Electronic Engineering—Descriptions of Courses

71B. Planning, Evaluation, and Decision Making in Post-secondary Education (EE 301, 302) Spring of even-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.
QA: EAD 971C

71C. Higher Education Finance (EE 303) Spring of odd-numbered years. 3(3-0)
Revenue sources of institutions of higher education. Restructuring conditions placed upon funds. Administrative structures used to obtain and manage funds. QA: EAD 707B

71D. Institutional Advancement in Higher Education (EE 304) Fall of odd-numbered years. 3(3-0)
Issues and strategies affecting institutional development. Governmental relations, admissions, alumni relations, and general administration. QA: EAD 870C, EAD 870J

990. Independent Study (EE 305) 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 E.12 Administration (EE 306) 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 (EE 307) 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 (EE 308) 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 practice, observations, internships, or externships in K-12 administration and in higher, adult, and lifelong education.

995. Research Practicum in Educational Administration (EE 309) 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.

999. Doctoral Dissertation Research (EE 310) 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.

Electrical Engineering

Department of Electrical Engineering
College of Engineering

302. Electronic Circuits (EE 311) Fall, Spring, 4(3-3)
P: EE 200, R: Open only to Electrical Engineering, Computer Engineering, and Computer Science majors.
Vol-ampere characteristics of diodes and transistors. SPICE modeling. Differential, multistage and integrated circuit amplifiers. High frequency effects. Electronic test equipment and verification of principles.
QP: EE 301, MTH 215 QA: EE 302, EE 303, EE 304

305. Electromagnetic Fields and Waves I (EE 312) Fall, Spring, 3(3-0)
P: MTH 225, PHY 184. R: Open only to Electrical Engineering, and Computer Engineering majors.
QP: MTH 310, PHY 208 QA: EE 305, EE 306

306. Electromagnetic Fields and Waves II (EE 313) Spring, Summer, 4(3-0)
P: EE 305, R: Open only to Electrical Engineering and Computer Engineering majors.
QP: EE 305, EE 306 QA: EE 307, EE 308

320. Energy Conversion and Power Electronics (EE 314) Fall, Spring, 3(3-0)
P: EE 302, EE 305. R: Open only to Electrical Engineering and Computer Engineering majors.
QP: EE 301, EE 306 QA: EE 320

330. Digital Logic Fundamentals (EE 315) Fall, Spring, Summer, 3(3-0)
P: CPS 130 or CPS 131 or CPS 230. R: Open only to College of Engineering majors.
QP: CPS 251 QA: EE 330

331. Microprocessors and Digital Systems (EE 316) Fall, Spring, 4(3-0)
QP: E 330 QA: EE 331

345. Electronic Instrumentation and Systems (EE 317) Fall, Spring, Summer, 3(3-0)
P: MTH 235, PHY 184. R: Open only to College of Engineering majors except Electrical Engineering and Computer Engineering.
Electrical and electronic components, circuits and instruments. Circuit analysis and applications, frequency response, operational amplifiers, semi-conductor devices, digital logic, counting circuits.
QP: PHY 208 QA: EE 345

360. Signals and Linear Systems (EE 318) Fall, Spring, 4(3-0)
P: EC 200, MTH 225. R: Open only to Electrical Engineering, Computer Engineering, and Computer Science majors.
QP: MTH 310 QA: EE 315, EE 417, EE 335

410. Digital Electronics (EE 319) Fall, Spring, 3(3-0)
P: EE 302, EE 330. R: Open only to Electrical Engineering, Computer Engineering, and Computer Science majors.
Transistor switch models. Device simulation models. Logic gate characteristics. Latches, flip-flops, timers, memory circuits, standard cells. Gate arrays, programmable logic devices.
QP: EE 330, EE 332 QA: EE 410

411. Electronic Design Automation (EE 320) Spring, 3(3-0)
P: CPS 320 or EE 351; EE 410. R: Open only to Electrical Engineering, Computer Engineering, and Computer Science majors.
QP: CPS 311, EE 410 QA: EE 411

412. Control Systems (EE 321) Fall, Spring, 3(3-0)
P: EE 302. R: Open only to Electrical Engineering and Computer Engineering majors.
QP: EE 322 QA: EE 412

421. Power System Analysis (EE 322) Spring, 4(3-0)
P: EE 320. R: Open only to Electrical Engineering and Computer Engineering majors.
QP: EE 330 QA: EE 421, EE 423

