

# Aircraft Structure Statics (MAE3315)

(Fall Semester 2009)

Textbook: Mechanics of Aircraft Structures, 2ed. (by C.T. Sun)  
Published by John Wiley & Sons, Inc. in 2006

Instructor: Wen S. Chan, Professor  
Department of Mechanical & Aerospace Engineering

**Goals/Objectives:** The course is intended to provide students with a clear and thorough presentation of both the theory and application of the fundamental principles of mechanics of materials that used in aircraft structural design.

Grading System		Tentative Grading Scale	
• homework	125 points	Total point	500
• two exams	375 points	A	425 or above
	(1st exam 175, 2nd exam 200)	B	375 –424
		C	315--375
		D	250--314
		F	249—below

**Key Assignments:** There will be two key assignments given for the semester. Students who fail the key assignments will not pass the course.

Office : Room 300B, Woolf Hall

Class Time: Tuesday & Thursday. 11:00-12:20pm

Office Hours: Walk-in-policy; Monday & Wednesday 2:30-3:30 pm

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# MAE 3315

## Aircraft Structure Statics

(Fall Semester 2009)

### Course Contents

Chapter 1	Characteristics of Aircraft Structures and Materials Basic structural elements; Structural loads; Review shear moment diagram; Aircraft materials	~1wk
Chapter 2	Introduction to Elasticity Basic concepts of stress/strain; Principal stresses and their planes Maximum shears and their planes; Stress transformation Linear stress/strain relationship; Elastic strain energy Plane stress/plane strain; Equation of equilibrium; Airy stress function	~2½wk
Chapter 3	Torsion Torsion of uniform bars with circular cross-sections; Torsion of uniform bars with rectangular cross-section; Torsional rigidity Transformation matrices; elastic constants transformation	~2wks
Chapter 4	Bending and Flexural Shear Bernoulli-Euler Beam equation Bi-directional Bending Transverse shear	~2wks
Chapter 5	Flexural Shear Flow in Thin-Walled Sections Open thin-walled sections Shear center Closed Thin-walled Sections Multicell closed Sections	~2wks
Chapter 6	Failure Criteria for Isotropic Materials Strength failure criteria Introduction to fracture mechanics Fatigue analysis and crack growth	~2½wks
Chapter 7	Elastic Buckling Euler's Buckling Equation; Torsional-Flexural Buckling	~1½wks
Chapter 8	Introduction to Composites (tentative) (If time allowed)	

## **MAE 3315 Aircraft Structures Statics (Fall Semester 2009)**

### **Course Description:**

Concepts of stress/strain, equation of equilibrium, constitute relations, extension, bending of beams, and torsion in thin-walled sections, introduction to fracture mechanics.

**Goals/Objectives:** The course is intended to provide students with a clear and thorough presentation of both the theory and application of the fundamental principles of mechanics of materials that used in aircraft structural design.

**Attendance Policy:** Students are **strongly** recommended to attend each class.

### **Homework:**

**Late homework will receive a 20% penalty per class.** Special permission for late submission can be granted case by case. No homework will be accepted after the solution is posted.

**Key Assignment for Outcome A** - *“an ability to apply knowledge of mathematics, science, and engineering.”* Analytical tools for solving aircraft structural problems will be introduced based upon knowledge of mathematics, physics and engineering. Homework problems related to physical science and engineering problems designed to use math tools will demonstrate students’ ability to judge the correctness or “make sense” of their engineering calculations based upon the engineer’s intuition.

### **American with Disabilities Act**

The University of Texas at Arlington is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 93112 - The Rehabilitation Act of 1973 as amended. With the passage of new federal legislation entitled Americans with Disabilities Act (ADA), pursuant to section 504 of the Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens.

As a faculty member, I am required by law to provide **“reasonable accommodation”** to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with **informing faculty at the beginning of the semester and in providing authorized documentation through designated administrative channels.** If you require an accommodation based on disability, I would like to meet with you in the privacy of my office during the first week of the semester to make sure that you are properly accommodated.

### **Academic Dishonesty**

It is the philosophy of the University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. all persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University.

“Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.” (Regents’ Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22)