

**ENGR 2143 Strength of Materials // CRN = 28318**

Spring 2006

Department of Physics and Engineering

University of Central Oklahoma

<b>Location</b>	Howell Hall 100
<b>Time</b>	MWF 9:00 - 9:50 a.m.
<b>Instructor</b>	Evan Lemley, Ph.D.; Assoc. Prof. of Physics and Engineering
<b>Office</b>	Howell Hall 221L
<b>Web</b>	<a href="http://engrphys.lemley.org">http://engrphys.lemley.org</a>
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<b>Phone</b>	(405)974-5473 // (405)204-5616
<b>Office Hours</b>	MWF 10:00 - 10:50 a.m. or by appointment.
<b>Final</b>	W May 3, 2006 from 9:00 - 10:50 a.m.

**Course Description**

This course provides an introduction to solid mechanics: concepts of stress and strain; mechanical behavior of engineering materials; analysis of bodies under axial, torsional, and flexural loading; and stress, strain and deflections in beams.

**Prerequisites**

ENGR 2033 Statics

**Textbook (Required)**

*Mechanics of Materials*, 4<sup>th</sup> Edition, Ferdinand P. Beer, E. Russell Johnston, Jr., and John T. DeWolf, McGraw-Hill, 2006.

ISBN: 0-07-298090-7

**Objectives**

The student shall be able to

1. Calculate the stress and strain in loaded two-force members.
2. Demonstrate understanding of stress and strain diagrams for engineering materials and of the application of Hooke's and Poisson's laws to loaded members.
3. Calculate stresses in axially loaded members.

4. Calculate stresses in torsionally loaded members.
5. Calculate stresses in flexurally loaded members.
6. Calculate shear stresses in loaded members.
7. Use stress and strain transformation theory and Mohr's circle to calculate principle stresses in loaded members.
8. Analyze and design beams and shafts.
9. Calculate deflections of beams and shafts.
10. Demonstrate understanding of the application of energy methods to the analysis of beams and trusses.

#### Topics

1. Stress Concepts
2. Axial Loading
3. Torsion
4. Pure Bending – Flexure
5. Beam Design
6. Shear Stress in Thin-Walled Members
7. Stress and Strain Transformation
8. Beam Deflections
9. Columns
10. Energy Methods (time permitting)

#### Calculator

You must own a scientific calculator – *see the list of allowed calculators for exams in the Department of Physics and Engineering.* **Please bring your calculator to class for each meeting.**

#### Engineering Paper

Engineering Paper -- available from the UCO bookstore, Thompson's Bookstore, and Triangle A&E at Broadway Ext. and 63rd. Please use engineering paper for all homework assignments.

#### Internet & E-mail

Access to the Internet and ability to send and receive E-mail. If you do not have a computer at home you can use machines on the UCO campus: Look at

<http://technology.ucok.edu/support/microcomplab.htm>

for a full list of available general use computers on campus.

#### Portable Electronic Devices (including cell phones)

Please turn off any portable electronic devices (esp. cell phones) during class. You may not access any portable electronic device during exams except calculators that are on the approved list for Physics and

Engineering courses.

### **Instruction Techniques**

Lecture will be used predominantly although sometimes recitation periods will be employed.

### **Class Polices**

Attendance is not required, but you will responsible for any announcements or notes from class (and quizzes).

Attendance is mandatory for all exams or other graded activities (e.g. project competitions or presentations).

Cheating or academic dishonesty of any kind will not be tolerated.

### **Homework**

Working HW problems in a timely manner is the best way to do well on exams and in the class as a whole. Homework is due at the beginning of the class period on the due-date or due-day. Homework should be neatly written on only one side of your paper, folded length-wise with your name written on the outside of the folded pages before turning it in. Each problem should fit all of the following criteria: clearly labeled, **one problem per sheet of paper**, legible and organized. HW papers that do not fit these criteria will be penalized accordingly. See the following web-page:

[http://engrphys.lemley.org/courses/hwk\\_format.php](http://engrphys.lemley.org/courses/hwk_format.php)

for details on the presentation of HW problems.