435. Electromagnetic Waves and Applications (EE 323) Fall, Spring, 4(3-0)
P: EE 306. R: Open only to Electrical Engineering and Computer Engineering majors.
QP: EE 307, EE 308 QA: EE 435, EE 436, EE 498

457. Statistical Communication Systems (EE 324) Spring, 4(3-0)
P: EE 360, STT 351. R: Open only to Electrical Engineering and Computer Engineering majors.
QP: EE 355, EE 456 or STT 441 or STT 351 QA: EE 457, EE 458

466. Digital Signal Processing and Filter Design (EE 325) Fall, Spring, 3(3-0)
P: EE 360. R: Open only to seniors and graduate students in Electrical Engineering and Computer Engineering.
QP: EE 365, EE 315 QA: EE 466

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474. Principles of Electronic Devices
Fall, Spring, 3(0-0)
P: EE 302, EE 305. R: Open only to Electrical Engineering and Computer Engineering majors.
Energy levels in atoms. Crystal properties, energy bands and charge carriers, semiconductors, transport properties of both materials. P-n junction diodes, bipolar transistors, field effect transistors.
QP: EE 302, EE 305 QA: EE 474

478. Opto-Optics
Fall, 3(2-3)
P: EE 305, EE 474. R: Open only to Electrical Engineering and Computer Engineering majors.
Operating principles and applications of high frequency and photonic devices including impact, Gunn, photodetector, light-emitting diodes, semiconductor laser devices. Photonic device applications to fiber optic systems.
QP: EE 474, EE 307 QA: EE 477

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

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.
QP: EE 801

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.
QP: EE 802

809. Algorithms and Their Hardware Implementation
Fall, 3(0-0) Interdepartmental with Computer Science.
Arithmetic, signal processing, and image processing algorithms. Array structure: arithmetic data flow structure, neural network architecture. Performance analysis.
QP: EE 809

813. Logic Design Principles
Spring, 3(0-0) Interdepartmental with Computer Science.
Behavioral modeling, combinational circuit analysis, design. Sequential circuit analysis and synthesis. Design for testability. Semiconductors and MSI design.
QA: EE 813

823. Power System Stability and Control
Fall of even numbered years, 3(0-0)
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.
QP: EE 826 QA: EE 829, EE 820

824. Power System Operation and Control
Fall of odd numbered years, 3(0-0)
P: EE 421; STT 351.
Operation and control 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.
QP: EE 421, EE 456, STT 441 QA: EE 824

825. Alternating Current Electrical Machines and Drives
Spring of odd numbered years, 3(0-0)
P: EE 320.
Analysis, modeling and design of synchronous, induction, and switched reluctance machines. Design drives for motion control and power system applications.
QP: MTH 424, EE 320 QA: EE 825

826. Linear Control Systems
Fall, 3(0-0)
P: MTH 314.
Vector spaces, representation, system description, solution to the state equations, stability, controllability and observability, Adjoints of linear maps. Eigenvalue assessment, Partial and full order observers, Disturbance decoupling.
QA: EE 826, EE 829

827. Nonlinear Systems Analysis
Spring, 3(0-0)
P: EE 826.
QP: EE 826, MTH 424 QA: EE 827

829. Optimal Multivariable Control
Spring, 3(0-0)
P: EE 826.
Performance and robustness. Minimum time, minimum energy and regulator. Optimal control and minimum principle. LQG, Nyquist, and H-infinity design methods.
QP: EE 413, EE 526, STT 441 QA: EE 829, EE 961

831. Analog Circuit Theory
Fall of even numbered years, 3(0-0)
QA: EE 831

832. Analog Integrated Circuit Design
Fall of odd numbered years, 3(0-0)
QP: EE 475 QA: EE 852, EE 475

835. Advanced Electromagnetic Fields and Waves I
Fall, 3(0-0)
QA: EE 835

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

841. Fourier Optics
Spring of even numbered years, 3(2-3)
P: EE 457, EE 458, EE 459.
QP: EE 355, EE 356, EE 307, EE 835 QA: EE 841

