

# Mechanics of Materials

**ME 316**

Instructor: **P. A. Greaney**

Winter 2014

2pm, Mon., Wed., Fri., 102 Owen Hall

**Course Credits:** This course is comprised of three 50 minute lectures per week for 3 credits.

**Prerequisites, Co-requisites and Enforced Prerequisites:** MTH 256 (Enforced), & ENGR 213 (Enforced).

**Course Content:** Determination of stresses, deflections and stability of deformable bodies with an introduction to finite element analysis.

**Course Learning Outcomes:** At the completion of the course, the student will be able to:

1. Use the principles of equilibrium of forces and moments, constitutive laws, and compatibility of deformation to calculate stress and deformation in bar structures under axial load and torsion.
2. Use the principles of equilibrium of forces and moments to calculate stresses in bar structures under bending.
3. Use the principles of equilibrium of forces and moments, constitutive laws, and compatibility of deformation to calculate stress and deformation in bar structures under bending.
4. Use virtual work principles to calculate deflections in bar structures under axial load, torsion and bending.

## Topics covered

Class	Topic	Reading (Philpot)
1-2	Stress and strain as tensor quantities.	1.5-6, 2.3-4
3-7	Statically indeterminate torsion, torsion of noncircular sections, and combined torsion and axial loading	5.5, 6.9-12, 15.2
7-10	Beam bending, parallel axis theorem, bending of unsymmetrical beams	8.6-9
11	<b>Midterm 1:</b> 01/29	—
12-13	Shear in beams	9.8-10
14-17	Beam deflections and column buckling	10.4, 10.7, 16.1-4, 16.6
18-19	Pressure vessels, combined loadings, and interpreting the stress tensor	12.11, 14.1-4, 15.4
20-21	Hook's law, elasticity theory, stress concentration	13.8
22	<b>Midterm 2:</b> 02/24	—
23-24	Failure theories	15.5
25-30	Energy Methods	17.1-13

This timetable of topics covered could evolve over the term.

**Grading:** Homework 30%, 2 Midterms 30% (15% each), Final 40%

**Homeworks Assignments:** Homework assignments will be given through Wiley Plus. The problems require you to enter your solution online. The assigned problems have randomly generated parameters. You have 5 attempts at every question, every time you get a wrong answer the parameters are reset. These will involve problem sets, but will also include reading and online movie watching assignments. Homework problems are a fundamental part of the learning process, and students are strongly urged to complete these learning exercises. Solutions to the problem sets are provided after you have obtained the correct answer or completed 5 attempts. Take the time to work through the solutions.

**Announcements:** Blackboard will be used as the primary means of communication for announcements regarding the class schedule.

### Exam Policy

- All exams will be closed book. A formula sheet will be provided for each exam.
- For all exams, the only electronic items you may use during the exams is a calculator (plus a pencil, pen, and/or eraser). Earphones, iPods, cell phones, laptops, etc. are not allowed.
- **Exam Dates:**
  - **Midterm 1:** Wednesday 01/29
  - **Midterm 2:** Monday 02/24
  - **Final** Tuesday: 03/28, 2–3:50pm in 103 Owen Hall
- **Missed Exams:** Every possible effort must be made on the student's part to inform the instructor 1 week prior to missing a midterm exam. Given an appropriate reason, accommodations will be made to provide an alternative time. If the instructor is not informed 1 week prior to the exam, the possibility of a makeup exam will be at the instructor's discretion.

### Learning Resources

- Timothy A. Philpot, "*Mechanics of Materials*", 3<sup>rd</sup> ed.

You may purchase *either* a hardbound edition of the text, *or* an e-text edition. You **must** purchase an access code for the Wiley Plus on-line content. Homeworks are assigned and administered through the Wiley Plus website.

**Office Hours:** Office hours will be held in 304 Dearborn Hall on Monday from 5–6pm and on Wednesdays from 3–4pm. If you cannot make these times you can email me and we can arrange an alternative time to meet.

**Academic Dishonesty:** Oregon State University provides clear definition and sanctions for academic dishonesty. As a result, academic dishonesty of any kind is not tolerated. For suspected academic dishonesty, a meeting with the student will take place and a formal report to the Chair of the Department, to the student's dean, and to the Student Conduct Office may follow. Students caught cheating, plagiarizing, or participating in any form of academic dishonesty may receive an F or other penalty on the assignment or test and possibly in the course. If you have any questions about the definition of academic dishonesty or the extent of sanctions that may result from dishonest behavior, it is important to access information on the OSU Student Conduct Website at: <http://oregonstate.edu/studentconduct/offenses>

**Statement Regarding Students with Disabilities:** Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098.