55A. Clinical Inquiry in Educational Administration
Spring, 3(3-0)
2: Open only to graduate students in Department of Educational Administration. Clinical approaches to problems of educational administration, with emphasis on development of multiple analytic perspectives.

55B. Field Research Methods in Educational Administration
Spring, 3(3-0)
Methods used in conducting field studies in educational organizations, with emphasis on interviews, observation, and participant observation.

160. Seminar in Higher, Adult, and Lifelong Education
Fall, 3(3-0)
2: Open only to graduate students in Higher, Adult, and Lifelong Education. Academic and student administration and leadership, adult learning. Central concepts and methods in the field of higher, adult, and lifelong education.

961. Seminar in Adult Learning
Fall, 3(3-0)
P: EAD 600; R: Open only to doctoral students. Dimensions of cognitive style and their application to various learning contexts. Personal theories of adult learning.

962. Education and Work
Spring, 3(3-0)
Trends shaping the relationship between education and work in the United States and other countries.

963. Leadership in Postsecondary Education
Spring of even-numbered years, 3(3-0)
P: EAD 600. Leadership as a complex social phenomenon in higher, adult, and lifelong educational settings. Theories of leadership as applied to education. Enhancing leadership diversity.

964. Women's Education and Professional Development
Fall of even-numbered years, 3(3-0) Gateway to women's achievement in education and their careers.

965. Diversity and Equity in Postsecondary Education
Fall of even-numbered years, 3(3-0) Promise, challenge, and management of diversity and equity in higher education. Analysis of data and policy. Management responses and strategies.

967. Policy Challenges in Postsecondary Education
Spring of even-numbered years, 3(3-0) P: EAD 600. Classic and contemporary policy issues such as access, finance, excellence, and purpose. Structures for policymaking. Agencies at federal, state, and local levels.

1970A. Administration and Governance of Higher Education
Spring of odd-numbered years, 3(3-0) P: EAD 600. Principles and patterns of organization and governance characteristic of colleges and universities. Administrative, trustees, faculty, and student roles.

1970B. The Community College
Spring of odd-numbered years, 3(3-0) History, philosophy, organization, and role of the community college in higher education. Emphasis on programs and services in comprehensive public community colleges.

971A. Institutional Research and Improvement
Fall of odd-numbered years, 3(3-0) R: Open only to graduate students in College of Education. Tools and methods used to conduct analyses of institutional management and policy issues.

971B. Planning, Evaluation, and Decision Making in Post-secondary Education
Spring of odd-numbered years, 3(3-0) Analysis of planning, evaluation, decision making in the leadership and management of post-secondary institutions. Integration of program, personnel, facility, and enrollment planning related to factors such as budgeting and accreditation.

971C. Higher Education Finance
Spring of even-numbered years, 3(3-0) Revenue sources of institutions of higher education. Restrictions and conditions placed upon funds. Administrative structures used to obtain and manage funds.

971D. Institutional Advancement in Higher Education
Fall of odd-numbered years, 3(3-0) Issues and strategies affecting institutional development. Governmental relations, admissions, alumni relations, and general administration.

990. Independent Study
Fall, Spring, Summer, 1 to 3 credits. A student may earn a maximum of 9 credits in all enrollments for this course. Advanced individual study in an area of K-12 administration or higher, adult, and lifelong education.

991A. Special Topics in K-12 Administration
Fall, Spring, Summer, 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course.

991B. Special Topics in Higher, Adult, and Lifelong Education
Fall, Spring, Summer, 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course.

994. Laboratory and Field Experience in Educational Administration
Fall, Spring, Summer, 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to doctoral students.

995. Research Practicum in Educational Administration
Fall, Spring, Summer, 1 to 6 credits. A student may earn a maximum of 4 credits in all enrollments for this course. R: Open only to doctoral students. Approval of department.

999. Doctoral Dissertation Research
Fall, Spring, Summer, 1 to 24 credits. A student may earn a maximum of 36 credits in all enrollments for this course. R: Open only to Ph.D. students.

