Electrical and Computer Engineering

In the College of Engineering

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Faculty

Mao-Shiu Lin, Ph.D., Professor of Electrical and Computer Engineering, Interim Chair of Department

Ching-Ten Chang, Ph.D., Professor of Electrical and Computer Engineering

fredric j. harris, M.S.E.E., P.E., Professor of Electrical and Computer Engineering

Madhu S. Gupta, Ph.D., Professor of Electrical and Computer Engineering

Jay H. Harris, Ph.D., Professor of Electrical and Computer Engineering

Paul T. Kolen, Ph.D., Professor of Electrical and Computer Engineering

Gordon K.F. Lee, Ph.D., Professor of Electrical and Computer Engineering, Interim Dean of the College of Engineering and Director of Doctoral Program

Long C. Lee, Ph.D., Professor of Electrical and Computer Engineering

Leonard R. Marino, Ph.D., Professor of Electrical and Computer Engineering

Andrew Y.J. Szeto, Ph.D., P.E., Professor of Electrical and Computer Engineering

Greg W. Bailey, Ed.D., Associate Professor of Electrical and Computer Engineering, Assistant Dean for Student Affairs, College of Engineering

Ramon Betancourt, Ph.D., Associate Professor of Electrical and Computer Engineering

Yusuf Ozturk, Ph.D., Associate Professor of Electrical and Computer Engineering

Laura L. McPheters, Ph.D., Assistant Professor of Electrical and Computer Engineering

Jong-Min Park, Ph.D., Assistant Professor of Electrical and Computer Engineering

Rahul Singh, Ph.D., Assistant Professor of Electrical and Computer Engineering (Graduate Adviser)

Courses Acceptable on Master's Degree Program in Electrical and Computer Engineering (COMPE) (E E)

UPPER DIVISION COURSES IN ELECTRICAL ENGINEERING (E E)

NOTE: Prerequisites will be enforced in all 500-level courses. A copy of an official transcript will be accepted as proof. For corequisites, an enrollment confirmation form will be accepted.

Any course at the 300 level or below must be passed with a grade of C– or better in order to be used as a prerequisite for any subsequent course.

502. Electronic Devices for Rehabilitation (3)
Two lectures and three hours of laboratory.
Prerequisite: Electrical Engineering 303 or 330.
Recent developments in electronic assistive devices and microcomputers for persons with various disabilities; assessment of disabled persons for suitable technological assistive devices.

503. Biomedical Instrumentation (3)
Prerequisites: Engineering 280; Electrical Engineering 410 and 430 (or for Mechanical Engineering majors, Electrical Engineering 303 and Mechanical Engineering 512).
Instrumentation systems to monitor, image, control, and record physiological functions. (Formerly numbered Electrical Engineering 403.)

520. Feedback Control Systems (3) I
Prerequisite: Electrical Engineering 410.
Analysis of regulatory systems including servomechanisms by the Laplace transform method. System performance and stability; Nyquist, Bode, and root-locus diagrams; elementary synthesis techniques. Practical components and examples of typical designs.

530. Analog Integrated Circuit Design (3)
Prerequisite: Electrical Engineering 430 with minimum grade of C-.
Advanced treatment of transistor pairs, device mismatches, differential amplifiers, current mirrors, active loads, level shifting, and output stages. Parasitic and distributed device parameters. Economics of IC fabrication and impact on design.

534. Solid-State Devices (3)
Prerequisite: Electrical Engineering 434.
Conduction theory of solids. Characteristics of tunnel, backward, breakdown, multilayer and varactor diodes; silicon controlled rectifiers and switches, unijunction transistors, hot electron devices. Lasers and laser applications.

539. Instrumentation Circuits I (3)
Prerequisite: Electrical Engineering 430.
Design and analysis of hybrid analog/digital electronic sub-systems incorporated into modern instrument design. Emphasis on operational amplifier based circuit design and analog-to-digital and digital-to-analog conversion processes.

540. Microwave Devices and Systems (3)
Prerequisite: Electrical Engineering 340. Recommended: Engineering 510.
Applications of Maxwell's equations to wave propagation. Microwave network parameters; guided wave transmission and reflection. Design of filters, couplers, power dividers and amplifiers. Applications in radar and telecommunications systems.

540L. Microwave Design and Measurements Laboratory (1)
Three hours of laboratory.
Prerequisites: Credit or concurrent registration in Electrical Engineering 430L and 540.
Designs, computer simulations, fabrications, and testings of microwave matching networks, couplers, filters, and amplifiers.

541. Electro-Optics (3) II
Prerequisite: Electrical Engineering 434.
Optical/electronic devices and systems; wave beams; light-matter quantum interactions; incoherent and laser light sources; modulators and detectors. Applications in data transmission, measurement, and materials processing.

546. Optical Fiber Communications Systems (3)
Prerequisite: Electrical Engineering 434.
Optical fiber attenuation and dispersion, light-emitting diodes and laser diodes, PIN diodes and avalanche photodiodes, receiver designs, optical power budgets and rise time budgets, applications in digital and analog communication systems.

