

## EGM 5611: Continuum Mechanics, Spring 2008

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**Office Hours:** TBD

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### Course Objectives:

The objective of this course is to introduce fundamental concepts of continuum mechanics with an emphasis on balance laws, thermodynamics, and constitutive relations.

### Prerequisites

Students are assumed to be familiar with topics of advanced strength of materials, concepts of stresses and strains, and the preliminaries of the linear elasticity theory and thermodynamics.

### Textbook:

Required:

*Introduction to the Mechanics of a Continuous Medium*, Lawrence Malvern, Prentice-Hall, Inc., Upper Saddle River, NJ, 07458; 1969

Supplemental text:

*Nonlinear Solid Mechanics: A continuum approach for engineering*, Gerhard Holzapfel, John Wiley & Sons, LTD; Chichester; 2000.

### Topics:

1. Vectors, tensors, orthogonal transforms
2. Eigenvalues, eigenvectors
3. Div, grad, curl operations
4. Stress, traction, and stress invariants
5. Mohr's circle
6. Plane stress
7. 2D and 3D small strain
8. Spatial and material derivatives
9. Finite strain and rates
10. Rotation and stretch
11. Green's thm., Stokes thm., divergence thm.
12. Conservation equations
13. Piola Kirchoff stress, Cauchy stress
14. First law of thermodynamics and virtual work
15. Second law, eqns. of state and dissipative functions
16. Constitutive relations and elastic symmetry
17. Legendre transformations
18. Behavior of fluids, polymers
19. Plasticity
20. Frame indifference, material symmetry
21. Navier Stokes and velocity potential

**Attendance Policy:** The universities require attendance in all classes.

**Grading:**

Homework	25%
Midterm	25%
Final Exam	50%

**ADA Policy:**

**AMERICANS WITH DISABILITIES ACT:**

Students with disabilities needing academic accommodation should:

- (1) Register with and provide documentation to the Student Disability Resource Center; and
- (2) Bring a letter to the instructor indicating the need for accommodation and what type.

This should be done during the first week of class. This syllabus and other class materials are available in alternative format upon request. For more information about services available to FSU students with disabilities, contact:

Student Disability Resource Center  
97 Woodward Avenue, South  
Florida State University  
Tallahassee, FL 32306-4167  
(850) 644-9566 (voice)  
(850) 644-8504 (TDD)  
[sdrc@admin.fsu.edu](mailto:sdrc@admin.fsu.edu)  
<http://www.fsu.edu/~staffair/dean/StudentDisability/>

**Syllabus Change Policy:**

Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and is subject to change with advanced notice.