842. Quantum Electronics
Fall of even numbered years, 3(0-0)
P: EE 835, EE 874.
QP: EE 316 QA: EE 842

847. Analog and Digital Communications
Fall of odd numbered years, 3(0-0)
P: EE 457, EE 883.
Optimization and design in noisy channels, matched filters, quadrature sampling of band-pass signals in noise. Coherent and non-coherent binary modulation such as PSK, FSK, DPSK. M-ary modulation, intersymbol interference, spread spectrum.
QP: EE 457, EE 853 QA: EE 847, EE 848

850. Electrodynamics of Plasmas
Spring of even numbered years, 3(0-0) Interdepartmental with Physics and Astronomy and Astrophysics.
P: EE 835 or PHY 483.
QP: EE 835, PHY 446 QA: EE 850

883. Analysis of Stochastic Systems
Fall, 3(0-0)
P: STT 441.
Theory of random variable theory. Stochastic processes and stochastic calculus. Optimal systems for filtering and detection.
QP: EE 456 QA: EE 863
966. Digital Signal Processing
Spring, 3(3-0) Interdepartmental with Computer Science.
P: EE 466, EE 863.
QP: EE 468, EE 456

874. Physical Electronics
Fall, 3(3-0)
QA: EE 874, EE 876

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.
QP: EE 474 QA: EE 875, EE 876

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

909. 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.
QA: EE 899

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 testable and fault-tolerant digital systems, embedded architectures.
QP: EE 899, EE 813

925. Advanced Topics in Power (MTC)
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 advanced stability and control of power systems, power system planning, or advanced machine drives.
QP: EE 823, EE 824 QA: EE 920

929. Advanced Topics in Electromagnetics (MTC)
Fall, Spring. 3 to 4 credits. A student may earn a maximum of 10 credits in all enrollments for this course.
Topics vary each semester. Topics such as planar waveguides and circuits, antenna theory, geometrical theory of diffraction.
QP: EE 837 QA: EE 929

931. Advanced Topics in Electronic Devices and Materials (MTC)
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course.
Topics vary each semester. Topics such as VLSI technology, microdevices and microstructures, properties of semiconductors.
QP: EE 874 QA: EE 932

932. Advanced Topics in Analog Circuits (MTC)
Spring of even-numbered years. 3(3-0) A student may earn a maximum of 5 credits in all enrollments for this course.
Topics vary each semester. Topics such as advanced circuit analysis.
QP: EE 826

963. Advanced Topics in Systems (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 system identification and adaptive filtering, robot dynamics and control, or learning in artificial neural networks.
QP: EE 899

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, multidimensional signal processing, or detection and estimation theory.

969. 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.
QP: EE 850 QA: EE 899

999. 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.
QA: EE 999

ENG

Department of English
College of Arts and Letters

090A. Intensive English for Non-Native Speakers
Fall, Spring. 0 credit. [3(0-0)
R: Approval of English Language Center.
Explanation and intensive practice of English skills.
Focus on beginning grammar, speaking, listening, reading, and writing.
QA: ENG 091, ENG 092, ENG 093, ENG 094, ENG 095

090B. Intensive English for Non-Native Speakers
Fall, Spring. 0 credit. [3(0-0)
R: Approval of English Language Center.
Explanation and intensive practice of English skills.
Focus on intermediate grammar, speaking, listening, reading, and writing.
QA: ENG 091, ENG 092, ENG 093, ENG 084, ENG 095

090C. Intensive English for Non-Native Speakers
Fall, Spring. 0 credit. [3(0-0)
R: Approval of English Language Center.
Explanation and practice of advanced grammatical structures of English in relation to written communication. Emphasis on editing skills.
QA: ENG 091

092. Academic oral Skills for Non-Native Speakers of English
Fall, Spring. 0 credit. [3(0-0)
R: Approval of English Language Center.
Intensive speaking and listening practice of spoken academic English. Lecture-listening and note-taking strategies. Oral communication skills improved through discussions and classroom presentations.
QA: ENG 092

093. Academic Reading and Writing Skills for Non-Native Speakers of English
Fall, Spring. 0 credit. [3(0-0)
R: Approval of English Language Center.
Integrative reading and writing strategies for academic purposes. Vocabulary development, intensive and extensive reading skills. Academic writing style and editing strategies.
QA: ENG 093, ENG 095

094. Academic Reading Skills for Non-Native Speakers of English
Fall, Spring. 0 credit. [3(0-0)
R: Approval of English Language Center.
Intensive and extensive reading skills. Vocabulary development, pre-reading strategies for comprehension, and critical reading skills.
QA: ENG 094

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