

ME 32301
MECHANICS OF MATERIALS LABORATORY

Course Outcomes [Related ME Program Outcomes in brackets]

1. Conduct simple experiments and analyze data. [1,3,5,6]
2. Enhance systematic problem-solving skills and sharpen written-communication skills through short technical laboratory memos. [1,3,5]
3. Complete a design project on a mechanical structure. [2, 3, 7]

Fundamentals.
Axial Loading. Torsion. Beam Loading.

1. Normal stress and strain.
2. Mechanical Properties
3. Torsional loading. Torsional deformation.
4. Equilibrium of beams. Shear force and bending moment diagrams.
5. Flexural stresses. Shear stresses.
6. Beam deflection.

Multiaxial Stress States

1. Transformation of stresses
2. Principal stresses and maximum shear stress.
3. Mohr's circle.
4. Stress transformation.

Analysis of Structures

1. Beams.
2. Combined loading.
3. Buckling.

Representative Laboratory Experiments

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| <ul style="list-style-type: none"> • Tensile and Poisson's ratio tests. • Photo-elasticity test. • Torsion tests. • Bending tests. | <ul style="list-style-type: none"> • Combined loading tests. • Column buckling test. • Single and multiaxial fatigue tests. |
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COURSE NUMBER: ME 32301		COURSE TITLE: Mechanics of Materials Laboratory (1 credit)	
REQUIRED COURSE OR ELECTIVE COURSE: Required		TERMS OFFERED: Fall and Spring	
TEXTBOOK/REQUIRED MATERIAL: None. Handouts provided by the instructors.		PRE-REQUISITES: ME 27000 Basic Mechanics I	
COORDINATING FACULTY: Solid Mechanics Area Faculty		CONCURRENT PRE-REQUISITES: ME 32300 Mechanics of Materials	
COURSE DESCRIPTION: Experimental methods and techniques employed for the measurement of mechanical properties and evaluation of mechanical structures. Application of mechanics of materials and fundamental concepts to measuring and analyzing mechanical structures. A laboratory design project on mechanical structures.		COURSE OUTCOMES [Related ME Program Outcomes in brackets]: <ol style="list-style-type: none"> 1. Conduct simple experiments and analyze data. [1,3,5,6] 2. Enhance systematic problem-solving skills and sharpen written-communication skills through short technical laboratory memos. [1,3,5] 3. Complete a design project on a mechanical structure. [2, 3, 7] 	
ASSESSMENTS TOOLS: <ul style="list-style-type: none"> • Laboratory memos. • Project reports. • Pre-lab quizzes. 		RELATED ME PROGRAM OUTCOMES: <ol style="list-style-type: none"> 1. Engineering fundamentals 2. Engineering design 3. Communication skills 4. Ethical/Prof. responsibilities 5. Teamwork skills 6. Experimental skills 7. Knowledge acquisition 	
NATURE OF DESIGN CONTENT: The students participate in a multi-week design project lab, in which a mechanical structure is designed to achieve a performance goal.			
PROFESSIONAL COMPONENT: <ol style="list-style-type: none"> 1. Engineering Topics: Engineering Science – 80% Engineering Design – 20% 		GRADING SCALE: Course grade will be based on a straight grading scale: 97-100% A+; 93-97% A; 90-93% A-; 87-90% B+; 83-87% B; 80-83% B-; 77-80% C+; 73-77% C; 70-73% C-; 67-70% D+; 63-67% D; 60-63% D-; <60% F.	
COMPUTER USAGE: Knowledge of word processing, spreadsheet software, and basic programming (for example, MATLAB) are necessary for laboratory memo preparation.			
COURSE STRUCTURE/SCHEDULE: <ol style="list-style-type: none"> a. Laboratory Prep – 1 day per week at 50 minutes b. Laboratory – 1 day per week at 75 minutes 			
PREPARED BY: Solid Mechanics Area Faculty		REVISION DATE: January 21, 2022	