Each HW problem you turn in is worth ten points. Some problems will be graded on detailed solutions and others will be graded on effort. I will **not** tell you ahead of time which or how many problems will be graded relative to a detailed solution, but on the returned and graded HW paper a check mark next to the problem number will indicate full effort (or ten points) and a numerical score (e.g. 8/10) next to the problem number will be used on those problems under more scrutiny.

### **Project**

There will be Team Design Projects in this course. Projects will constitute a significant portion of your grade. More information will be given to you as project assignments are made.

### **Grading Policies**

The following table shows the breakdown of credit for the course.

HW and Misc.	10%
Exams (x3)	10%
Projects	30%
Final Exam	30%
<b>Total</b>	<b>100%</b>

**Tentative Grading Scale**

90-100% -- A, 80-90% -- B, 70-80% -- C, 60-70% -- D, <60% -- F

**STUDENT INFORMATION SHEET / SYLLABUS ATTACHMENT**

See separate handout or go to:

<http://www.busn.ucok.edu/academicaffairs/FORMS/Student%20Information%20SheetSPR06rev.pdf>

<b>ENGR 2143 Tentative Schedule for Spring 2006</b>			
<b>Week</b>	<b>Date</b>	<b>Day</b>	<b>Sections Covered</b>
1	09Jan2006	Mon	Intro + 1.1 – 1.4
	11Jan2006	Wed	1.5 – 1.7
	13Jan2006	Fri	1.8 – 1.10
2	16Jan2006	Mon	<b>NO CLASS – MLK Day</b>
	18Jan2006	Wed	1.11 – 1.13
	20Jan2006	Fri	2.1 – 2.6
3	23Jan2006	Mon	2.7 – 2.9
	25Jan2006	Wed	2.10 – 2.11
	27Jan2006	Fri	2.12 – 2.15
4	30Jan2006	Mon	2.17 – 2.19
	01Feb2006	Wed	3.1 – 3.3
	03Feb2006	Fri	3.4 – 3.6
5	06Feb2006	Mon	<b>Exam 1</b>
	08Feb2006	Wed	3.7 – 3.8
	10Feb2006	Fri	3.12 – 3.13
6	13Feb2006	Mon	4.1 – 4.3
	15Feb2006	Wed	4.4 – 4.5
	17Feb2006	Fri	4.6 – 4.7
7	20Feb2006	Mon	4.12 – 4.14
	22Feb2006	Wed	5.1 – 5.3
	24Feb2006	Fri	5.4 – 5.6
8	27Feb2006	Mon	6.1 – 6.3
	01Mar2006	Wed	6.4 – 6.5
	03Mar2006	Fri	<b>Exam 2</b>
9	06Mar2006	Mon	6.6 – 6.7
	08Mar2006	Wed	6.9
	10Mar2006	Fri	7.1 – 7.2
10	13Mar2006	Mon	<b>NO CLASS – SPRING BREAK</b>
	15Mar2006	Wed	<b>NO CLASS – SPRING BREAK</b>
	17Mar2006	Fri	<b>NO CLASS – SPRING BREAK</b>
11	20Mar2006	Mon	7.2 – 7.4
	22Mar2006	Wed	7.5 – 7.6
	24Mar2006	Fri	7.9
12	27Mar2006	Mon	7.10 – 7.13
	29Mar2006	Wed	9.1 – 9.3
	31Mar2006	Fri	9.4 – 9.5
13	03Apr2006	Mon	9.7 – 9.8
	05Apr2006	Wed	9.9 – 9.11
	07Apr2006	Fri	9.12 – 9.13
14	10Apr2006	Mon	<b>Exam 3</b>
	12Apr2006	Wed	10.1 – 10.3
	14Apr2006	Fri	10.3
15	17Apr2006	Mon	10.4 – 10.5
	19Apr2006	Wed	10.6 – 10.7
	21Apr2006	Fri	11.1 – 11.3
16	24Apr2006	Mon	11.4 – 11.5
	26Apr2006	Wed	11.7 – 11.9
	28Apr2006	Fri	11.10
17	03May2006	Wed	<b>FINAL – 9:00 – 10:50 a.m. HOH 100</b>