Aerospace and Mechanical Engineering
Graduate Course Offereings
Spring 2006 (10/18/05)

ENG AM 506 Statistical-Mechanical Concepts in ENG Yakhot TR 4-6
Prereq: graduate standing or consent of instructor. Specific prerequisites vary according to topic, but do not extend beyond what is covered in the core courses in the undergraduate curriculum in mechanical engineering. Elementary introduction to selected fundamental concepts in probability, random processes, signal processing, and statistical mechanics with strong emphasis on their applications to aerospace and mechanical engineering. Examples taken from acoustics, mechanics, thermodynamics, and fluid dynamics. 4 cr.

ENG AM 720 Acoustics 2 Cleveland MW 2-4
Wave equation in cylindrical and spherical co-ordinate systems. Propagation in waveguides. Diffraction: the Rayleigh integral and the Helmholtz-Kirchhoff integral. Green's function and angular spectrum methods. Diffraction of sound beams: Gaussian beams, unfocused and focused sources, and arrays. Diffraction by apertures, discs and wedges. Scattering of sound; Rayleigh scattering, scattering cross-section, elastic scatterers. Propagation in inhomogeneous media: rays, the eikonal equation, the Blokhintzev invariant and the acoustic field near caustics. Absorption and dispersion of acoustic waves. Transmission and reflection at a fluid-solid interface.

ENG AM 740 Vision, Robotics, & Planning Baillieul MW 4-6
Grad Prereq: graduate standing in the College of Engineering or consent of instructor. Methodologies required for constructing and operating intelligent mechanisms. Comprehensive introduction to robot kinematics for motion planning. Dynamics and control of mechanical systems. Formal treatment of differential relationships for understanding the control of forces and torques at the end effector. Discussion of robot vision and sensing and advanced topics in robot mechanics, including elastic effects and kinematic redundancy. Meets with ENG MN 740; students may not take both for credit.

ENG AM 700 Special Topics in AME McDaniel MW 10-12
This course will investigate the interaction of sound with structures. A primary focus will be on the acoustic radiation and scattering from elastic structures such as plates and shells.

ENG AM 742 Bio-Fluids and Structural Mechanics Barbone MW 12-2
Prereq: Eng AM 542 and EK 305. Mechanics of biological systems, with emphasis on biological application of fluid mechanics. Topics will be chose from the following: cardiovascular dynamics--pulsatile flow, vessel elasticity, non-Newtonian behavior, flow in bifurcations, thermodilution; pulmonary dynamics-oscillatory flow, convection-diffusion interactions, surface tension effects, high frequency ventilation, turbulence; clinical applications—urodynamics, bone fracture, dental mechanics, male impotency; mechanics of propulsion—microorganisms in viscous liquids, swimming, flying.

ENG AM 762 Non-linear Control of Mechanical Systems Wang TR 10-12
Pre-req: ENG AM/SC501 or permission of instructor. Introduction to the theory and design methods of non-linear control systems. Application to robotics, vibration and noise control, fluid control, manufacturing processes, and biomedical systems. Mathematical methods based on the theory of differentiable manifolds; non-linear control techniques include feedback linearization, backstepping, forwarding, and sliding mode control. Additional course topics will include controllability and observability, Lyapunov stability and its applications, limit cycles, input-output stability, zero dynamics, center manifold theory, perturbation theory, and averaging. 4 cr.

FOR COURSES IN OTHER DEPARTMENTS PLEASE CHECK THE STUDENT LINK UNDER "ACADEMICS."