



AERSP 470- Advanced Aerospace Structures
Syllabus - Spring Semester 2014



Goals: The objectives of the course are to help students:

- 1) Appreciate the roles that structures and structural materials play in aerospace vehicles;
- 2) Understand general design concepts for aerospace structures: vehicles, components, and materials;
- 3) Develop the analysis tools and skills needed to analyze the static and dynamic performance of aero structures;
- 4) Gain experience identifying, formulating, and solving aerospace structural engineering problems.

Times and Location: M W F 12:20 – 1:10 PM 220 Hammond (I think?!)

Prerequisites: AERSP 301, AERSP 304, EMCH 215

Text: Megson, T.H.G., *Aircraft Structures for Engineering Students 4th Ed.*, Wiley, 2007.
 (Same as in AERSP 301 for Fall 2009)

References:

- Curtis, H.D., *Fundamentals of Aircraft Structural Analysis*, Irwin, 1997.
- Hoskin, B.C. and Baker A.A., *Composite Materials for Aircraft Structures*, AIAA, 1986.
- Allen, D.D. and Haisler, W.E., *Introduction to Aerospace Structural Analysis*, Wiley, 1985.
- D.K. Donaldson, *Analysis of Aircraft Structures: An Introduction*, McGraw-Hill, 1982
- Rivello, R.M., *Theory and Analysis of Flight Structures*, McGraw-Hill, 1969.
- Agarwal, B.D. and Broutman, L.J., *Analysis and Performance of Fiber Composites*, Wiley, 1980.
- Sarafin and W. and Larson, Kluwer, *Spacecraft Structures and Mechanisms*, Academic Publishers, 1995.

Grading:

Homework Assignments	30%
Mid term Exam	30%
Final Exam	40%

Instructor: Jose Palacios OFH MW 9-10 PM
 Room 233 Hammond, 867-4871
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Course Topical Outline:

Review (Chps 4, 5, 16)	2 weeks
Aerospace Structural Design Principles (Energy Methods, Beam Bending)	
Plate Theory (Chp 7)	3 weeks
Thin Plate Theory, Stress Resultants and Kinematics Thin Plate Governing Equations and Boundary Conditions	
Advanced Concepts in Buckling of Lightweight Structures (Chp 9, etc)	2 weeks
Thin Plate Solutions and Plate Buckling Local and Global-Local Buckling of Thin Walled Structures	
Composite Materials (Chp 25)	3 weeks
Introduction to Advanced Fiber Composites Analysis of Orthotropic Composite Plies Analysis of Composite Laminates – Stiffness Matrix Analysis of Composite Laminates – Stress and Strain Analysis of Composite Laminates – Thermal Expansion Failure Mechanisms and Analysis	
Introductory Structural Dynamics and Aeroelasticity (Chps 10, 28)	4 weeks
Introduction to Structural Vibration, Beam Free Vibration Forced Response of a Beam Structure Airfoil and Wing Divergence Wing Divergence, Swept Wings Control Effectiveness and Reversal Airfoil Flutter Wing Flutter, Swept Wings	



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