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ELECTRICAL ENGINEERING EE

Department of Electrical Engineering
College of Engineering

200. Electric Circuits
Fall, Spring, 4/4-0

305. Electromagnetic Fields and Waves I
Fall, Spring, 3/3-0

306. Electromagnetic Fields and Waves II
Fall, Spring, Summer, 3/3-0

311. Introduction to Biomedical Engineering

320. Energy Conversion and Power Electronics
Fall, Spring, 3/3-0

330. Digital Logic Fundamentals
Fall, Spring, Summer, 3/3-0
331. Microprocessors and Digital Systems

345. Electronic Instrumentation and Systems
Fall, Spring. 4(3-3)

360. Signals and Linear Systems
Fall, Spring. 4(4-0)

381. Capstone: Professionalism, Communication and Ethics (W)
Fall, Spring. 3(1-0)
P: EE 200. C: EE 303 or EE 332. R: Open only to Electrical Engineering and Computer Engineering majors. Completion of Tier I writing requirement. Not open to students with credit in 3.
Examination of issues in professionalism, ethics, and technical communications related to the electrical and computer engineering.

405. Biomedical Electronics
Fall of even-numbered years. 3(3-0) Interdepartmental with Biomedical Engineering. Administered by Biomedical Engineering. MTH 132, PHY 184.
Electronic components and circuits. Physiological measurements, transduction of physiological events to electrical signals. Ultrasonic techniques, biomedical applications of lasers, x-ray and magnetic resonance imaging.

410. Digital Electronics
Fall, Spring. 3(3-0)

411. Electronic Design Automation
Spring. 3(3-0)

412. Control Systems
Fall, Spring. 3(3-0)

418. Algorithms of Circuit Design
Fall. 3(0-0)

421. Power System Analysis
Spring. 4(3-3)

435. Electromagnetic Waves and Applications
Fall. 4(3-3)

457. Statistical Communication Systems
Spring. 4(3-3)

466. Digital Signal Processing and Filter Design
Summer. 3(3-0)

474. Principles of Electronic Devices
Fall, Spring. 3(3-0)

476. Electro-Optics
Fall. 3(3-0)
P: EE 362. R: Open only to Electrical Engineering and Computer Engineering majors. Operating principles and applications of high frequency and photonic devices including impatt, Gunn, photodiode, light-emitting diodes, semiconductor laser devices. Photonic device applications to fiber optic systems.

Electrical Engineering—Descriptions of Courses

482. Capstone: Computer System Design (W)
Fall. 3(3-0)

483. Capstone: Integrated Circuit Design and Fabrication (W)
Fall. 3(3-0)
P: EE 303, EE 381, EE 474. R: Open only to Electrical Engineering and Computer Engineering majors. Completion of Tier I writing requirement. Processing fundamentals and process simulations. Comparison of current metal oxide semiconductors and bipolar technologies and their limitations. Layout design rules and methodology. Packaging and yield.

484. Capstone: Applications of Analog Integrated Circuits (W)
Fall. 3(3-0)
P: EE 302, EE 363, EE 381. R: Open only to Electrical Engineering and Computer Engineering majors. Completion of Tier I writing requirement. Circuit design using analog integrated circuits. SPICE modeling. Opamps, comparators, amplifiers, filters. Design project with hardware and software verification.

485. Capstone: Digital Control and Robotics (W)
Spring. 3(3-0)
P: EE 365, EE 366, EE 381, EE 413. R: Open only to Electrical Engineering and Computer Engineering majors. Completion of Tier I writing requirement. Robot classifications, kinematics, trajectory planning, digital controller design. Design and implementation of sensor-based robots.

490. Independent Study
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 3 credits in all enrollments for this course. R: Approval of department. Independent study of a topic in electrical engineering or computer engineering.

491. Special Topics
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to Electrical Engineering and Computer Engineering majors. Independent investigation of special topics in electrical engineering or computer engineering.

499. Undergraduate Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 4 credits in all enrollments for this course. R: Approval of department. Independent undergraduate research in contemporary areas of electrical engineering or computer engineering.

801. Independent Study
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 3 credits in all enrollments for this course. R: Approval of department. Independent study of a topic in electrical engineering compatible with the student's prerequisites, interest, and ability.
Descriptions — Electrical Engineering

of Courses

862. Selected Topics
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Approval of department. Investigation of special topics in electrical engineering.

867. Computer System Performance and Measurement
Spring of even-numbered years. 3(3-0) Interdepartmental with Computer Science. Administered by Computer Science. P: CPS 410, SIT 441. R: Open only to Computer Science or Electrical Engineering majors. Queuing network modeling, general analytic techniques, workload characterization, representing specific subsystems, parameterization. Software and hardware monitors, performance measures. Case studies, software packages.

868. Modelling and Discrete Simulation
Fall of even-numbered years. 3(3-0) Interdepartmental with Computer Science. Administered by Computer Science. P: CPS 230, SIT 441. R: Open only to Computer Science or Electrical Engineering majors. Simulation examples, and languages. Mathematical models, petri nets, model validation, random variate generation. Analysis of simulation data. Case studies.

