Syllabus for MAE 444
Flight Structures
Fall Semester 2007
Meeting Days MWF
11:00 –11:50 am
Room EGC 110

Instructor: Dr. Dick Kunz, Associate Professor
Department of Mechanical and Industrial Engineering

Office: Suite 105F, School of Engineering
Hours: In general: MTWThF 8:00 am – 5:00 pm, except:
F 10:00 am – 11:00 am
MWF 11:00 am – 1:00 pm
MW 2:00 pm – 5:00 pm
TTh 12:15 pm – 1:30 pm

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Textbook:

Catalog Description:
Loads, fatigue, minimum weight design, stress analysis of semi-monocoque structures, and design of members in tension, bending, and torsion.

Course Objectives:
Introduce fundamental concepts in the analysis and design of aircraft structures, with specific focus on:
- Functions of and loads on aircraft structural components
- Considerations of basic elasticity as a framework for structural analysis
- Behavior of thin-walled structures under tension, compression, shear, bending, and torsion

Provide the necessary background to apply the general principles of solid mechanics and structural analysis to specific aircraft structural components

Prerequisite:
MAE 320: Solid Mechanics II
Grading:

- Homework 10%
- Tests (3) 20% each
- Final Exam 30%

Course Standards:

1. Homework problems that are assigned in class are due at the start of the next class.

2. Reading assignments will be posted at each class meeting. You are expected to read the listed sections before the next class to prepare for the material to be covered.

3. Tests: There will be three 50-minute tests during the semester. Problems will be similar to the homework and problems worked in class. All tests will be open notes and open book. A calculator is recommended. No make-up tests will be given without a documented excuse.

4. Final Exam: There will be a comprehensive final exam. It will be open notes and open book. It will consist of problems similar to those on the tests.

5. The final exam will be given Thursday, 13 December, 9:00 – 12:00 a.m.

Additional Information:

1. Please feel free to arrange a meeting with me at any point that you feel you need it. If you would like to see me, come to my office during posted office hours, catch me after class to schedule a time, call, email, or stop by my office.

2. The honor code provisions as outlined in the Catalog and in the student handbook, The Lair, and on the web at http://www2.mercer.edu/HonorCouncil/default.htm apply to everyone and to all work handed in. By turning in a paper to the instructor, each student certifies that he/she has neither given nor received unauthorized aid in its completion. Plagiarism is a violation of the honor code and is prohibited. When in doubt, please ask to avoid potentially embarrassing situations.

3. Please turn off cell phones and pagers before entering the classroom.

4. Electronic communication is an important adjunct to face-to-face communication, including from professor to students, students to professor, and students to students. You must have regular access to your Mercer e-mail. If you do not have an active e-mail address on the first day of class, please secure one.

5. Students requiring accommodations for a disability should inform the instructor at the close of the first class meeting or as soon as possible. If you are not registered with Disability Services, the instructor will refer you to the Disability Support Services office for consultation regarding documentation of your disability and eligibility for accommodations under the ADA/504. In order to receive accommodations, eligible students must provide each instructor with a “Faculty Accommodation Form” from Disability Services. Students must return the completed and signed form to the Disability Services Coordinator on the 3rd floor of the Connell Student Center. Students with a documented disability who do not wish to use academic accommodations are also strongly encouraged to register with Disability Services and complete a Faculty Accommodation Form each semester. For further information, please contact Carole Burrowbridge, Disability Services Coordinator, at 301-2778 or visit the website at http://www.mercer.edu/stu_support/swd.htm
Tentative Course Schedule

Chapter

Principles of Stressed Skin Construction
  Materials ........................................................................................................... 11
  Aircraft Structural Components ................................................................. 12

Airworthiness and Airframe Loads ................................................................ 13, 14

Fundamentals of Structural Analysis
  Basic Elasticity ................................................................................................. 1
  Mechanics of Structures ................................................................................... Notes

Bending, Shear and Torsion of Thin-Walled Beams
  Bending of Open- and Closed-Section Thin-Walled Beams ....................... 16
  Shear of Beams ................................................................................................. 17
  Torsion of Beams .............................................................................................. 18
  Combined Open- and Closed-Section Beams ................................................. 19
  Structural Idealization .................................................................................... 20

Stress Analysis of Aircraft Components
  Wing Spars and Box Beams ........................................................................... 21
  Fuselages .......................................................................................................... 22
  Wings .................................................................................................................. 23
  Fuselage Frames and Wing Ribs ...................................................................... 24

Structural Instability
  Columns ............................................................................................................. 8
  Thin Plates ......................................................................................................... 9

Test Dates

Test 1 .............................................................................................................. Friday, Sep 21
Test 2 ............................................................................................................. Wednesday, Oct 24
Test 3 .............................................................................................................. Wednesday, Nov 28
Final ............................................................................................................... Thurs, Dec 13

9:00 – 12:00 am