### Leadership in Postsecondary Education (Spring of even-numbered years. 3(3-0))
- **P:** EAD 800.
- Leadership as a complex social phenomenon in higher, adult, and lifelong educational settings. Theories of leadership as applied to education. Examination of leadership diversity.

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

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

### Policy Challenges in Postsecondary Education (Spring of even-numbered years, 3(3-0))
- P: EAD 853.
- Classic and contemporary policy issues such as access, finance, excellence, and purpose. Structures for policy-making. Agencies at federal, state, and local levels.

### 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.

### 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.

### Planning, Evaluation, and Decision Making in Post-secondary Education (Spring of odd-numbered years, 3(3-0))
- Analysis of planning, evaluation, and 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.

### 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.

### 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.

### 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.

### 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.

### 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.

### 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.
- Supervised advanced graduate practica, observations, internships, or externships in K-12 administration and in higher, adult, and lifelong education.

### Research Practicum in Educational Administration (Fall, Spring, Summer, 1 to 4 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.
- Supervised research practicum. Design, execution, analysis, presentation, critique, and revision of research projects.

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

### Electrical Engineering Descriptions of Courses

#### Electromagnetic Fields and Waves I (Fall, Spring, 3(3-0))
- P: MTH 235, PHY 184. (R: Open only to Electrical Engineering, and Computer Engineering majors.)

#### Electromagnetic Fields and Waves II (Spring, 3(3-0))
- P: EE 303. (R: Open only to Electrical Engineering and Computer Engineering majors.)

#### Energy Conversion and Power Electronics (Fall, 1 credit)
- P: EE 306 or concurrently. (R: Open only to juniors or seniors or graduate students in the Electrical Engineering or Computer Engineering major.)

#### Digital Logic Fundamentals (Fall, Spring, Summer, 3(3-0))
- P: CFS 101 or CFS 131 or CFS 230. (R: Open only to College of Engineering majors.)

#### Microprocessors and Digital Systems (Fall, Spring, 3(3-0))
- P: EE 330. (R: Open only to juniors or seniors or graduate students in the Electrical Engineering or Computer Engineering major.)
- Not open to students with credit in CFS 320.

#### Microprocessors and Digital Systems Laboratory (Fall, Spring, 1 credit)
- P: EE 330. (R: Open only to juniors or seniors or graduate students in the Electrical Engineering or Computer Engineering major.)
- Not open to students with credit in CFS 320.
- A project laboratory in a digital-logic design and microprocessor-based systems.
Electrical Engineering of Courses

345. Electronic Instrumentation and Systems
Fall, Spring, Summer. 3(2-3)
P: MTH 225, PHY 184. R: Open only to College of Engineering majors except Electrical Engineering and Computer Engineering. Completion of Tier 1 writing requirement.

350. Signals and Linear Systems
Fall, Spring. 4(4-0)
P: EE 209, MTH 325. R: Open only to Electrical Engineering, Computer Engineering, and Computer Science majors.

381. Professionalism, Communication and Ethics (W)
Fall, Spring. 1(1-0)
P: EE 360 or concurrently. R: Open only to juniors or seniors or graduate students in the Electrical Engineering or Computer Engineering major. Completion of Tier 1 writing requirement. Examination of issues in professionalism, ethics, and technical communications related to electrical and computer engineering.

410. Digital Electronics
Fall, Spring. 3(3-0)
P: EE 303, EE 330. R: Open only to juniors or seniors or graduate students in the Electrical Engineering or Computer Engineering or Computer Science majors.

415. Computer Aided Manufacturing
Fall. 3(2-3)
P: EE 416 and EE 414, or ME 451. R: Open only to juniors or seniors in the Manufacturing Engineering major.

418. Algorithms of Circuit Design
Fall. 3(3-0)
P: EE 302, EE 304. R: Open only to juniors or seniors or graduate students in the Electrical Engineering or Computer Engineering major.

