ELECTRICAL AND COMPUTER ENGINEERING  ECE

Department of Electrical and Computer Engineering
College of Engineering

200 Electric Circuits
Fall, Spring. 4(4-0) P:M: (CSE 131 or CSE 231) and (MTH 235 or concurrently or LBS 119 or concurrently or MTH 255H or concurrently) SA: EE 200


230 Digital Logic Fundamentals
Fall, Spring. 3(3-0) P:M: (CSE 131 or CSE 231) SA: ECE 330


302 Electronic Circuits
Fall, Spring. 3(3-0) P:M: (ECE 200) RB: (ECE 200) R: Open only to students in the Department of Electrical and Computer Engineering or Department of Computer Science and Engineering. SA: EE 302

Volt-ampere characteristics of diodes and transistors. SPICE modeling. Differential, multistage and integrated circuit amplifiers. High frequency effects.

303 Electronics Laboratory
Fall, Spring. 1(0-3) P:M: (ECE 200) R: Open only to students in the Department of Electrical and Computer Engineering or Department of Computer Science and Engineering. SA: EE 303 C: ECE 302 concurrently.

Electronic test equipment and measurement fundamentals. Experimental verification of topics covered in EE 200 and EE 302.

305 Electromagnetic Fields and Waves I
Fall, Spring. 3(3-0) P:M: (MTH 235 or concurrently or LBS 119 or concurrently or MTH 255H or concurrently) and (PHY 184 or PHY 184B or PHY 234B) R: Open only to students in the Department of Electrical and Computer Engineering. SA: EE 305


306 Electromagnetic Fields and Waves II
Spring. Summer. 4(3-3) P:M: (ECE 305) SA: EE 306, ECE 307


313 Control Systems
Fall, Spring. 3(3-0) P:M: (ECE 200 or ECE 345) R: Open only to juniors or seniors or graduate students in the Department of Electrical and Computer Engineering, the Department of Computer Science and Engineering, and the Manufacturing Engineering major. SA: EE 413, ECE 413

Analysis and design of control systems using transfer functions and state variable methods.

320 Energy Conversion and Power Electronics
Fall, Spring. 3(3-0) P:M: (ECE 302 and ECE 303 and ECE 305) SA: EE 320


331 Microprocessors and Digital Systems
Fall, Spring. 3(3-0) P:M: (CSE 231 and ECE 230) R: Open only to juniors or seniors or graduate students in the Department of Electrical and Computer Engineering. SA: EE 331


345 Electronic Instrumentation and Systems
Fall, Spring. 4(4-0) P:M: (ECE 200 or MTH 255H or LBS 119) and (PHY 184 or PHY 184B or PHY 234B) and completion of Tier I writing requirement. R: Open only to students in the College of Engineering with the exception of students in the Department of Electrical and Computer Engineering. SA: EE 345

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:M: (ECE 200 or concurrently) and (MTH 235 or concurrently or MTH 255H or concurrently) and (PHY 184 or PHY 234B) R: Open only to students in the Department of Electrical and Computer Engineering or Department of Computer Science and Engineering. SA: EE 360


410 VLSI Design
Fall, Spring. 4(3-3) P:M: (ECE 302 and ECE 303 and ECE 230) R: Open only to juniors or seniors or graduate students in the Department of Electrical and Computer Engineering or Department of Computer Science and Engineering. SA: EE 410


411 Electronic Design Automation
Fall, Spring. 4(3-3) P:M: (ECE 320 or ECE 331) R: Open only to juniors or seniors or graduate students in the Department of Electrical and Computer Engineering or Department of Computer Science and Engineering. SA: EE 411


415 Computer Aided Manufacturing
Fall. 3(2-3) P:M: (ECE 313 or ME 451) R: Open only to juniors or seniors in the Manufacturing Engineering major. SA: EE 415

CAD/CAM fundamentals, programmable controllers, numerical control, NC part programming, sensors, data acquisition systems.

