

GRADUATE COURSES

Engineering Courses (ENGR)

ENGR 202. Applied Engineering Analysis (3)

Study of analytical tools used in the analysis and modeling of engineering systems. Emphasis is placed on solving problems in engineering disciplines.

ENGR 205. Computing in Engineering Analysis (3)

Prerequisite: a first course in numerical analysis at the graduate level. Solution of engineering problems using digital computation. Modeling of engineering systems for numerical analysis.

ENGR 206. Probability Theory and Statistical Analysis (3)

A first course in probability theory and statistical analysis at the graduate level. Finite sample spaces, conditional probability and independence, one-dimensional random variables, functions of random variables, two- and higher-dimensional random variables, poisson and other discrete random variables, continuous random variables, moment-generating function, reliability theory, sums of random variables, samples and sampling distributions, estimation of parameters, testing hypothesis.

ENGR 210. Linear Control Systems (3)

A first-year graduate course covering the analysis, synthesis, and performance of linear control systems. Partial fraction expansion, Routh's criterion, the impulse function. Basic servo characteristics and types, block diagrams, transfer functions. A detailed treatment of the root locus method for analysis and synthesis. Frequency response, logarithmic and polar plots, Nyquist's criterion, stability characteristics, phase margin and gain margin.

ENGR 212. Advanced Control Systems (3)

Prerequisite: ENGR 210 or permission of coordinator. Describing function analysis of nonlinear control systems; phase-plane analysis; Liapunov stability analysis; discrete-time systems; z-transform-method; linear stochastic systems; application of statistical design principles; optimal and adaptive control systems; digital control systems.

Electrical Engineering (EE) Courses

EE 230. Nonlinear Control Systems (3)

Prerequisite: ECE 155 or permission of instructor. Dynamic systems modeling and analysis, stability, sliding mode control, fuzzy logic control, and introduction to relevant topics. (Formerly EE 291T)

EE 231. Digital Control Systems (3)

Prerequisite: ECE 155 or permission of instructor. Discrete Time Feedback systems modeling and analysis, stability, digital controller design, digital transformation of analog controllers, implementation techniques, and case studies. (Formerly EE 291T)

EE 241. Applied Electromagnetics (3)

Prerequisite: ECE 136 or permission of coordinator. Electrostatic field boundary conditions, energy relations, and forces; multidimensional potential problems; magnetic field boundary conditions, scalar and vector potentials, and magnetization; Maxwell's equations for stationary and moving media; energy, force, and momentum in an electromagnetic field; plane waves; waves near metallic boundaries; inhomogeneous wave equation.

EE 243. Modern Methods in Synchronous Sequential Design (3)

Prerequisite: ECE 172 or permission of coordinator. Synchronous machine design with PLDs and FPGAs; algorithmic state machines; incompletely specified machines; maximum compatibility classes; partitioning of sequential machines; state merging and state splitting.

EE 245. Communications Engineering (3)

Prerequisite: ECE 134 or permission of coordinator. Basic modulation concepts; statistical properties of signals; transmission systems optimization against noise; digital transmission and modulation methods; attenuation and phase distortion in analog and digital systems; intermodulation distortion; random multipath channels; intersystem interference.

EE 247. Modern Semiconductor Devices (3)

Prerequisite: ECE 114 or permission of coordinator. Crystal structures and elastic constants; lattice energy and vibrations; thermal and dielectric properties of solids; ferroelectric and magnetic properties of crystals; free electron model of metals; quantum statistics distributions; band theory; semiconductor crystals; superconductivity; photoconductivity and luminescence; dislocations.

EE 249. Advanced Communication Engineering (3)

Prerequisite: ECE 245 or permission of coordinator. The measure of information; noiseless coding; models of communication channels; channel capacity; discrete memoryless channels; error correcting codes; information sources; discrete channels with memory; continuous channels.

EE 251. Antennas and Propagation (3)

Wave equation, plane waves, metallic boundary conditions; wave equation for the potentials Lorentz transformation; covariant formulation of electrodynamics; radiation from a moving charge; scattering and dispersion; Hamiltonian formulation of Maxwell's equations.

EE 253. Advanced Asynchronous Machine Design (3)

Asynchronous machine design; primitive flow tables; static/dynamic hazards; state assignment; covers; partitions; decompositions; state identification and fault detection experiments; pulse mode circuits; iterative networks; introduction to hardware description languages.

EE 255. Digital Signal Processing (3)

Prerequisite: ECE 107 or permission of coordinator. Discrete-time signals; Fourier transforms; random discrete-time signals; filtered random signals; correlation functions; power-spectral-density estimation; cross-spectral estimates; detection of signals in noise; estimation of signals in noise; recursive estimation of time-varying signals.

EE 257. Optical Communications and Lasers (3)

Quantum measure of light, linear, elliptical, and circular polarization; optical waveguide equations, ray and mode theory; source and detector characteristics; attenuation, dispersion, and noise effects; correlation, spectral density, noise equivalent bandwidth, coding, modulation, multiplexing techniques; systems and link design.

EE 259. Radar System Design (3)

The nature and history of radar, the radar equation, PRF and range considerations, CW and FM radars. MTI and pulse-Doppler radars, tracking radars. Radar power generation, antenna types and design considerations, receivers, detection of signals in noise, extraction of information from radar signals, propagation of radar wave, the effects of clutter, weather and interference. Examples of radar system engineering and design.

EE 290. Independent Study (1-3; max total 6)

Prerequisite: graduate status in engineering or permission of instructor. Approved for RP grading.

EE 291T. Topics in Electrical Engineering (1-3; max total 6)

Prerequisite: graduate status in engineering or permission of instructor. Selected electrical engineering subjects not in current courses.

EE 298. Project (3; max total 3)

Prerequisite: graduate status in engineering. See Criteria for Thesis and Project. Independent investigation of advanced character such as analysis and/or design of special engineering systems or projects; critical review of state-of-the-art special topics, as the culminating requirement of the master's degree. Abstract required. Approved for RP grading.

EE 299. Thesis (3-6; max total 6)

Prerequisite: see [Criteria for Thesis and Project](#). Preparation, completion, and submission of an acceptable thesis for master's degree. Approved for RP grading.