

COE 3001 E – Mechanics of Deformable Bodies - Spring 2013

Meeting Times: Tu&Th 8.05am-9.25am
Classroom: Instructional Center, room 115
Grader: Mr. Rachit Kejariwal <rkejariwal3@gatech.edu>

Prerequisites: COE 2001 Statics (or equivalent). Prerequisites w/ concurrency: MATH 2403, 2413 or 24X3.
Textbook: *Mechanics of Materials*, 8th edition, J.M. Gere & B.J. Goodno, 2013, CENGAGE Learning, ISBN-13:9781111577735

Learning Objectives:

1. Sketch the fundamental behavior of solids and structures.
2. Explain the assumptions and idealizations commonly used for analysis of solids and structures.
3. Compute stresses in structural members and gears. Use Mohr’s circles in plane stress.
4. Compute internal forces and stresses in indeterminate structures: use equilibrium equations, compatibility conditions, symmetries, force-temperature-deformation relations.
5. Design structure members: circular shafts subjected to torsion, beams subjected to pure bending (including beams made of composite materials), beams and thin-walled members subjected to shear stresses, columns subjected to any support conditions.

Outline & Schedule:

Note that the schedule of topics may have to be updated during the semester. Chapter and section numbers indicated in the table below refer to the 8th edition of the textbook. Reading is not graded but it is strongly recommended to read the book according to the schedule indicated to be successful in this course.

Week	Lecture	Date	Topics	To Read Before Class
1	1	01/08/13	Review: problem solving, statics.	Appendices B&C + 1.1-1.2
2	2	01/10/13	Stress & Strain: definition of stress and strain, stress-strain diagrams, elasticity, plasticity and Hooke’s law.	Appendix I + 1.3-1.8
	3	01/15/13		
3	4	01/17/13	Axial Deformation: deformation of axially loaded members, statically indeterminate structures, thermal deformation.	2.1-2.7
	5	01/22/13		
4	6	01/24/13	Torsion: torsion of circular bars, power transmission in circular shafts.	12.6 + 3.1-3.7
	7	01/29/13		
5	8	01/31/13	First 45 min: Exam 1.	
	9	02/05/13		
6	10	02/07/13	Shear force and bending moment diagrams.	4.1-4.5
	11	02/12/13		
7	12	02/14/13	Stresses in Beams: normal stress in beams, properties of sections, shear stress in beams, built-up beams, unsymmetric bending, principal stresses in beams.	12.1-12.9 5.1-5.11
	13	02/19/13		
8	14	02/21/13	Combined Stresses: bending and axial loading of beams.	6.1-6.5 6.7-6.8
	15	02/26/13		
9	16	02/28/13	First 45 min: Exam 2.	5.12 + 8.5
	17	03/05/13		
10	18	03/07/13	Stress and Strain Transformation at a Point (1/2).	7.1-7.4
	19	03/12/13		
	20	03/14/13		

Outline & Schedule (*continued*):

11		<i>Spring Break</i>		
12	21	03/26/13	Stress and Strain Transformation at a Point (2/2): principal stresses, maximum shear stress, Mohr's circle, membrane stresses, pressure vessels and pipes, principal strains, maximum shear strain.	7.5-7.7
	22	03/28/13		
13	23	04/02/13		8.1-8.4
	24	04/04/13	Beam Deflection: curvature and beam deflection equation, boundary conditions, statically indeterminate beams, <i>energy methods (if time permits).</i>	9.1-9.5
14	25	04/09/13		9.8-9.9
	26	04/11/13		10.1-10.4
15	27	04/16/13		
	28	04/18/13	First 45 min: Exam 3.	
16	29	04/23/13	Column Buckling: energy and equilibrium, buckling of columns with different boundary conditions, <i>eccentric loading and imperfection (if time permits), secant formula (if time permits).</i>	11.1-11.6
	30	04/25/13		
05/02/13 (Thursday) - 8am-10.30am - Final Exam (period #10)				

Grading: Final grade: $F < 60\% \leq D < 70\% \leq C < 80\% \leq B < 90\% \leq A \leq 100\%$
Score: Pop quizzes: 5%. HW 1-7: 2% each = 14%. Exams 1-3: 17% each = 51%. Final Exam: 30%.
Exam dates are indicated in the schedule above. **All students must take the final exam and exams 1-3 at the posted times to pass the course – there are no “make-up” exams.** Exam syllabi will be posted later during the semester. Sample problems will be solved in class before exams.

Homework: Homework format requirements and due dates are indicated in the “Homework Syllabus”. **Note that HW 7 is due during dead week.** The “Homework Syllabus” will be updated regularly during the semester with the list of problems assigned.

- **Homework is due at the beginning of class** on the assigned due date. Students needing extra-time need to ask permission from the instructor to submit late, before the deadline. **All late homework will be given half credit, even with permission to submit late.** Extra time will never exceed one week. No credit will be given for homework submitted more than one week after the deadline.
- Homework solutions will (usually) not be discussed in class but rather in office hours.

Academic Honor Code: Full compliance with the GT Academic Honor Code (available at www.honor.gatech.edu) is expected. Working in group on homework is allowed (and encouraged). However, each student must write up and turn in his/her own solutions. In-class quizzes and exams are strictly individual.

Important notes:

- Attendance and punctuality at all lectures is expected. Moreover, missing a class is not an excuse not to submit homework.
- No electronic communication of any kind is allowed during lectures or exams (i.e. no cell phones).
- Students are allowed (and encouraged) to ask questions to the instructor during office hours, although students should try to solve problems before asking.
- Exams will be partly based on assigned homework and/or examples from lecture. In addition, it is strongly recommended to work on extra problems from the book to prepare exams.
- Grades obtained at pop-quizzes and homework assignments will be used to determine the final grade of students who are borderline between two grades.