THE OHIO STATE UNIVERSITY

COLLEGE OF ENGINEERING

Flight Vehicle Structures I

AEROENG 3542

Credit Hours:

3.00

Course Levels:

Undergraduate (1000-5000 level)

Course Components:

Lecture

Course Description:

Introduction to aerospace structures: Basic structural components; fundamental elements of linear elastic boundary value problems; composites; bending, torsion and shear of thin-walled sections; laboratory demonstrations.

Prerequisites and Co-requisites:

Prereq: 2200 and MechEng 2030 and 2040, or 2200 and MechEng 2010 and 2020 and 2030; and enrollment as AeroEng-BS student.

Course Goals / Objectives:

• Introduce the concepts of structural mechanics in the context of aerospace vehicles: governing equations of 2-D and 3-D linear elasticity; analysis of thin-walled structures; and an introduction to composite structures and materials

Course Topics:

- Introduction to Mechanics of Materials and Aircraft Structures. Primer on Mechanics of Materials. Basic Structural Elements of Aerospace Vehicles. Free Body Diagrams: External vs. Internal Forces/Stresses.
- Introduction to Linear Elasticity (3-D). Analysis of Stress and Strain. Material Behavior. Governing equations of Linear Elastic Boundary Value problems.
- 2-D Linear Elasticity. Plane Stress/Plane Strain/Airy Stress Function. Pure Torsion.
- Torsion and Bending of Aircraft Structures. Pure Torsion of Closed thin-walled tubes. Bi-directional Bending. Closed thin-walled sections under combined bending, shear, and torsion.
- Introduction to Composites. Constitutive relations revisited. Classical laminated plate theory.
- Laboratory Experiments/Demonstrations: Constant stress beams; Modulus of Elasticity and Poisson's Ratio (Flexure); Principal Strains and Stresses (Flexure).

Designation:

Required