418 Algorithms of Circuit Design
Fall. 3(2-3) P:M: (ECE 303 and ECE 360) R: Open only to juniors or seniors or graduate students in the Department of Electrical and Computer Engineering. SA: EE 418


421 Power System Analysis
Spring. 4(3-3) P:M: (ECE 320) SA: EE 421


435 Electromagnetic Waves and Applications
Fall. 4(3-3) P:M: (ECE 306) SA: EE 435


457 Communication Systems
Spring. 3(3-0) P:M: (ECE 302 and ECE 360 and STT 351) R: Open only to juniors or seniors or graduate students in the Department of Electrical and Computer Engineering. SA: EE 457


458 Communication Systems Laboratory
Spring. 1(0-3) P:M: (ECE 303 and ECE 457 or concurrently) SA: EE 458

A projects laboratory in communication systems.
466 Digital Signal Processing and Filter Design
Fall, 3(3-0) P.M: (ECE 360) R: Open only to seniors or graduate students in the Department of Electrical and Computer Engineering. SA: EE 466

474 Principles of Electronic Devices
Fall, Spring. 3(3-0) P.M: (ECE 302 and ECE 305) SA: EE 474
Energy levels in atoms. Crystal properties, energy bands and charge carriers, semiconductors, transport properties of bulk materials. P-n junction diodes, bipolar transistors, field effect transistors.

476 Electro-Optics
Fall, Summer. 3(2-3) P.M: (ECE 302 and ECE 303) SA: EE 476
Operating principles and applications of high frequency and photonic devices including impatt, Gunn, photodetector, light-emitting diodes, semiconductor laser devices. Photonic device applications to fiber optic systems.

477 Microelectronic Fabrication
Fall, 3(2-3) P.M: (ECE 474 or concurrently) R: Open only to juniors or seniors in the Department of Electrical and Computer Engineering. SA: ECE 483
Microelectronic processing fundamentals and simulations. Comparison of current microfabrication technologies and their limitations.

480 Senior Design
Fall, Spring. 3(6-0) P.M: (ECE 302 and ECE 303) and (ECE 331 or ECE 313 or ECE 306) and (ECE 410 or ECE 411 or ECE 421 or ECE 435 or ECE 457 or ECE 468 or ECE 476 or ECE 418) or (CSE 410 or CSE 420 or CSE 422) and completion of Tier I writing requirement. R: Open only to seniors in the Department of Electrical and Computer Engineering. SA: ECE 481, ECE 482, ECE 483
Electrical engineering and computer engineering senior design experience involving contemporary design tools, practicum engineering standards, ethics, cross-functional teaming, oral and written technical communication, lifelong learning.

484 Applications of Analog Integrated Circuits
Spring, 4(3-3) P.M: (ECE 302 and ECE 303) R: Open only to juniors or seniors or graduate students in the Department of Electrical and Computer Engineering. SA: EE 484
Circuit design using analog integrated circuits. SPICE macromodeling, Operational amplifiers, comparators, timers, regulators, multipliers and converters. Design project with hardware and software verification.

485 Digital Control and Robotics
Spring, 4(3-3) P.M: (ECE 331 and ECE 313) R: Open only to juniors or seniors or graduate students in the Department of Electrical and Computer Engineering. SA: EE 485
Robot classifications, kinematics, trajectory planning, digital controller design. Design and implementation of sensor-based robots.
929A Planar Waveguides and Circuits
Fall of odd years. Spring of odd years. 3(3-0) RB: (ECE 835) SA: EE 929A

929B Antenna Theory
Fall of odd years. Spring of odd years. 4(4-0) RB: (ECE 835) SA: EE 929B

929C Geometrical Theory of Diffraction
Fall of odd years. Spring of odd years. 3(3-0) RB: (ECE 835) SA: EE 929C

931 Advanced Topics in Electronic Devices and Materials
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course. SA: EE 931 Topics vary each semester.

931A VLSI Technology
Fall of odd years. Spring of odd years. 3(3-0) RB: (ECE 875) SA: EE 931A
Oxidation, doping techniques, simulation techniques, film deposition and etching, epitaxial growth, lithography, passivation, and packaging.

931B Microdevices and Microstructures
Fall of odd years. Spring of odd years. 3(3-0) RB: (ECE 875) SA: EE 931B

931C Properties of Semiconductors
Fall of odd years. Spring of odd years. 3(3-0) RB: (ECE 874) SA: EE 931C
Carrier scattering, single particle and collective transport, quantum effects, hot electron effects, electron-photon and electron-photon interactions.

932 Advanced Topics in Analog Circuits
Spring of odd years. 3(3-0)
Variable topics in advanced circuit analysis.

960 Advanced Topics in Control
Fall, Spring. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. RB: (ECE 827 and ECE 829) SA: EE 960 Topics vary each semester.

