

Course alpha, number, title	ME 423 Intermediate Mechanics of Deformable Solids
Required or elective	Elective
Course (catalog) description	Stress, strain and linearly elastic behavior. Plane stress and plane strain. Torsion. Yield criteria. Elastoplastic behavior of beams, shafts and cylinders. Unsymmetrical bending. Curved beams.
Prerequisite(s)	(ME 222)
Textbook(s) and/or other required material	<u>Advanced Strength & Applied Elasticity. 4th ed., by Ugural and Fenster</u>
Class/Lab schedule:	Total Credits: 3 <i>Lecture/Laboratory/Discussion Hours: 3/0/0</i>
Topics covered	<ul style="list-style-type: none"> (a) Stress (b) Strain (c) Elastic behavior (d) Plane stress (e) Plane strain (f) Torsion (g) Yield criteria (h) Elastoplastic beams (i) Elastoplastic shafts (j) Elastoplastic cylinders (k) Unsymmetrical bending (l) Curved beams
Course learning objectives	<p>The student shall be able to:</p> <ul style="list-style-type: none"> (1) Describe the significance of and write the following three-dimensional relations: strain-displacement, stress-strain, and static equilibrium. (2) Explain the significance and demonstrate the use of compatibility relations and geometric and traction boundary conditions. (3) Explain the differences between theory of elasticity and mechanics of materials approaches to predicting mechanical response. (4) Determine three-dimensional stress states in common structural members, including beams, plates, spinning disks, and cylinders. (5) Apply various failure criteria for ductile and brittle materials to predict failure in common engineering materials. (6) Solve inelastic beam, torsion, and cylinder problems to determine ultimate load and plastic strains.
Relationship of course to ME program outcomes	<p>The following measurement standard is used to evaluate the relationship between the course outcomes and the educational-program outcomes: 3 = Strong Emphasis, 2 = Some Emphasis, 1 = Little or No Emphasis.</p> <ul style="list-style-type: none"> (a) an ability to apply knowledge of mathematics, science, and engineering—3 (b) an ability to design and conduct experiments, as well as to analyze and interpret data—3 (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability—2 (d) an ability to function on multidisciplinary teams—1 (e) an ability to identify, formulate, and solve engineering problems—3 (f) an understanding of professional and ethical responsibility—2 (g) an ability to communicate effectively—2

- (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context —1
- (i) a recognition of the need for and the ability to engage in life-long learning—1
- (j) a knowledge of contemporary issues—1
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice—2
- (l) application of advanced mathematics—2
- (m) design, build, and test in mechanical systems area—1
- (n) design, build, and test in thermal/fluids area—1
- (o) capstone design experience—1

Contribution to professional component:

100% Engineering Science

Person(s) who prepared this description

Seungik Baek

Date of Preparation

August 15, 2009