421. Power System Analysis
Spring. 4(3-3)
P: EE 320. R: Open only to Electrical Engineering and Computer Engineering majors.

435. Electromagnetic Waves and Applications
Fall. 3(3-0)
P: EE 307. R: Open only to juniors or seniors or graduate students in the Electrical Engineering or Computer Engineering major.

447. Communication Systems
Spring. 3(3-0)
P: EE 309, EE 360, STT 351. R: Open only to juniors or seniors or graduate students in the Electrical Engineering or Computer Engineering major.

453. Communication Systems Laboratory
Spring. 1(1-0)
P: EE 303, EE 457 or concurrently. R: Open only to juniors or seniors or graduate students in the Electrical Engineering or Computer Engineering major.

456. Digital Signal Processing and Filter Design
Fall. 3(3-0)
P: EE 360. R: Open only to seniors and graduate students in Electrical Engineering and Computer Engineering.

474. Principles of Electronic Devices
Fall, Spring. 3(3-0)
P: EE 303, EE 305. R: Open only to juniors or seniors or graduate students in the Electrical Engineering or Computer Engineering major.

483. Capstone: Integrated Circuit Design and Fabrication (W)
Fall, Spring. 4(3-3)
P: EE 332 or CPS 320; EE 381. R: Open only to juniors or seniors or graduate students in the Electrical Engineering or Computer Engineering major. Completion of Tier 1 writing requirement.

484. Capstone: Applications of Analog Integrated Circuits (W)
Spring. 4(3-3)
P: EE 302, EE 303, EE 381. R: Open only to Electrical Engineering and Computer Engineering majors. Completion of Tier 1 writing requirement.

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.

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.

497. Electro-Optics
Fall. 3(2-3)
P: EE 303, EE 305, EE 474. R: Open only to juniors or seniors or graduate students in the Electrical Engineering or Computer Engineering major.

498. Capstone: Computer System Design (W)
Fall, Spring. 4(3-3)
P: EE 332 or CPS 320; EE 381. R: Open only to juniors or seniors or graduate students in the Electrical Engineering or Computer Engineering major. Completion of Tier 1 writing requirement.

499. Undergraduate Research
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 4 credits in all enrollments for this course.

Descriptions — Electrical Engineering of Courses

345. Electronic Instrumentation and Systems
Fall, Spring, Summer. 3(2-3)
P: MTH 225, PHY 184. R: Open only to College of Engineering majors except Electrical Engineering and Computer Engineering. Completion of Tier 1 writing requirement.

Electrical and electronic components, circuits and instruments. Circuit laws and applications, frequency response, operational amplifiers, semi-conductor devices, digital logic, counting circuits.

360. Signals and Linear Systems
Fall, Spring. 4(4-0)
P: EE 209, MTH 325. R: Open only to Electrical Engineering, Computer Engineering, and Computer Science majors.


381. Professionalism, Communication and Ethics (W)
Fall, Spring. 1(1-0)
P: EE 360 or concurrently. R: Open only to juniors or seniors or graduate students in the Electrical Engineering or Computer Engineering major. Completion of Tier 1 writing requirement. Examination of issues in professionalism, ethics, and technical communications related to electrical and computer engineering.

SA: EE 481

410. Digital Electronics
Fall, Spring. 3(3-0)
P: EE 303, EE 330. R: Open only to juniors or seniors or graduate students in the Electrical Engineering or Computer Engineering or Computer Science majors.


415. Computer Aided Manufacturing
Fall. 3(2-3)
P: EE 416 and EE 414, or ME 451. R: Open only to juniors or seniors in the Manufacturing Engineering major.

CAD/CAM fundamentals, programmable controllers, numerical control, NC part programming, sensors, data acquisition systems.
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 investigation of a topic in electrical engineering compatible with the student's prerequisites, interests, and ability.

802. Selected Topics
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
R: Approval of department.
Investigation of special topics in electrical engineering.

