DEPARTMENT OF AERONAUTICS AND ASTRONAUTICS

AA 210 STATICS

AUTUMN, WINTER AND SUMMER QUARTERS

CREDITS AND CONTACT HOURS: 4 credits, Three 50 minute lectures per week and one 50 minute quiz section.

COORDINATOR: Carl Knowlen, Research Scientist Aeronautics and Astronautics

TEXTBOOK: Engineering Mechanics Statics and Dynamics, Bedford, Anthony M. and Fowler, Wallace 5th Edition, 2007

SUPPLEMENTAL MATERIALS: None

CATALOG DATA: ENGINEERING STATICS, Required
Vector analysis applies to equilibrium of rigid body systems and subsystems. Force and moment resultants, free body diagrams, internal forces, and friction. Analysis of basic structural and machine systems and components. Prerequisites: either MATH 126, MATH 129, or MATH 136, PHYS 121.

PREREQUISITES BY TOPIC: Calculus and Physics

OUTCOMES:

1) Students will understand basic concepts of vectors and vector operations and be able to apply these tools to the analysis of forces and torques acting on a body.
2) Students will be able to formulate and solve a system of equations for the forces and torques necessary to maintain equilibrium of various 2D and 3D systems by applying Newton's First and Third Laws.
3) Students will gain experience with the concept of the centroid and moments of inertia.
4) Students will develop Confidence in analyzing the internal forces and moments acting throughout a given structure.
5) Students will be able to analyze the behavior of simple systems involving static and kinetic friction.

RELATIONSHIP TO STUDENT OUTCOMES:

a) An ability to apply knowledge of mathematics, science, and engineering.
e) An ability to identify, formulate and solve engineering problems.
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

TOPICS:

1) Overview of statics. Vectors: addition, components, dot product
2) Type of forces; equilibrium; free-body diagrams.
3) Forces and moments; moment as cross-product; couples; equivalent systems of forces.
4) Equilibrium of supported bodies; types of supports; 2-D and 3-D applications.

5) Analysis of common structures - tresses and frames.
6) Centers of mass; distributed forces.
7) Moments of inertia; applications of theorems for computation.
8) Internal forces; shear and bending moments.