MAE 254: Mechanics of Solids
Fall Quarter 2017

Syllabus

Instructor: *Lorenzo Valdevit*
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Office hours: M 9.30 – 10.30 in ET444. Other times by appointment.

Class schedule: M W 8.00 – 9.20am, DBH 1431

Textbook: Mase, Smelser, Mase, *Continuum Mechanics for Engineers*, 3rd Ed., CRC Press

References: Allan F. Bower, "Applied Mechanics of Solids", CRC Press, 2009 (also available online free of charge at http://solidmechanics.org)
Fung and Tong, *Classical and Computational Solid Mechanics,* World Scientific Publishing, 2001.
James R. Rice, "Solid Mechanics", posted on the website
Satya Atluri, "Analytical Mechanics of Solids", posted on the website

Course website: https://eee.uci.edu/17f/19545

Course description: This course presents a foundational overview of continuum mechanics, with emphasis on mechanics of solids. Topics include: an overview of tensor algebra and calculus; the concept of stress; kinematics of deformation and motion; fundamental laws (conservation of mass, linear momentum, angular momentum, energy); constitutive equations; an introduction to general and linear elasticity.

Course Learning Outcomes. Students will: (1) appreciate the fundamental assumptions of continuum mechanics; (2) understand the concept of stress; (3) learn how to describe the motion and deformation of continuum media under arbitrarily large deformations; (4) learn the difference between the material and spatial descriptions of motion; (5) understand the key fundamental conservation laws; (6) understand the mathematical formulation of these laws using the language of tensor analysis; (7) appreciate the existence of a variety of stress and strain measures to describe the behavior of solids under large deformations; (8) appreciate the variety of constitutive behaviors for solid materials; (9) understand how to express elastic behavior, both under large and infinitesimal deformations.

Prerequisites: General undergraduate-level knowledge of mechanics of materials.

Lecture topics: See attached document

Grading Criteria:
Homework: 40%
Final paper/presentation: 20%
Final oral exam: 40%

Homework Policy:
There will be a number of homework assignments (~6) throughout the course, covering analytical derivations, problem solving and synthesis of reading assignments. Assignments will be posted on the website, and are typically due one week after posting.

Working together is strongly encouraged (but NOT copying each other). Identical homework assignments from two students will be considered cheating and not tolerated.

Some homework assignments might require the use of computational resources (e.g., ABAQUS and/or MATLAB), available in the computer labs.

These factors ALL contribute to the grade:
- Conceptually sound problem-solving approach.
- Numerical accuracy of results.
- Neatness of the presentation and description of the procedure.

Please, format your homework in a clear way. All the fundamental steps of your derivations need to be clearly stated.
A correct solution obtained with a wrong or unclear methodology will be given no credit. Conversely, numerical mistakes associated with sound and reasonable approaches will result in partial credit.

Final examination
There will be one final oral examination, approximately 30-45 minutes in length. Each student should contact the instructor to schedule her/his oral exam at a mutually convenient time (ideally during finals week, Dec 9-15, 2017).