EM 4213/6213
ADVANCED MECHANICS OF MATERIALS

CATALOG DATA: EM 4213/6213. Advanced Mechanics of Materials (3) (Prerequisites: EM 3213.) Three hours lecture. Stress, strain, stress-strain relationships, strain energy, failure theories, curved beams, unsymmetrical bending, shear center, torsion of noncircular sections, energy principles, Castigliano's theorem, inelastic behavior.

PREREQUISITES BY TOPIC:

1. Mechanics of Materials

TEXTBOOK: Arthur P. Boresi and Richard J. Schmidt; Advanced Mechanics of Materials, 6th Edition, John Wiley & Sons, Inc.

COORDINATOR: Kiran N. Solanki, Assistant Professor (Research), CAVS/ME

OBJECTIVES:
(The numbers in brackets show the relationship with mechanical engineering program objectives)

1. To further develop the students understanding of the concept of stress at a point, including the three dimensional nature of stress, stress transformations, principal stresses, and principal directions. [1]
2. To further develop the students understanding the geometric nature of strain at a point and the subsequent deformations involved. [1]
3. To develop the students ability to determine stresses and strains in simple components under simple and combined loads. [1]
4. To further develop the students understanding of the concept of elastic stability. [1]
5. To develop the students ability to apply finite element analysis stress software to analyze simple components. [1,2]

TOPICS COVERED:

		(No. MWF classes)
1.	stress and strain at a point	(6)
2.	constitutive equations	(2)
3.	finite element analysis	(2)
4.	plasticity and failure theories	(4)
5.	energy methods	(4)
6.	torsion	(6)
7.	nonsymmetrical bending of straight beams	(4)
8.	shear center for straight beams	(2)
9.	composite beams	(1)
10.	curved beams	(2)
11.	elastic instability	(4)
12.	analysis of cracked bodies: fracture mechanics	(2)
13.	fatigue	(2)
14.	contact stresses	(2)
15.	flat plates	(2)

PROFESSIONAL PROGRAM: Engineering Topics of Engineering Science and Design

ASSESSMENT:

Homework will consist primarily of problem sets. All homework will be collected and graded. **Homework's are due every Friday - in class, distance learner please scan and email me**. The final examination will be comprehensive.

Homework	35%
Test 1	20%
Test 2	20%
Final exam	25%

Grading will be on a hundred-point scale: 90-100 A, 80-89 B, 70-79 C, 60-69 D, below 60 F. Each distance student must have a proctor (approved by the home department of the Instructor of Record), who will administer the exams.

MEASURED OUTCOMES:

(Numbers in brackets indicate assessment methods. Letters in parentheses indicate ME program learning outcomes supported by these assessments.)

Objective 1:	Demonstrate a basic understanding of stress at a point. [1] (1.1)
Objective 2:	Demonstrate a basic understanding of deformation and strain at a point. [1] (1.1)
Objective 3.	Demonstrate the ability to determine stresses and deformations in simple components under simple and combined loads. [1] (1.1)
Objective 4	To further develop the students understanding of the concept of elastic stability. [1] (1.1)
Objective 5.	Demonstrate the ability to interpret results from finite element analyses and to use this information to make engineering decisions. [1,2] (2.1)

PREPARED BY:

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