Course Syllabus

Course Information
Aerospcae Structural Analysis and Material  MANE 4060  Section 1
RPI Fall 2012  4 cr
Lecture  MR  4:00PM-5:50PM  Sage 3303
Course Website:  https://bblms-fe1.server.rpi.edu/
Prerequisites or Other Requirements:
ENGR 2530
Single and multivariate calculus
Calculus with multiple variables
Linear algebra
Differential equations

Instructor
Zahra Sotoudeh  sotouz@rpi.edu
Office Hours: MR 3:00PM-4:00PM

Teaching Assistant(s)
Name  Office  Office Hours  Email Address
Gerken, William  TBA  W/F:12:30-2:30  gerkew@rpi.edu
Dener, Alp  TBA  T:10:12  denera@rpi.edu

Course Description
Beam structures under combined shear, bending, and torsional loads. Semi-monocoque structures: idealizations involving wings, ribs, and fuselage bulkheads. Effects of taper and cutouts in stiffened shell structures, shear deformations and warping, location of elastic axis in open and closed sections, torsion of multi-cell sections, stability of beam and membrane elements.

Introduction to materials used in aerospace vehicles including metals, ceramics and composites with special emphasis on fiber-reinforced composite materials. Methods for material analysis and selection.

Course Text(s)
Structural Analysis: With Applications to Aerospace Structures, by A. Bauchau and J.I. Craig, Springer Publ., 2009
**Course Goals / Objectives**
This course is designed to introduce the concepts and methods used in the analysis of primary Aircraft/aerospace structure, including principal components of the wing and fuselage. Students will be comfortable with the basic aircraft structural elements loads, and materials. Building from the elementary concepts of elastic continuum mechanics, students will be able to determine the stresses, strains, and deflections of simple thin-walled monocoque and semi-monocoque aircraft/aerospace structures subjected to torsional, bending, and shear loadings. A link is then made between this analysis and the failure of aerospace structures and materials by yielding, fatigue, fracture, and buckling.

**Course Content**
Introduction to linear elasticity (selected from chapter1)
Constitutive behavior of material (selected from chapter2)
Engineering structural analysis (selected from chapter4)
Beam theory (selected from chapter 5 and 6)
Torsion and thin walled structures (selected from chapter 7 and 8)
Introduction to material
Failure modes

**Student Learning Outcomes**
1. -A knowledge of aerospace structural analysis
   -A knowledge of simplified and idealized structures
   -An understanding failure modes

**Course Assessment Measures**

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<tr>
<th>Assessment</th>
<th>Oct 4th, Oct 29th, Nov 15th, Dec 3rd</th>
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<tr>
<td>Exam</td>
<td>Oct 4th, Oct 29th, Nov 15th, Dec 3rd</td>
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<td>Homework</td>
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**Grading Criteria**
4 tests for total of %80 credit (each %20).
Home work for total of %20.
Class activities are for extra credit.

**Academic Integrity**
Student-teacher relationships are built on trust. For example, students must trust that teachers have made appropriate decisions about the structure and content of the courses they teach, and teachers must trust that the assignments that students turn in are their own. Acts that violate this trust undermine the educational process. The Rensselaer Handbook of Student Rights and Responsibilities defines various forms of Academic Dishonesty and you should make yourself familiar with these. In this class, all assignments that are turned in for a grade must represent the student’s own work. In cases where help was received, or teamwork was allowed, a notation on the assignment should indicate your collaboration.
Submission of any assignment that is in violation of this policy will result in a penalty.
If you have any question concerning this policy before submitting an assignment, please ask for clarification.