

August 25th 2008

ES 3023

#53.26/lecture.

MECHANICS OF MATERIALS

Fall 2008

Chew, Chen, Muzar, Shera, Tarkenton

Course Description: The concepts of “stress” and “strain” are introduced and used to describe the mechanical behavior of material comprising engineering components under external loading. Loading conditions are classified as axial, torsional, bending and transverse. The load cases are introduced separately, and then techniques are defined for dealing with “combined” loading, as experienced by many engineering components. Using the analytical tools developed during the treatment of these topics, the design of engineering components of quantifiable strength and “factor of safety” is covered. (We not only assure that a component will be able to sustain the applied loading, but we quantify how safe the component is from failure by yielding or fracturing due to the applied loading.) Also, the deflection of a component due to external loading is considered by several techniques. (In addition to being strong enough, the amount a component deflects under load can be very important.) Finally, elastic stability is considered, or the ability of a component or structure to resist “buckling” under compressive loads.

Prerequisites: Statics (ES 2013) (VERY IMPORTANT!), Calculus III (MATH 2073)

Place: KEH M216

Time: MWF 11:00 - 11:50

Instructor: Steven M. Tipton

KEH L-177, Ext. 2994, smt@utulsa.edu, 850-0252 (cell)

Office Hours: I am usually in my office and *students are always welcome!* I work with my door closed, but *please* don't hesitate to knock anytime. It's a good idea to call for an appointment before making a special trip. Leave a voice mail or e-mail message and I'll respond immediately.

Grading:	Homework/Pop Quizzes	15%
	Separate Design Problems	10%
	3 Midterm Exams	40%
	Comprehensive Final Exam	35%

Homework: Problems from the text, with regular supplemental problems, will be due weekly, primarily on Mondays. **VERY IMPORTANT: None of the 14 homework scores will be “dropped!”** Attempting the homework is imperative to success in this class. Late homework is penalized at a rate of 10% per day. No homework is accepted after solutions have are posted on the web.

Pop quizzes: Can occur any day, any time! They are more likely to occur if you decide not to attend class – law of the jungle. The pop quiz average grade is treated like one full hw assignment.

Exams: Closed book, one 8.5” x 11” page of hand written notes. *No photocopying.* Sheet is turned in with exam, and returned. **First 3 note sheets may be used with a 4th sheet for the comprehensive final.**

Textbook: *Mechanics of Materials*, 5th Edition, Beer and Johnston, McGraw Hill, NY, 2002.

Comments: Having a **solid** grasp of STATICS is extremely important to your ability to understand the material in this course. In this text, first chapter is designed to overview statics. Important static concepts are also covered in Chapters 5.1-5.3 (shear and moments in beams) and Appendix A. **You should review these sections thoroughly.**

WebCT: Used extensively for this class! You are responsible for checking there regularly for handouts, demo programs, assignments, solutions, old exams, etc. Grades are posted there regularly, so you can keep up with your progress. FYI, your use of WebCT (or lack thereof) is recorded.

Cheating: Not tolerated: Automatic F, or worse.

More Important Stuff

Students with disabilities should contact the Center for Student Academic Support to self-identify their needs in order to facilitate their rights under the Americans with Disabilities Act. The center for Student Academic Support is located in Holmes Student Center, Room 59.

All students are encouraged to familiarize themselves with and take advantage of services provided by the Center for Student Academic Support such as tutoring, academic counseling, and developing study skills. The Center for Student Academic Support provides confidential consultations to any student with academic concerns as well as to students with disabilities.