807. Computer System Performance and Measurement
Spring of odd-numbered years. 3(3-0) Interdepartmental with Computer Science. Administered by Computer Science.
P: CPS 410, STT 441. R: Open only to Computer Science or Electrical Engineering majors.

808. Modelling and Discrete Simulation
Fall of even-numbered years. 3(3-0) Interdepartmental with Computer Science. Administered by Computer Science.
P: CPS 330, STT 441. R: Open only to Computer Science or Electrical Engineering majors.
Simulation examples, and languages. Mathematical models, petri nets, model validation, random variable generation. Analysis of simulation data. Case studies.

813. Logic Design Principles
Fall. 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.

818. Robotics
Fall. 3(3-0)
P: EE 413 or ME 451 R: Open only to graduate students in the College of Engineering. 
Robot geometry, kinematics, dynamics, trajectory planning, robot programming, sensors, controller design.

820. Advanced Computer Architecture
Fall, Spring. 3(3-0) Interdepartmental with Computer Science. Administered by Computer Science.
P: CPS 419, CPS 429. 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.

822. 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.

823. Power System Stability and Control
Fall of even-numbered years. 3(3-0)
P: EE 826.
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 operations 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 320.
Analysis, modeling and design of synchronous, induction, and switched reluctance machines. Design drives for motion control and power system applications.

826. Linear Control Systems
Fall. 3(3-0)
P: MTH 314.

827. Nonlinear Systems Analysis
Spring. 3(3-0)
P: EE 326.

829. Optimal Multivariable Control
Spring. 3(3-0)
P: EE 826.
Performance and robustness. Minimum time, minimum energy and regulator, optimal control and minimum principle. LAG, Nyquist, and H-infinity design methods.

831. Analog Circuit Theory
Fall of even-numbered years. 3(3-0)

832. Analog Integrated Circuits Design
Fall of odd-numbered years. 3(3-0)

835. Advanced Electromagnetic Fields and Waves I
Fall. 3(3-0)

836. Advanced Electromagnetic Fields and Waves II
Spring. 3(3-0)
P: EE 835.

841. Fourier Optics
Spring of odd-numbered years. 3(3-0)
P: EE 360; EE 435 or EE 835.

842. Quantum Electronics
Fall of even-numbered years. 3(3-0)
P: EE 835, EE 874.

847. Analog and Digital Communications
Fall of odd-numbered years. 3(3-0)
P: EE 457, EE 863.
Optimum signal design in noiselur, matched filters, quadrature sampling of band-pass signals in noise. Coherent and non-coherent binary modulation such as FSK, DPSK, DSSB, M-ary modulation, intersymbol interference, spread spectrum.

850. Electrodymanics of Plasmas
Spring of odd-numbered years. 3(3-0) Interdepartmental with Physics, and Astronomy and Astrophysics.
P: EE 826, or PHY 488.

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.

865. Analog and Digital Communications
Fall of odd-numbered years. 3(3-0)
P: EE 457, EE 863
Optimum signal design in noisy channels, matched filters, quadrature sampling of band-pass signals in noise. Coherent and non-coherent binary modulation such as FSK, DPSK, M-ary modulation, intersymbol interference, spread spectrum.

874. Physical Electronics
Fall. 3(3-0)

875. Electronic Devices
Spring. 3(3-0)
P: EE 874.
Operating properties of semiconductor devices including DC, AC, transient and noise models of FET, BJT, metal-semiconductor contact, heterostructure, microwave and photonic devices.
### Descriptions — Electrical Engineering of Courses

**885. Artificial Neural Networks**  
Fall, 3(3-0) Interdepartmental with Computer Science.  

**899. Master's Thesis Research**  
Fall, Spring, 3(3-0). A student may earn a maximum of 9 credits in all enrollments for this course.

**920. Selected Topics in High Performance Computer Systems**  
Spring of odd-numbered years. 3 credits. A student may earn a maximum of 9 credits in all enrollments for this course. Interdepartmental with Computer Science. Designed for students interested in high performance computer systems. Topics vary each semester. Topics such as parallel processing, optimization techniques, parallel computer architectures, and embedded architectures.

