ME561-001 Deformation Analysis & Modeling
Fall 2012
http://vista.unm.edu

Instructor

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Course Objective
To develop fundamental skills for applying numerical modeling (finite element method) to analyze material deformation under physical constraint, through case studies and projects on thin-film systems, device components and composite materials under mechanical and thermal loading.

Prerequisite
Any one of ME401/501, CE501, ME512 and ME540, or equivalent.

Text
(**Required**) Y.-L. Shen, "Constrained Deformation of Materials," Springer (2010).

Course Delivery
This is an online only course. There is no class meeting. When the semester begins you can start accessing the course material on WebCT (vista.unm.edu). The following is some highlights about how the course will be delivered.

- There is one "module" each week. The module is basically a slide presentation with voice. View it at your own pace, but it is strongly recommended that you follow the weekly progression.
- Before each topic, there will be handout posted for you to download. Print out the handout before you view the modules. There are blanks left in the handout for you to fill in (by hand) when you view the modules. The entire set of handout will become your personal notes for the course.
- Homework assignments will be posted. On average there will be one assignment every other week (but the actual frequency may vary). Each assignment has a firm deadline. Submit your assignment paper electronically on the WebCT.
- The last assignment is a final project, which you will be given more time to work on.

Computer Software
Download the ABAQUS Student Edition for free at:
http://academy.3ds.com/software/students/abaqus-student-edition/
Do this within the first two weeks of class.
If you have problems with the download or installation, I also have a CD (with an older version, but equally useful) that you can borrow.

Outline of Contents

Week of 08/20/12:	Syllabus & Introduction Mechanics Preliminaries (#1-8)
Week of 08/27/12:	Mechanics Preliminaries (#9-22) - Post Homework 1
Week of 09/03/12:	Numerical Modeling Preliminaries (#1-10) Running ABAQUS codes and viewing the results - Post Homework 2
Week of 09/10/12:	Numerical Modeling Preliminaries (#11-13) Thin Films and Thermal Stress (#1-14)
Week of 09/17/12:	Thin Films and Thermal Stress (#15-23) - Post Homework 3
Week of 09/24/12:	Curvature and Film Stress (#1-10) Deflection of Microbeam (#1-11)
Week of 10/01/12:	Nanoindentation (#1-15) - Post Homework 4
Week of 10/08/12:	**Break**
Week of 10/15/12:	Patterned Thin Films (#1-14) - Post Homework 5
Week of 10/22/12:	Heterogeneous Materials 1 (#1-13) - Post Homework 6
Week of 10/29/12:	Heterogeneous Materials 2 (#1-23) - Post Homework 7
Week of 11/05/12:	Heterogeneous Materials 3 (#1-10)
Week of 11/12/12:	Heterogeneous Materials 4 (#1-11) - Post Homework 8 - Post Final Project
Week of 11/19/12:	Heterogeneous Materials 5 (#1-8)
Week of 11/26/12:	Electronic Packaging (#1-17)
Week of 12/03/12:	Challenges and Outlook (#1-3)

Evaluation

Homework/Projects	70%
Final Project	30%