ME 211 COURSE PROFILE

DEGREE PROGRAM: Mechanical Engineering

COURSE NUMBER: ME 211	**COURSE TITLE:** Introduction to Solid Mechanics
REQUIRED COURSE OR ELECTIVE COURSE: Required	**TERMS OFFERED:** Fall, Winter, