ME 65 – Mechanics of Materials, Fall 2013

Course Information and Syllabus

Professor E.E. Gdoutos
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Instructor

TAs

Class website ME065 on Moodle

Class Tuesday and Thursday, 9-10.30am, 101 Guggenheim

Recitation Tuesday, 7-8pm,

Office Hours Thursday, 7-8pm,

Textbook Applied Mechanics of Solids, Allan F. Bower, http://solidmechanics.org/

Homework Posted on Moodle every Friday. Due the following Friday, 5pm, 102 Firestone.

Collaboration Policy

- The students may discuss homework problems and solution strategies with each other, but ultimately the solving and writing of homework problems should be done by the students on their own. For example, you should not include in your solution a step someone mentioned that you do not fully understand. Use of packages such as Matlab and Mathematica is permitted.
- The students are welcome and encouraged to discuss among themselves the subject matter of the course in order to improve their understanding of the subject.
- The students are also encouraged to attend TA and office hours and bring up any questions they may have regarding the homework problems or the material covered in the course. Should the students be unable to attend the TA or office hours, they are welcome to contact the head TA or the instructor directly and set up individual appointments.

Late Homework In general, no late homework or examinations will be accepted except in the case of genuine documented emergencies. Extensions will be considered on a case by case basis and must approved by the instructor in advance of the due date.

Grading 40% Homework, 20% Midterm, and 40% Final

Tentative Syllabus

Date	Description	Textbook Reference http://solidmechanics.org/
Tuesday, Sept. 30	Math Review: coordinate systems, index notation, dot/cross products, tensors	Appendices A-D
Thursday, Oct. 2	Review continued: vector/tensor calculus	Appendices A-D
Tuesday, Oct. 7	Review continued: divergence theorem, eigenvalues/vectors, rotation matrices	Apendices A-D
Thursday, Oct 9	Kinematics: deformation gradient, strain, strain tensors	Sec. 2.1,
Tuesday, Oct. 14	Kinematics: Strain, linearization, volumetric/deviatoric strain, strain compatibility	Sec. 2.1
Thursday, Oct 16	Forces and moments, traction, equilibrium equations	Sec. 2.2, 2.3
Tuesday, Oct. 21	Principal stresses and directions, deviatoric stress, Mohr's circle in 2d/3d	Sec. 2.2
Thursday, Oct 23	Constitutive laws, intro to elasticity, strain energy density, elastic modulus tensor, Voigt notation	Sec. 3.1,3.2
Tuesday, Oct. 28	Linear elasticity, elastic constants, introduction to boundary value problems (BVP)	Sec. 3.2, 4
Thursday, Oct 30	BVPs continued: constraints	Sec. 4.1
Tuesday, Nov. 4	BVPs continued: plane problems, Airy stress functions, cylindrical coordinates	Sec. 4.1,4.2, Appendix D
Thursday, Nov 6	BVPs continued: Cylindrical axisymmetric problems (Lame solutions)	Sec. 4.2
Tuesday, Nov. 11	BVPs continued: additional solution strategies, examples	Sec. 4
Thursday, Nov 13	Fracture mechanics, theorem of minimum potential energy	Sec. 9.3, 5.7, 8.1
Tuesday, Nov. 18	Introduction to the finite element method (FEM)	Sec. 8.1
Thursday, Nov 20	FEM continued: weighted residual form, approximation theory, symmetry	Sec. 8.1
Tuesday, Nov. 25	FEM continued: thermal stresses, examples	Sec. 8.1
Thursday, Nov. 27	*Thanksgiving Holiday*	
Tuesday, Dec. 2	Contact mechanics	Sec. 3.13
Thursday, Dec. 4	Review	