553. Stochastic Signals (3) I
Prerequisite: Electrical Engineering 410.
Random signals, correlation functions, power spectral densities, the Gaussian process, narrow band processes. Applications to communication systems.

556. Digital Signal Processing (3)
Prerequisite: Electrical Engineering 410 or Physics 516.
Digital signal processing. Discrete-time signals, transform techniques, and digital filters. Design of FIR and IIR filters, FFTs, and finite length effects on digital systems.

558. Communication Systems II (3) II
Prerequisite: Electrical Engineering 458.
Performance of analog and digital communication systems. Effects of noise and spectral characteristics.

558L. Communications and Digital Signal Processing Laboratory (1)
Prerequisite: Electrical Engineering 558.
Experiments in modulation techniques, effects of noise on system performance, digital filters, and signal processing.

570. Advanced Digital Circuits (3)
Prerequisite: Computer Engineering 470.
Digital applications of linear devices, the digital/analog interface, and ultra high speed logic devices.

580. Modern Power Systems I (3) I
Prerequisites: Engineering 280, Electrical Engineering 310 and 380.
Modern power system elements; calculation of load flow, fault currents, and system stability.

581. Modern Power Systems II (3) II
Prerequisite: Electrical Engineering 580.
Transient response of modern power system elements; positive, negative and zero sequence impedance; subharmonic effects.

582. Power Relay Systems (3) I
Prerequisite: Electrical Engineering 380.
Power relays including metering and control as used in modern power systems. Characteristics of operations and applications of equipment. Demonstrations on individual component relays. Basic relay calculations.

583. Power Electronics (3)
Prerequisites: Electrical Engineering 380 and 430.
Design and analysis of power electronic devices. Power semiconductor switches, switch-mode power supplies, dc-to-ac inverters, PM and PWM ac-to-ac converters. Power electronics applications.

596. Advanced Electrical Engineering Topics (1-3) I, II
Prerequisite: Consent of instructor.
Modern developments in electrical engineering. See Class Schedule for specific content. Maximum credit of nine units for any combination of Electrical Engineering 496 and 596 applicable to a bachelor's degree. Maximum credit of six units of Electrical Engineering 596 applicable to a 30-unit master's degree.

UPPER DIVISION COURSES IN COMPUTER ENGINEERING (COMPE)

NOTE: Prerequisites will be enforced in all 500-level courses. A copy of an official transcript will be accepted as proof. For corequisites, an enrollment confirmation form will be accepted.
Any course at the 300 level or below must be passed with a grade of C– or better in order to be used as a prerequisite for any subsequent course.

560. Computer and Data Networks (3)
Two lectures and three hours of laboratory.
Prerequisites: Computer Engineering 271 and Electrical Engineering 410.
Wide area and local area networks. Multi-layered protocol models, telephone systems, modems, and network applications.

561. Advanced Windows Programming (3)
Prerequisite: Computer Engineering 361.
Win32 application programmers interface. Microsoft foundation classes. Memory management. Multitasking and multithreading. The clipboard. Dynamic data exchange. Dynamic link libraries. Object linking and embedding. Active template library. ActiveX controls. Internet programming. (Formerly numbered Computer Engineering 577 and 577L.)

565. Multimedia Communication Systems (3)
Prerequisite: Credit or concurrent registration in Computer Engineering 560.
Design and implementation of multimedia communication systems. Image compression, JPEG, VQ, cell-B standards. Video and audio compression standards, MPEG, MPEG-2, H.26X, G.72X. Data storage systems and multimedia requirements. Networking requirements and networks as multimedia carriers. Transport and network protocols for carrying multimedia over data networks. Multimedia system design, scheduling, congestion control, traffic shaping, buffer management.

572. VLSI Circuit Design (3) I
Prerequisites: Computer Engineering 271 and Electrical Engineering 330.
Design of digital integrated circuits based on CMOS technology; characterization of field effect transistors, transistor level design and simulation of logic gates and subsystems; chip layout, design rules, introduction to processing; ALU architecture.

596. Advanced Computer Engineering Topics (1-3) I, II
Prerequisite: Consent of instructor.
Modern developments in computer engineering. See Class Schedule for specific content. Maximum credit of nine units for any combination of Computer Engineering 496 and 596 applicable to a bachelor's degree. Maximum combined credit of six units of Computer Engineering 596 and 696 applicable to a 30-unit master's degree.

GRADUATE COURSES IN ELECTRICAL ENGINEERING (E E)

All listed prerequisite courses or their equivalent for computer engineering and electrical engineering courses must be satisfied with a grade of C– or better.

622. Sampled-Data Systems (3)
Prerequisite: Electrical Engineering 520.
Analysis and synthesis of sampled-data and digital control systems; techniques for the design of time optimal sampled-data control systems; z-transform calculus and difference equation synthesis techniques for determining stability and system response.