**921. Advanced Topics in Digital Circuits and Systems (MTC)**  
Fall, Spring, 3(3-0). A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with Computer Science. Topics vary each semester. Topics such as digital systems, computer architecture, and system design.

**925. Advanced Topics in Power (MTC)**  
Fall, Spring, 3 credits. A student may earn a maximum of 9 credits in all enrollments for this course. Topics vary each semester. Topics such as power system design, power electronics, and power system economics.

**931. Advanced Topics in Electronic Devices and Materials (MTC)**  
Fall, Spring, 3(3-0). A student may earn a maximum of 12 credits in all enrollments for this course. Topics vary each semester. Topics such as semiconductor devices, materials science, and device physics.

**932. Advanced Topics in Analog Circuits (MTC)**  
Spring of odd-numbered years. 3(3-0) A student may earn a maximum of 3 credits in all enrollments for this course. Topics vary each semester. Topics such as advanced circuit analysis.

**936. Advanced Topics in Control (MTC)**  
Fall, Spring, 3(3-0). A student may earn a maximum of 6 credits in all enrollments for this course. Topics vary each semester. Topics such as adaptive control, nonlinear control.

**966. Advanced Topics in Signal Processing (MTC)**  
Fall, Spring, 3(3-0). A student may earn a maximum of 9 credits in all enrollments for this course. Topics vary each semester. Topics such as discrete time processing of speech signals, multistage signal processing, and detection and estimation theory.

**980. Advanced Topics in Plasma (MTC)**  
Fall of odd-numbered years. 3(3-0). A student may earn a maximum of 6 credits in all enrollments for this course. Topics vary each semester. Topics such as plasma processing for IC fabrication, plasma diagnostic techniques.

**990. Doctoral Dissertation Research**  
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 72 credits in all enrollments for this course.

### ENGINEERING EGR  
**College of Engineering**

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<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Description</th>
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<tbody>
<tr>
<td>101.</td>
<td>Overview of Science</td>
<td>Fall, 3(3-0) Interdepartmental with Natural Science, Agriculture and Natural Resources, and Social Science. Administered by Natural Science. R: Approval of College. Focus on intermediate grammar, speaking, listening, and reading.</td>
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<tr>
<td>160.</td>
<td>Minority Engineering Education Seminar</td>
<td>Fall, 3(3-0) R: Open only to freshmen in the College of Engineering and to freshmen non-preference students. Issues relevant to underrepresented engineering minority groups. Diversity in engineering. Transition problems. Communication skills. Career options.</td>
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<tr>
<td>192.</td>
<td>Environmental Issues Seminar</td>
<td>Fall, Spring, 1(1-0) A student may earn a maximum of 4 credits in all enrollments for this course. Interdepartmental with Natural Science, Agriculture and Natural Resources, and Social Science. R: Open only to students in the College of Agriculture and Natural Resources, College of Engineering, College of Agriculture and Natural Resources, and College of Social Science. Focus on environmental issues and problems explored from a variety of perspectives, including legal, scientific, historical, political, socio-economic, and technical points of view.</td>
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<tr>
<td>200.</td>
<td>Technology, Society and Public Policy</td>
<td>Fall, 2(2-0) R: Open only to students in the College of Engineering. Focus on environmental issues and problems explored from a variety of perspectives, including legal, scientific, historical, political, socio-economic, and technical points of view.</td>
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### ENGLISH ENG  
**Department of English**

**College of Arts and Letters**

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<th>Course</th>
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<tbody>
<tr>
<td>090A.</td>
<td>Intensive English for Non-Native Speakers</td>
<td>Fall, Spring, 0 credit. R: Approval of English Language Center. Focus on intensive practice of English skills.</td>
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<tr>
<td>090B.</td>
<td>Intensive English for Non-Native Speakers</td>
<td>Fall, Spring, 0 credit. R: Approval of English Language Center. Focus on intensive practice of English skills.</td>
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