology, assembly language and C programming, input/output interfacing, data acquisition hardware, interrupts, and timing. Real-time operating systems and application programming. Embedded system application examples.

ELEC 5270 LOW-POWER DESIGN OF ELECTRONIC CIRCUITS (3) LEC. 3. Pr. ELEC 2210. Departmental approval. Design of digital circuits and systems for reduced power consumption, power analysis algorithms, low-power MOS technologies, low-power design architectures for FPGAs, memory, and microprocessors, reduction of power in testing of circuits.

ELEC 5280 BUILT-IN-SELF-TEST (3) LEC. 3. Pr. ELEC 2210. Testing during product life-cycle, fault models and detection, design for testability, test pattern generation, output response analysis, concurrent fault detection, manufacturing and system use, built-
in self-test approaches and applications.

ELEC 5310 DESIGN OF ANTENNAS AND ANTENNA SYSTEMS (3) LEC. 3. Pr. P/C ELEC 3320. Application of electromagnetic and circuit concepts to the design of practical antennas and antenna systems.

ELEC 5320 ELECTROMAGNETIC COMPATIBILITY (3) LEC. 3. Pr. ELEC 3320 and ELEC 3700. Electromagnetic noise coupling, designing for electromagnetic compatibility (EMC), EMC regulation, noise sources, standard techniques for eliminating noise, circuit layout for reduced electromagnetic interference (EMI).

ELEC 5340 MICROWAVE AND RF ENGINEERING (3) LEC. 3. Pr. ELEC 3320 and ELEC 3700. Application of electromagnetic and electronic concepts to the design of practical microwave devices and circuits typically used in wireless communications.

ELEC 5350 RADAR PRINCIPLES (3) LEC. 3. Pr. ELEC 3320 and ELEC 3800. Study of the fundamentals of RADAR and related systems such as SONAR and LIDAR.

ELEC 5360 BIO-MEDICAL APPLICATIONS OF ELECTROMAGNETICS (3) Lec. 3. Pr., ELEC 3310. Development of medical instrumentation using electromagnetic principles; focus on magnetic resonance imaging systems.

ELEC 5410 DIGITAL SIGNAL PROCESSING (3) LEC. 3. Pr. ELEC 3800. Digital processing of signals, sampling difference equations, discrete-time Fourier transforms, discrete and fast Fourier transforms, digital filter design.

ELEC 5530 MOBILE ROBOT DESIGN (3) LEC. 3. Pr. ELEC 2210 and (ELEC 3040 or ELEC 3050). Fundamentals of mobile robot design, including motor control, sensor integration, path planning, navigation, and localization.


ELEC 5620 POWER SYSTEM ANALYSIS (3) LEC. 3. Pr. ELEC 3600. Departmental approval. Power system modeling, power flow analysis, analysis of faulted power systems.


ELEC 5650 POWER SYSTEM PROTECTION (3) LEC. 3. Pr. ELEC 3600. Fault analysis using symmetrical components. Power switchgear, including switches, disconnects, fuses, relays and circuit breakers. Fundamentals of electric power system protection, including bus, transformer and line protection.

ELEC 5700 SEMICONDUCTOR FUNDAMENTALS (3) LEC. 3. Pr. ELEC 3700. Introduction to semiconductors: crystal structure, energy band theory, equilibrium electron and hole statistics, doping, generation and recombination processes, carrier drift and diffusion, transport equations.

ELEC 5710 SEMICONDUCTOR DEVICES (3) LEC. 3. Pr. ELEC 5700. Introduction to semiconductor devices: pn junctions, junction diode based devices, optoelectronic devices, bipolar transistors, field effect transistors.

ELEC 5730 MICROELECTRONIC FABRICATION (3) LEC. 2. LAB. 3. Pr. ELEC 2210. Departmental approval. Introduction to monolithic integrated circuit technology. Bipolar and MOS processes and structures. Elements of layout, design, fabrication, and applications. Experiments in microelectronic technologies.

ELEC 5740 ELECTRONICS MANUFACTURING (3) LEC. 2. LAB. 3. Pr. ELEC 3700. Departmental approval. Materials and processes used to manufacture electronic products. Particular attention is given to substrate technology and electronics assembly.

ELEC 5750 INTRODUCTION TO PLASMA ENGINEERING (3) LEC. 3. Pr. ELEC 3320. Departmental approval. Electrical breakdown and discharges in gases, basic plasma theories, applications of plasmas, plasma processing for microelectronic fabrication.

ELEC 5760 SOLID STATE SENSORS (3) LEC. 3. Pr. ELEC 3700. Departmental approval. Theory, technology and design of micro-mechanical sensors, electrochemical microsensors, photodetectors, and integrated smart sensors.

ELEC 5770 VLSI DESIGN (3) LEC. 3. Pr. ELEC 2210 and ELEC 2220. Review of MOS transistor fundamentals, CMOS logic circuits; VLSI fabrication and design rules; clocking strategies and sequential design; performance estimation; memories and programmable arrays; standard cell design methodologies; computer aided design (CAD) tools.

ELEC 5780 ANALOG CIRCUIT DESIGN (3) LEC. 3. Pr. ELEC 3700. Departmental approval. Circuit design techniques used for implementing analog integrated circuits in both CMOS and bipolar technologies.

ELEC 5810 COMPUTED IMAGING SYSTEMS (3) LEC. 3. Pr. ELEC 2120. Departmental approval. Introduction to computed imaging systems such as magnetic resonance imaging (MRI), computed tomography (CT), and synthetic aperture radar (SAR).

ELEC 5820 MEMS TECHNOLOGY (3) LEC. 3. Departmental approval. Introduction to Micro-Electro-Mechanical Systems (MEMS), the study of the materials and microfabrication processes used to fabricate MEMS devices, the principles of operation of MEMS devices, and an introduction to the different application areas of MEMS devices.

ELEC 5970 SPECIAL TOPICS IN ELECTRICAL ENGINEERING (1-5) LEC. Departmental approval. Departmental approval. Course may be repeated with change in topics.