## THE UNIVERSITY OF TEXAS AT AUSTIN

#### EM 319 Mechanics of Solids Fall 2005

#### **SYLLABUS**

UNIQUE NUMBERS:	13230, 13235, 13240, 13245
INSTRUCTOR:	Rui Huang WRW 117D, 471-7558, ruihuang@mail.utexas.edu
TIME:	MWF 1-2pm
PLACE:	PHR 2.108
TEACHING ASST.:	Min Kyoo Kang, WRW 117C, 1-4162, minkyu0909@mail.utexas.edu Tyler Summers, WRW 414B, 1-4248, thsummers@mail.utexas.edu Haixia Mei, hxmei@mail.utexas.edu Jun Zhou, junzhou@mail.utexas.edu
WEB PAGE:	http://www.ae.utexas.edu/courses/em319 huang/

#### **OBJECTIVES:**

To learn how to determine stresses, strains, and displacements in simple solid structures subjected to various types of loading, which is critical for design and analysis of mechanical and structural systems in all engineering areas.

#### TEXT:

Mechanics of Materials, by James M. Gere, 6<sup>th</sup> ed.

### **TOPICS:**

- 1. Stress and strain basics (5 lectures)
- 2. Axially loaded members (5)
- 3. Torsion (6)
- 4. Shear forces and bending moments (3)
- 5. Stresses in beams (8)
- 6. Deflections of beams (4)
- 7. Statically indeterminate beams (3)
- 8. Analysis of stress and strain (5)
- 9. Pressure vessels and combined loadings (3)
- 10. Buckling and stability of columns (3)

#### **PREREQUISITES:**

EM 306 or 306S with a grade of at least C, and M 408D or 308L with a grade of at least C.

## KNOWLEDGE, SKILLS, AND ABILITIES STUDENTS SHOULD HAVE BEFORE ENTERING THIS COURSE:

Basic trigonometry, calculus, statics, free-body diagram analysis of simple structures.

### KNOWLEDGE, SKILLS, AND ABILITIES STUDENTS GAIN FROM THIS COURSE:

Fundamental concepts of solid mechanics, including stress, strain, and displacement; analysis and design of simple structure members subjected to tension, compression, torsion, and bending; elementary models of material behaviors.

### IMPACT ON SUBSEQUENT COURSES IN CURRICULUM:

Mechanics of solids is a basic engineering subject that must be understood by anyone concerned with the strength and physical performance of solid structures. The course is an essential prerequisite for subsequent mechanics courses, such as EM339, ASE 221K, 324L, CE 329, and ME 336, 338, and each of these courses is prerequisite for more advanced design courses in aerospace engineering, civil engineering, and mechanical engineering.

## ABET CRITERIA 2000 OUTCOMES ACHIEVED:

This course contributes to the following EC2000 Criterion 3 outcomes and those specific to the EAC accredited \_ program.

Outcome		Outcome	
a. An ability to apply knowledge of mathematics, science, and	$\checkmark$	g. An ability to communicate effectively	$\checkmark$
engineering	,		
b. An ability to design and conduct experiments, as well as to		h. The broad education necessary to understand the impact of	
analyze and interpret data		engineering solutions in a global/societal context	
c. An ability to design a system, component, or process to meet	$\checkmark$	i. A recognition of the need for and an ability to engage in life-	
desired needs	'	long learning	
d. An ability to function on multi-disciplinary teams		j. A knowledge of contemporary issues	
e. An ability to identify, formulate, and solve engineering	$\checkmark$	k. An ability to use the techniques, skills, and modern	$\checkmark$
problems		engineering tools necessary for engineering practice	
f. An understanding of professional and ethical responsibility		1. Begin list of any other outcomes unique to the program.	

#### ABET PROGRAM CRITERIA OUTCOMES ACHIEVED:

Program criteria outcomes are unique to each degree program and are to be compiled from the program criteria given for each degree program and listed in bullet format below. The faculty should check which of the program criteria are achieved in the course.

Criterion		Criterion	Criterion	-
A. Aerodynamics		G. Orbital Mechanics	M. Preliminary/Conceptual Design	T
B. Aerospace Materials	$\checkmark$	H. Space Environment	N. Other Design Content	
C. Structures	$\checkmark$	I Attitude Determination and Control	O. Professionalism	
D. Propulsion		J. Telecommunications	P. Computer Usage	
E. Flight Mechanics		K. Space Structures		
F. Stability and Control	$\checkmark$	L. Rocket Propulsion		

## **CLASS FORMAT:**

Each week there will be three lectures and one discussion session. The discussion sessions will be led by one of the TAs. See below for the time and place:

Unique No.13230:	Wednesday	5-7pm	RLM 5.120
Unique No.13235:	Thursday	5-7pm	RLM 5.120
Unique No.13240:	Wednesday	7-9pm	RLM 5.120
Unique No.13245:	Thursday	7-9pm	RLM 5.122

## **OFFICE HOURS:**

Huang:	MWF 2-3pm
Kang:	Th 9-10am; F 3-4pm
Summers:	W 3-5pm

Extra office hours will be allocated during the weeks of exams.

## **HOMEWORK POLICY:**

- Homework problems will be assigned at each class, and they are due once a week on Fridays by 5pm unless specified otherwise.
- Homeworks will be collected at the end of the Friday's class. After that, you may turn in your homework to Dr. Huang's office, WRW 117D, before 5pm. It will not be accepted after 5pm.
- You will get back your graded homework at the discussion sessions the week after you turn it in.

# **EXAMINATIONS:**

There will be two quizzes and one final exam:

Quiz #1:	October 4 (Tuesday)	7-9pm	Location TBD
Quiz #2:	November 17 (Thursday)	7-9pm	Location TBD
Final:	TBD		

# **GRADING:**

Homeworks, quizzes, and final exam contribute to the final grade as below:

Homework: 10% Quizzes: 40% (20% each) Final: 50%

## **SPECIAL NOTES:**

The University of Texas at Austin provides upon request appropriate academic adjustments for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471-4641 TDD or the College of Engineering Director of Students with Disabilities at 471-4321.

## **EVALUATION:**

The Measurement and Evaluation Center forms for the College of Engineering will be used during the last week of class to evaluate the course and the instructor.