960A Adaptive Control
Fall of odd years. Spring of odd years. 3(3-0) RB: (ECE 827 and ECE 829) SA: EE 960A

960B Nonlinear Control
Fall of odd years. Spring of odd years. 3(3-0) RB: (ECE 827 and ECE 829) SA: EE 960B

963 Advanced Topics in Systems
Fall, Spring. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. SA: EE 963 Topics vary each semester.

963A Sensor Fusion and System Identification and Observation
Fall of odd years. Spring of odd years. 3(3-0) RB: (ECE 826) SA: EE 963A
Model parameterization, adaptive filters, identifiability criteria, equation and output error methods, recursive algorithms, least squares and maximum likelihood identification, convergence analysis, closed-loop system identification, experiment design.

963B Intelligent Control in Robotics and Automation
Fall of odd years. Spring of odd years. 3(3-0) RB: (ECE 818 and ECE 826) SA: EE 963B
Robot dynamics, different formulations. Control types: joint space, task space, force and compliance, robust control. Coordination of multiple robots, mobile robots.

963C Adaptation and Learning in Neural Networks and Systems
Fall of odd years. Spring of odd years. 3(3-0) RB: (ECE 885) SA: EE 963C
Analysis, design. Learning algorithms. Stability, convergence. Possible engineering applications.

966 Advanced Topics in Signal Processing
Fall, Spring. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. SA: EE 966 Topics vary each semester.

966A Discrete Time Processing of Speech Signals
Fall of odd years. Spring of odd years. 3(3-0) RB: (ECE 466 and ECE 863) SA: EE 966A

966B Multidimensional Signal Processing
Fall of odd years. Spring of odd years. 3(3-0) RB: (ECE 846 and ECE 864) SA: EE 966B

966C Advanced Topics in Statistical Signal Processing
Fall of odd years. Spring of odd years. 3(3-0) RB: (ECE 866 and ECE 864) SA: EE 966C
Communication channels, noise models, hypothesis testing of signals by Bayesian minimax, and Neyman-Pearson criteria. Performance evaluation using ROC. Bayesian and maximum likelihood parameter estimation. Kalman-Bucy filtering.

989 Advanced Topics in Plasma
Fall of odd years. Spring of odd years. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. SA: EE 989 Topics vary each semester.

989A Plasma Processing for IC Fabrication
Fall of odd years. Spring of odd years. 3(3-0) RB: (ECE 835 and ECE 890) SA: EE 989A Process requirements. Plasma reactors. Etching and deposition applications. Broad ion beam processing.

999 Doctoral Dissertation Research
Fall, Spring. 1 to 24 credits. A student may earn a maximum of 72 credits in all enrollments for this course. SA: EE 999 Doctoral dissertation research.

ENGINEERING EGR
College of Engineering

101 Preview of Science
Fall. 1(1-0) Interdepartmental with Natural Science; Agriculture and Natural Resources; Social Science. Administered by Natural Science. R: Approval of college. Overview of natural sciences. Transitional problems. Communications and computer skills. Problem solving skills. Diversity and ethics problems in science. Science and society.

124 Internet and Technology
Fall, Spring, Summer. 2(2-0)
The Internet from a user perspective and from a technical perspective. History and social impact of the Internet. Internet tools.

150 Engineers and the Engineering Profession
Spring. 2(2-0) R: Open only to freshmen or sophomores. Overview of the engineering profession. Historical background. Engineering specialties. Engineers at work. Professionalism and ethics. Communication skills. Future trends and challenges.

160 Diversity and Engineering
Fall, Spring. 2(2-0) P:M: (MTH 116 or concurrently or MTH 132 or concurrently) R: Open only to freshmen or sophomores in the College of Engineering. Diversity and engineering. Transitional problems. Career options. Communication skills.

192 Environmental Issues Seminar
Fall, Spring. 1 credit. A student may earn a maximum of 4 credits in all enrollments for this course. Interdepartmental with Natural Science; Agriculture and Natural Resources; Social Science; Communication Arts and Sciences. Administered by Natural Science. R: Open only to students in the College of Agriculture and Natural Resources or College of Engineering or College of Natural Science or College of Communication Arts and Sciences or College of Social Science. Approval of college.

Environmental issues and problems explored from a variety of perspectives, including legal, scientific, historical, political, socio-economic, and technical points of view.