

## EGM 6611 - CONTINUUM MECHANICS

MWF4: 10:40-11:30 am  
CSE E107

### I. INSTRUCTOR

Dr. Youping Chen  
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### II. OVERVIEW OF COURSE

The course provides a broad introduction to the fundamentals of the mechanics of continuous media. It covers the concepts and general principles common to all branches of solids and fluid mechanics. Topics include kinematics, stresses, conservation equations, and constitutive theories. We will also introduce the state of the art research on continuum mechanics.

### III. PREREQUISITES

- Undergraduate Newtonian physics
- Sophomore mathematics and linear algebra
- Mechanics of materials (e.g. EGM3520) or equivalent

### III. TEXTBOOKS AND RECOMMENDED READING

- L.E. Malvern. *Introduction to the Mechanics of a Continuous Medium*. Prentice Hall, 1969.

### IV. HOMEWORK

Four Homework sets will be assigned.

Late homework will be deducted 20% per day.  
Solutions will be posted on the E-Learning class web site

### V. GRADING

Homework	20% of total grade
Exam 1	30% of total grade
Exam 2	30% of total grade
Project	20% of total grade

#### Grading Scale

93 – 100: A	87 – 89.9: B+	77 – 79.9: C+	67 – 69.9: D+	0 – 59.9: E
90 – 92.9: A-	83 – 86.9: B	73 – 76.9: C	63 – 66.9: D	
	80 – 82.9: B	70 – 72.9: C-	60 – 62.9: D-	

V. REMARKS

Students are responsible for knowledge of all scheduling and policy announcements made in class.

VI. ACADEMIC HONESTY

All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action.

This statement is a reminder to uphold your obligation as a student at the University of Florida and to be honest in all work submitted and exams taken in this class and all others.

VII. ACCOMMODATIONS FOR DISABILITIES

Students with disabilities who are requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodations.

VIII. COURSE OUTLINE

- (1) Introduction to the course
- (2) Mathematical Preliminaries
  - a. Points, vectors, and tensors in Euclidean space
  - b. Direct and indicial notation
  - c. Coordinate transformation
  - d. Tensor calculus
- (3) Motion and Deformation
  - a. Bodies, configurations, and motions
  - b. Deformation gradient, deformation tensors and strains
  - c. Principal strains
- (4) Stress
  - a. Stress vector and stress tensor
  - b. Principal stresses and principal axes
  - c. Stress measures and their rates
- (5) Basic Physical Principles
  - a. Conservation of mass
  - b. Balance of linear and angular momentum
  - c. Conservation of energy
  - d. Thermodynamics second law and the entropy inequality
- (6) Constitutive theories
  - a. General considerations and invariance requirements
  - b. Objectivity
  - c. Linear and non-linear elastic solids

(7) Current Research on Continuum Mechanics

(8) Tentative Schedule

<b>Wk.</b>		<b>Topic</b>
1	Jan 6	<b>Introduction to the course</b>
2		<b>Mathematical Preliminaries (vectors and tensors)</b>
3		<b>Kinematics of Deformation</b>
4		
5		<b>Stress</b>
6		
7		
8	Feb 24- 28	<b>Midterm Exam</b>
9		<b>Spring Break</b>
10		<b>General Principles</b>
11		
12		
13		
14		<b>Constitutive Theories</b>
15		
16		<b>Current research on continuum mechanics</b>
17	April 29 (3 – 5pm)	<b>Final Exam</b>