



**THE OHIO STATE UNIVERSITY**  
COLLEGE OF ENGINEERING

# Flight Vehicle Structures I

## AEROENG 3542

**Credit Hours:**

3.00

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**Course Levels:**

Undergraduate (1000-5000 level)

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**Course Components:**

Lecture

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**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.

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**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.

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**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
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**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).
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**Designation:**

Required