

Auburn University
Department of Electrical and Computer Engineering
Computer Option Electives

Students in the computer option may take 5000 level COMP classes for elective credit provided prerequisite requirements for the class have been met. See separate listing for COMP course descriptions.

ELEC 4800. Instrumentation Engineering (3). LEC. 2, LAB. 3. Pr., completion of ELEC 3040 or ELEC 3050 courses. 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 and consent of instructor. 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 4970. Special Topics in Electrical Engineering (Credit To Be Arranged, 1 to 5). Pr., departmental approval. Course may be repeated with change in topic.

ELEC 4980. Special Projects in Electrical Engineering (Credit To Be Arranged, 1 to 3). Pr., departmental approval. Course may be repeated with change in topic.

ELEC 4997. Honors Thesis (1 to 6). Ind. Pr., ELEC major; membership in the Honors College; departmental approval. Directed research and writing of honors thesis. Course may be repeated for a maximum of 6 credit hours.

ELEC 5110. Wireless Networks (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) Pr., ELEC 3400. Plain Old Telephone System (POTS), Public Switching Telephone Network (PSTN), circuit switching, packet switching, frame relay, local subscriber loop, trunk, Signal System 7 (SS&), ISDN, DSL, ATM, SONET, wave-length division multiplexing (WDM), SMDS, voice over IP, network management.

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). Pr., Senior standing and departmental approval. Emerging protocols, standards and technologies of information security; Design of information network security, firewall, virtual private networks and secured applications.

ELEC 5190. Introduction to Digital and Analog IC Design (3). LEC. Pr. ELEC 2210, ELEC 3700. Introduction to digital and analog integrated circuit (IC) design with emphasis on front-end IC design skills. Digital IC designs using Verilog hardware description language. Analog IC designs using Cadence analog IC design tools. Gain hands-on experience through digital and analog IC design projects.

ELEC 5230. Parallel Processing (3) Lec. 3. Pr., ELEC 2220. Hardware components of multiprocessor systems including processor, interconnection, memory, and control architectures; Software elements of parallel processing.

ELEC 5240. Neural Networks (3) Lec. 3. Pr., ELEC 2120. Principles, architectures, and technologies of neural networks; design and implementation of neural networks using electronics and optics; applications of neural networks.

ELEC 5250. Computer-Aided Design of Digital Circuits (3) Lec. 3. Pr., ELEC 2220. 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. 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 or departmental approval. Design of digital circuits and systems for reduced power consumption, power analysis algorithms, low-power MOS technologies, low-power design architectures for FPGA, memory and microprocessor, reduction of power in testing of circuits.

ELEC 5280. Built-In Self-Test (3) LEC. 3. Pr., ELEC 2200, 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 5410. Digital Signal Processing (3). Lec. 3. Pr., ELEC 3800 or departmental approval. Digital processing of signals, sampling difference equations, discrete-time Fourier transforms, discrete and fast Fourier transforms, digital filter design.

ELEC 5430. Digital Image Processing (3). Lec. 3. Pr., ELEC 3400 and ELEC 3800 or departmental approval. Digital image processing principles and applications such as enhancement, restoration and compression.

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 5700. Semiconductor Fundamentals (3) Lec. 3. Pr., ELEC 3700. An 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. An introduction to semiconductor devices: pn junctions, junction diode based devices, optoelectronic devices, bipolar transistors, field effect transistors.

ELEC 5730. Microelectronic Fabrication (3) Lec. 3. Pr., ELEC 2210 or 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 or departmental approval. This course examines the materials and processes used to manufacture electronic products. Particular attention is given to substrate technology and electronics assembly.

ELEC 5760. Solid-State Sensors (3) Lec. 3. Pr., ELEC 3700 or 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, 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 or 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 or 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. Pr., senior standing or 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 (Credit To Be Arranged, 1 to 5). Pr., departmental approval. May be repeated for up to 9 credits toward degree requirements.

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COMP 5000 Web Application Development (3). Lec. 3. Pr., Senior or graduate standing or departmental approval. Design and implementation of web sites and associate applications. Emphasis on user interface design and information organization and presentation. Fall, Spring.

COMP 5010 Interactive Applications in Visual Basic (3). Lec. 3. Pr., COMP 5000 or departmental approval. Design and implementation of applications like simulations, front-ends to Excel for modeling, interfaces to databases and multimedia applications.

COMP 5020 Advanced Web Application Development (3) Lec. 3. Pr., COMP 5000 or departmental approval. Design and implementation of interactive web applications. Use of concepts such as security, internationalizations, multi-threading and server/client architectures. Fall, Spring.

COMP 5030 Object-Oriented Technologies (3). Lec. 3. Pr., COMP 5000 or departmental approval. Object-oriented design and implementation of a variety of applications including databases and intelligent agents with one or more object-oriented programming language.

COMP 5120 Database Systems I (3). Lec. 3. Pr., COMP 3270. Theoretical and applied issues related to the analysis, design, and implementation of relational database systems.