Edited by: smt 8/25/08

No	Day	Date	Topic	Text	HW Problems	DUE
1	Mon	8/25	Introduction & Review of Statics			
2	Wed	8/27	Ch.1-stress (normal & shear)	1.1-1.10		
3	Fri	8/29	Ch.1-oblique planes-safety factors	1.11-1.13		
	Mon	9/1	Happy Labor Day (whatever that means)			
4	Wed	9/3	Ch.1-summary, Ch.2-axial loading	2.1-2.8	1- 1,5,8,9,18,25,26(+F _{AD})	hw#1
5	Fri	9/5	Ch.2-axial stress-strain curve	2.1-2.9	+ supplemental statics	
6	Mon	9/8	Ch.2-axial deflection	2.9-2.9	1- 29,35,42,45,51,52 / 2- 1,14,16	hw#2
7	Wed	9/10	Ch.2-statically indeterminate probs.	2.9-2.10	2- supp. stress-strain & statics	
8	Fri	9/12	Ch.2-transverse & shear strain	2.11-2.15		
9	Mon	9/15	Ch.2-transverse & shear strain	2.11-2.16	2- 22,29,35,38,46,50,52,58+ statics	hw#3
10	Wed	9/17	Ch.2-St.Venant's Principle	2.17-2.20		
11	Fri	9/19	Ch.2-axial stress concentration	2.17-2.20		
12	Mon	9/22	Ch.2-summary, Ch.3-torsion	3.1-3.3	2-62,63,69,70,79,97,2C5	hw#4
13	Wed	9/24	Exam #1	no lecture	2-Supp. Problems + statics	EX#1
14	Fri	9/26	Ch.3-torsional stress	3.4		
15	Mon	9/29	Ch.3-torsional deflection	3.5-3.6	3- 2,3,7,11,27+ statics	hw#5
16	Wed	10/1	Ch.3-transmission shafts	3.7		
17	Fri	10/3	Ch.3-torsional stress concentration	3.8	Design Problem #1	
18	Mon	10/6	Ch.3-torsion non-circular X-sections	3.12	3-	hw#6
19	Wed	10/8	Ch.4-bending of engineering comp.	4.1-4.5	+ statics	
20	Fri	10/10	Ch.4-bending stress distribution	4.6-4.7		
21	Mon	10/13	Ch.4-bending stress concentration	4.8-4.11	3-	hw#7
22	Wed	10/15	Ch.4-eccentric axial loading	4.12-4.14	4- + statics	
23	Fri	10/17	Ch.4- unsymmetric bending	4.15, 5.1-5.3		
24	Mon	10/20	Ch.5-beams & beam design for bending	5.1-5.4	4-	hw#8
25	Wed	10/22	Exam #2	no lecture	4- + statics	EX#2
26	Fri	10/24	Ch.6-transverse shear stresses	6.1-6.5		
	Mon	10/27	Ch.6-transverse shear stresses	6.6-6.8	5- + statics	hw#9
	Wed	10/29	Ch.7-stresses from combined loading	6.9		
	Fri	10/31	Ch.7-Mohr's circle	7.1-7.3		
27	Mon	11/3	Ch.7-Mohr's circle	7.4	6- + statics	hw#10
28	Wed	11/5	Ch.7-yield criteria, ductile material	7.4		
29	Fri	11/7	Ch.7-yield criteria, ductile material	7.5-7.8		
30	Mon	11/10	Ch.7-thin walled pressure vessels	7.9	7- + statics	hw#11
31	Wed	11/12	Ch.7-thin walled pressure vessels	7.10-7.13		
32	Fri	11/14	Ch.8-design for combined loading	8.1-8.4		
33	Mon	11/17	Ch.9-defl. of beams	9.1-9.5	7-	hw#12
34	Wed	11/19	Exam #3	no lecture	8-	EX#3
35	Fri	11/21	Ch.9-deflection-Appx.D & superposition	9.7-9.8		
36	Mon	11/24	Thanksgiving Break			
37	Wed	11/26	Thanksgiving Break			
38	Fri	11/28	Thanksgiving Break			
39	Mon	12/1	Ch.9-deflection & statically ind. problems	9.7-9.8	9-	hw#13
40	Wed	12/3	Ch.10-Columns	10.1-10.4		
41	Fri	12/5	Ch.10-Columns	10.1-10.4	Design Problem #2	
42	Mon	12/8	Final Lecture - Summary	Ch. 9 & 10 Review	9-	
	Wed	12/10	dead day (review session)	Review for Final	10-	hw#14
	Mon	12/15	Final Exam 9:00 - 11:25 A.M.			