CoE3001 Mechanics of Deformable Bodies

Instructor: Professor Min Zhou
min.zhou@gatech.edu

Credit: 3 (3-0-3)

Class format: On-campus in-person lectures. All class information (lecture recordings, assignments, grades, etc.) can be accessed online via Canvas. All homework assignments will be completed using Cengage WebAssign which is accessed through Canvas (see below).

Textbook: James M. Gere & Barry J. Goodno, **Mechanics of Materials**, 9th Ed., 2016. The ebook is included in WebAssign online tool which is required. Purchasing WebAssign will give you access to the ebook and the ability to complete all homework assignments. To access WebAssign from Canvas, go to "Modules", scroll down to and click on "Click Here to Access WebAssign". You will need to create a Cengage WebAssign account if you do not have one already. Because the ebook is included, you do not need to purchase the hard copy textbook unless you otherwise wish to.

Prerequisites: COE 2001

Objectives:

(1) Develop an ability to visualize and understand the fundamental behavior of structures and solids

(2) Develop an understanding of assumptions and idealizations commonly used for analysis of structures and solids

(3) Learn methods of computing stresses in several types of structural and machine components

(4) Learn the fundamental approach for determining internal forces and stresses in indeterminate structures: use of equations of equilibrium, force-temperature-deformation relations, and expressions for the geometry of the deformations

(5) Develop a basic knowledge of approaches to design of structural and machine components

Course Outcomes:

Outcome 1: Students will apply skills learned in statics and mathematics to solve mechanics of solids problems.

Outcome 2: Students will demonstrate an ability to set up and solve strength of materials problems such as beam bending and stress transformation.

Topics:	**Hours**
Introduction/Problem Solving Procedure/Review (§1.1-1.2)	1
Stress and Strain (§1.3-1.9) Definition of stress and strain Stress-strain diagrams Elasticity, plasticity and Hooke's Law	4
Axial Deformation (§2.1-2.7) Deformation of axially loaded members Statically indeterminate structures Thermal deformation	5
Torsion (§3.1-3.11, 12.6) Torsion of circular bars Torsion testing Power transmission in circular shafts	4
Shear Force and Bending Moment Diagrams (§4.1-4.5)	3
Stresses in Beams (§5.1-5.10, 12.1-12.5, 12.7, 6.1-6.5, 6.7, 6.8) Normal stress in beams Properties of sections Shear stress in beams Built-up beams Unsymmetric bending Principal stresses in beams	7
Combined Stresses (§8.5) Beams under bending and axial loading	2
Stress and Strain Transformation at a Point (§7.1-7.7, 8.1-8.5) Principal stresses Maximum shear stress Mohr's circle Membrane stresses, pressure vessels and pipes Principal strains, maximum shear strain	6
Beam Deflection (§9.1-9.5, 9.8, 9.9, 10.1-10.4) Curvature and beam deflection equation Boundary conditions Statically indeterminate beams Energy methods	7
Column Buckling (§11.1-11.6) Energy and equilibrium Buckling of columns with different boundary conditions Eccentric loading and imperfection Secant formula	3
Exams	3
Total	45

Grading:

Exam I:	20%	
Exam II:	25%	
Final:	35%	
Homework:	20%	One lowest HW score will be dropped automatically, no action needed on your part.

Expectations:

1. Students shall abide by the GT honor code for conduct.
2. Discussions on homework and class notes are encouraged. However, exchange of written information in completing assignments is not permitted.
3. No late assignments will be accepted except for delays due to serious illness or other institute-documented excuses. Whenever possible, advance request for extension is required. You can email the request to me and provide documentation when handing in the late assignments.
4. All activities (lectures, office hours, assignments, exams) can be fully completed online. However, student participation/attendance in lectures and office hours and other interactions as maintained by Canvas, although not directly used in course grade calculation, will be used to gauge participation and commitment and to determine grades in borderline cases.
5. Use of email for class purposes is encouraged. Students are expected to check email and the Canvas site at least twice every week.

How to do well in this course:

1. Attend classes;
2. Complete all homework assignments;
3. Make sure you understand. If not, ask questions;
4. Take advantage of office hours or separate appointments;
5. If there is a problem, talk to me;
6. If you are concerned about your grade, talk to me well before the final exam.