COMP 5200 Theoretical Computer Science (3). Lec. 3. Pr. COMP 4200. The nature of the recursive sets and recursively enumerable sets. Decidability. Context-sensitive grammars and linear-bounded automata, including closure properties; oracles; reduction; the arithmetic hierarchy; the analytic hierarchy.

COMP 5210 Compiler Construction (3). Lec. 3. Pr., COMP 4200. Compiler organization; lexical analysis; parsing; syntax-directed translation; symbol tables; basic dependence analysis; intermediate forms; interpreters vs. compilers; run-time storage management; code generation; error detection and recovery.

COMP 5220 Advanced Topics in Programming Languages (3). Lec. 3. Pr., COMP 3220. Advanced topics in programming language concepts design, and implementation.

COMP 5230 Declarative Programming Languages and Principles (3). Lec. 3. Pr., COMP 3220. Functional and logic programming theoretical foundations, models and implementation issues; example language studies.

COMP 5280 Object Oriented Programming Languages and Principles (3). Lec. 3. Pr., COMP 3220. Object oriented language principles and study of the language support for these principles. Example languages and distributed object programming principles.

COMP 5320 Design and Analysis of Computer Networks (3). Lec. 3. Pr., COMP 4320 or departmental approval. Computer networks design, including multiplexing, switching, routing, internetworking, transport protocols, congestion control, and performance evaluation.

COMP 5330 Parallel and Distributed Computing (3). Lec. 3. Pr., COMP 3500. Overview of hardware and software issues in parallel systems: fundamental parallel architectures, programming languages, tools and algorithms, parallel applications.

COMP 5340 Network Quality Assurance & Simulation (3). Lec. 3. Pr., COMP 4320 or ELEC 5220/6220. Theoretical and practical aspects of network simulation and quality assurance.

COMP 5360 Wireless and Mobile Networks (3). Lec. 3. Pr., COMP 4320 or departmental approval. Mobile IP, wireless routing, locations management, ad-hoc wireless networks, wireless TCP personal communication systems and GSM.

COMP 5370 Computer and Network Security (3). Lec. 3. Pr., COMP 3270. Fundamentals of computer security. Access Control. Authentication. Digital signatures and watermarks. Modeling and performance assessment. Viruses and worms. Identification of avenues of compromising systems.

COMP 5380 Personal Area Networks (3). Lec. 3. Pr., COMP 4320 or ELEC 5220. Fundamentals of very low power, short-range high-bandwidth personal network technologies such as Bluetooth and direct diffusion.

COMP 5390 3G and 4G Wireless (3). Lec. 3. Coreq., COMP 5360 or ELEC 5110. Exploration of technology types, design issues for handset and network systems, economics, Exploration of standards such as CT2, CT3, and IS901A. Future challenges for 4G.

COMP 5400 Fundamentals of Computer Graphics (3). Lec. 3. Pr., COMP 2210, MATH 2660. Graphics hardware and software components, coordinate systems, 2-D and 3-D transformations, 3-D viewing and projection, clipping and windowing, scan conversion and algorithms, visibility determination and shadowing and software projects using a graphics software package.

COMP 5500 Distributed Operating Systems (3). Lec. 3. Pr., COMP 4320. Basic concepts of distributed systems. Concurrent process communication and synchronization mechanisms, distributed process scheduling, distributed file systems, distribute shared memory, distributed system security and case studies.

COMP 5510 Networked Multimedia Systems (3). Lec. 3. Pr., COMP 4320 or departmental approval. Basic concepts, architecture and design of networked multimedia systems.

COMP 5520 Network and Operating System Administration (3). Lec. 3. Pr., COMP 4320. Studies of the installation, configuration, and management of traditional, distributed, and networked system software. Network integration of different systems. Performance monitoring, safety, and security issues together with policies, politics, and the laws regarding system software management.

COMP 5600 Artificial Intelligence (3). Lec. 3. Pr., COMP 3270 and COMP 4640 or departmental approval. Introduction to intelligent agents, search, knowledge representation and reasoning, machine learning.

COMP 5610 Artificial Intelligence Programming (3). Lec. 3. Pr. COMP 5600 or departmental approval. Design and implementation of advanced artificial intelligence techniques including expert systems, planning, logic and constraint programming, knowledge representation, and heuristic search methods.

COMP 5620 User Interface Design and Evaluation (3). Lec. 3. Pr., COMP 4640 or departmental approval. Theory and practice of designing interfaces for interactive systems, usability engineering techniques; implementing and evaluating interfaces.

COMP 5700 Software Process (3). Lec. 3. Pr., COMP 3700 or COMP 3710 or departmental approval. Process models of the software lifecycle as well as methods and tools for software development.

COMP 5710 Software Quality Assurance (3). Lec. 3 Pr., COMP 3700 or COMP 3710 or departmental approval. Processes, methods, and tools associated with the production of robust, high-quality software.

COMP 5720 Real Time and Embedded Systems (3). Lec. 3. Pr., COMP 3500. Concepts of real-time and embedded computer systems. Studies of real-time algorithm issues such as timeliness, time-constrained scheduling and communication. Embedded system issues such as limited memory, low power, and high latency communication.