

MAE 734
Finite Element Analysis II
Dr. M.A. Zikry
8:30-9:45 AM
2220 EB 3

Prerequisite: MAE 533 or equivalent , Elasticity or equivalent

This course will provide a general preparation in computational solid mechanics for graduate engineering, science, and mathematics students who will pursue further work and research in areas pertaining to nonlinear material and structural phenomena, such as wave and structural dynamic analysis, finite elasticity, plasticity, viscoplasticity, fracture mechanics, nonlinear solution methods for quasi-static and dynamic, plates and shells, and contact.

Prerequisites: Elasticity and MAE 533 or equivalent Introductory Finite-Elements. Ability to use MATLAB and some aspect of commercial FEM codes (ANSYS, ABAQUS,..). This is only available for **graduate** students

Some of the topics to be covered will include:

- I. **Review of Linear Finite-Elements: Variational calculus, weak solutions, variational solutions**
- II. **Dynamic and wave propagation problems**
- III. **Nonlinear Problems: Nonlinear Solution Methods, Finite-elasticity, plasticity, viscoplasticity, and creep,**
- IV. **Incompressibility, reduced and selective integration, incompatible modes, mixed formulations and constraint**
- V. **Research topics in solid and computational mechanics**

Grading: The course evaluation will be based on six Projects that encompass theory and computation and a research paper related to current topics. Total points will be accumulated for each of these for each student and the final grade is adjusted based on the a class curve.

My notes and relevant papers will be handed out and will form the main core of the lectures. Access to my lecture tapes is available.

Recommended Texts (will be on reserve in library):

**Finite-Element Procedures, Klaus-Jurgen Bathe
Concepts and Applications of Finite Element Analysis, Cook, Malkus and Plesha**

HWs, emails, announcements through MOODLE

The link for the tapes for this course is at

<https://ncsu.hosted.panopto.com/Panopto/Pages/Sessions/List.aspx#folderID=%221115d10c-a65a-4adb-a126-af6c00e4473c%22>

Expectations, Policies and Attendance Academic Integrity

I will strictly enforce NC State's standards of academic honesty. I expect that you will neither give nor receive unauthorized aid on any tests. Please refer to the following website for further details:

http://www.ncsu.edu/policies/student_services/student_discipline/POL1.1.35.1.php.

Disability

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 5157653. http://www.ncsu.edu/provost/offices/affirm_action/dss/ For more information on NC State's policy on working with students with disabilities, please see the Academic

Accommodations for Students with Disabilities

Regulation(http://www.ncsu.edu/policies/academic_affairs/courses_undergrad/REG02.20.1.php).

Office Hours: T/Thursday 11:30-12:30