634. Semiconductor RF Circuit Design (3)
Prerequisite: Electrical Engineering 540.
Wide band amplifiers, low level RF amplifiers and mixers, IF amplifiers, AGC, tuning and stability problems, unilateralization and mismatching techniques, harmonic oscillators, VHF power amplifiers including varactor multipliers.

642. Optical Communications (3)
Prerequisite: Electrical Engineering 541 or 546.
Advanced topics of interest in electro-optical communications, including lasers, background light sources, modulators, receivers, optical fiber and atmospheric channels, and adaptive techniques.

644. Optical Data Processing (3)
Prerequisites: Electrical Engineering 340 and 410.
Electro-optical systems for processing electronic data or images. Spatial frequency analysis, filtering, convolution, and correlation based on light diffraction. Film as a recording medium. Acousto-optic and electro-optic processing devices and their applications.

645. Antennas and Propagation (3)
Prerequisite: Electrical Engineering 540.
Impedance characteristics and radiation patterns of thin linear antenna elements; field intensity calculations. Tropospheric and ionospheric propagation; propagation anomalies.

650. Modern Communication Theory I (3)
Prerequisite: Electrical Engineering 553 or 558.
Probability theory, random variables, random processes, Gaussian process, random signals through linear systems, noise considerations, optimum receiver design, applications to digital and waveform communication.

652. Principles and Applications of Information Theory (3)
Prerequisite: Electrical Engineering 650.
Measure of information; digital communication systems, Shannon theorems, channel coding for applications in interference, noise combatting and jamming; source encoding for data compression. Multichannel and multi-user information theory with applications to diversity, multipath and other environments.

653. Coding Theory (3)
Prerequisite: Electrical Engineering 650.
The theory of coding to combat noise over communication channels. Redundancy added to messages to assure arbitrarily small error rates at a given information rate. Discussion of channels and capacity. Block codes, cyclic codes, BCH codes, convolutional code.

657. Digital Image Processing (3)
Prerequisite: Electrical Engineering 556.
Theory of two-dimensional signals and systems, image transforms, image enhancement, restoration and compression, image analysis and computer vision.

658. Advanced Applications of Digital Signal Processing (3)
Prerequisite: Electrical Engineering 556 or 657.
Concepts of spectral analysis. Applications of DSP to speech encoding. Image coding, fast algorithms applied to speech, image, radar, sonar and geophysical signal processing.

672. VLSI System Design (3)
Prerequisite: Computer Engineering 572.
Design of microprocessor data paths and controllers, memory management, pipelines, multipliers, Risc and multiprocessor systems and applications.

675. Advanced Microprocessors (3)
Prerequisite: Computer Engineering 475.
Program development, circuit design, direct-memory access, multiprocessing, co-processing, and standardized bus design for a 32-bit microprocessor.

676. Fault Tolerant Computing (3)
Prerequisite: Computer Engineering 470.
Redundancy in computer design. Reliability modelling for digital systems. State-of-the-art in fault tolerant computers. Testing and diagnostics of digital systems. Designing for testability.

678. Advanced Computer Design (3)
Prerequisite: Computer Engineering 475.
Design principles for high performance computers. State-of-the-art in parallel computer systems, including pipelined computers, array processors and multiprocessor systems.

679. Real-Time Software Engineering (3)
Prerequisite: Electrical Engineering 675.
Principles of real-time programming and software engineering for microprocessor systems. Concurrent programming and multitasking. Structured programming. Software validation. Team programming projects.

680. Computer Methods in Advanced Power System Analysis (3)
Prerequisite: Electrical Engineering 580.
Computer Modeling and analysis techniques applied to large power systems.

705. Seminar in Communications Systems (1-3)
Prerequisite: Consent of instructor.
An intensive study in communication theory and systems. May be repeated with new content. See Class Schedule for specific content. Maximum credit six units applicable to a master's degree.

706. Seminar in Computer Engineering (1-3)
Prerequisite: Consent of instructor.
Intensive study in computer engineering topics. May be repeated with new content. See Class Schedule for specific content. Maximum credit six units applicable to a master's degree.

797. Research (1-3) Cr/NC/RP
Prerequisite: Consent of department chair.
Research in engineering. Maximum credit six units applicable to a master's degree.

798. Special Study (1-3) Cr/NC/RP
Prerequisite: Consent of department chair.
Individual study. Maximum credit three units applicable to a master's degree.

799A. Thesis or Project (3) Cr/NC/RP
Prerequisites: An officially appointed thesis committee and advancement to candidacy.
Preparation of a project or thesis for the master's degree.

799B. Thesis or Project Extension (0) Cr/NC
Prerequisite: Prior registration in Thesis or Project 799A with an assigned grade symbol of RP.
Registration required in any semester or term following assignment of RP in Course 799A in which the student expects to use the facilities and resources of the university; also student must be registered in the course when the completed thesis or project is granted final approval.