869. Algorithms and Their Hardware Implementation
Spring. 3(3-0) Interdepartmental with Computer Science. Arithmetic, signal processing, and image processing algorithms. Array structures: systolic architecture, data flow structure, neural network architecture. Performance analysis.

873. Logic Design Principles
Fall. 3(3-0) Interdepartmental with Computer Science. Behavioral modeling. Combinational circuit analysis and design. Sequential circuit analysis and synthesis. Design for testability. Semicustom and MSI design.

876. Advanced Computer Architecture
Fall, Spring. 3(3-0) Interdepartmental with Computer Science. Administered by Computer Science. P: CPS 410, CPS 420. R: Open only to Computer Science or Electrical Engineering majors. Instruction set architecture. Pipelining, vector processors, cache memory, high bandwidth memory design, virtual memory, input and output. Benchmarking techniques. New developments related to single CPU systems.

882. Parallel Processing Computer Systems
Spring. 3(3-0) Interdepartmental with Computer Science. Administered by Computer Science. P: CPS 420. R: Open only to Computer Science or Electrical Engineering majors. Massively parallel SIMD processors, multiprocessor architectures, interconnection networks, synchronization and communication. Memory and address space management, process management and scheduling. Parallel compilers, languages, performance evaluation.

883. Power System Stability and Control
Fall of even-numbered years. 3(3-0) P: EE 296. Analysis and simulation of small and large disturbance stability of power systems. Generator, exciter, voltage regulator models. Design of excitation systems and power system stabilizers.

824. Power System Operation and Control
Fall of odd-numbered years. 3(3-0) P: EE 421; STT 351. Operation planning of power systems including load flow, unit commitment, production cost methods. On line operation and control including automatic generation control, economic dispatch, security assessment, state estimation.

825. Alternating Current Electrical Machines and Drives
Spring of even-numbered years. 3(3-0) P: EE 295. Analysis, modeling and design of synchronous, induction, and switched reluctance machines. Design drives for motion control and power system applications.

826. Linear Control Systems

827. Nonlinear Systems Analysis

829. Optimal Multiarcature Control

831. Analog Circuit Theory

832. Analog Integrated Circuit Design

835. Advanced Electromagnetic Fields and Waves I

836. Advanced Electromagnetic Fields and Waves II

841. Fourier Optics

842. Quantum Electronics

847. Analog and Digital Communications
Fall of odd-numbered years. 3(3-0) P: EE 457, EE 583. Optimum signal design in noisy channels, matched filters, maximum likelihood estimation of linear Gaussian signals in noise. Coherent and non-coherent binary modulation such as PSK, FSK, FQPSK. M-ary modulation, intersymbol interference, spread spectrum.

850. Electrodynamics of Plasmas

863. Analysis of Stochastic Systems
Fall. 3(3-0) P: STT 441. Advanced topics in random variable theory. Stochastic processes and stochastic calculus. Optimal systems for filtering and detection.

866. Digital Signal Processing

874. Physical Electronics
Fall. 3(3-0) Applications of quantum mechanics and statistical mechanics in solids. Band theory of semiconductors. Electrical transport phenomena. PN junctions.

875. Electronic Devices
Spring. 3(0-0) P: EE 774. Operating properties of semiconductor devices including DC, AC, and noise models of FET, BJT, metal-semiconductor contact, heterostructure, microwave and photonic devices.

885. Artificial Neural Networks

899. Master’s Thesis Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 24 credits in all enrollments for this course.

920. Selected Topics in High Performance Computer Systems
Spring. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. Interdepartmental with Computer Science. Administered by Computer Science. P: CPS 822. R: Open only to Computer Science or Electrical Engineering majors. Design of high performance computer systems. Seminar format.
<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credits</th>
<th>Department/College</th>
<th>Course Code</th>
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<th>Department/College</th>
<th>Course Code</th>
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<td>EGR 925</td>
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**Engineering Courses**

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<tr>
<td>Engineering Cooperative Education</td>
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<tr>
<td>Special Problems in International Engineering</td>
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**English Courses**

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<td>English Structure for Non-Native Speakers</td>
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<td>ENG 090C</td>
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<td>Academic Oral Skills for Non-Native Speakers</td>
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<td>ENG 092</td>
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<td>Academic Reading and Writing Skills for Non-Native Speakers of English</td>
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<td>ENG 095</td>
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