

Optional Courses for CE Structural Eng. 2013/2014

Fall 2013:

ENGRMAE 254 Mechanics of Solids and Structures (Credit Units: 4) Finite deformation kinematics; Stress and strain measures; Invariance in Solid Mechanics; Objective rates; constitutive theory of elastic and inelastic solids; rate formulations; computational approaches; theories of plates and shells; applications to aerospace vehicles. (Design units: 0)

ENGRMAE 270A Linear Systems I (Credit Units: 4) Methods of linear systems analysis. State-space representations of continuous-time linear systems-impulse response and state transition operators. Controllability and observability. Prerequisite: ENGRMAE 170 or EECS 160A. (Design units: 0)

EECS 240 Random Processes (Credit Units: 3) Extensions of probability theory to random varying with time. General properties of stochastic processes. Convergence. Estimation, including nonlinear and linear minimum mean square error and maximum likelihood. Spectral density and linear filters. Poisson processes and discrete-time Markov chains. Prerequisite: EECS 140. (Design units: 0)

Winter 2014:

ENGRMAE 200B Engineering Analysis II (Credit Units: 4) Review of ordinary differential equations, including Bessel and Legendre functions. Partial differential equations, including the diffusion equation, Laplace's equation, and the wave equation. Fourier series, Fourier and Laplace transforms and their applications. (Design units: 0)

ENGRMAE 241 Dynamics (Credit Units: 4) Kinematics and dynamics of three-dimensional motions. Lagrange's equations, Newton-Euler equations. Applications include robot systems and spinning satellites. Prerequisite: ENGRMAE 147 or equivalent (Design units: 0)

ENGRMSE 256A Mechanical Behavior of Engineering Materials (Credit Units: 3) Principles governing structure and mechanical behavior of materials, relationship relating microstructure and mechanical response with application to elasticity, plasticity, creep, and fatigue, study of rate-controlling mechanisms and failure modes, fracture of materials. Prerequisite: ENGR 54. (Design units: 0)

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Spring 2014:

ENGRMAE 206 Nonlinear Optimization Methods (Credit Units: 4) Numerical methods for constrained and unconstrained optimization. Necessary and sufficient conditions for optimality. Conjugate gradient, variable metric algorithms. Gradient projection, penalty functions, and Lagrange methods. Prerequisite: ENGRMAE 200A. (Design units: 0)

ENGRMAE 207 Methods of Computer Modeling in Engineering and the Sciences (Credit Units: 4) Unified introduction to Finite Volume, Finite Element, Field-Boundary element, Meshless, Primal, Dual, and Mixed Methods. Nonlinear Problems posed by Ordinary as well as Partial differential equations. Computer implementations and Comparisons of accuracy and convergence. (Design units: 0)

ENGRMAE 255 Composite Materials and Structures (Credit Units: 4) Motivation for composite materials. Different classifications according to the nature of the matrix (PMC, MMC, CMC) and the reinforcement of topology (fibers, whiskers, particulates). Mechanical properties. Failure mechanisms. Designing with composite materials. Advantages and limitations of homogenization techniques for numerical modeling. Prerequisite: ENGR 54 and (ENGRCEE 150 or ENGRMAE 150 or ENGR 150). Concurrent with [ENGRMAE 155](#). (Design units: 0)

ENGRMAE 270B Linear Systems II (Credit Units: 4) Advanced topics in linear systems: bases, linear operator representations, and Jordan forms. Review of dynamical systems, and stability. Time-varying systems, discrete-time representations, and multi-input/multi-output systems. Introduction to continuous and discrete time linear regulator (LQR) problems. Prerequisite: ENGRMAE 270A. (Design units: 0)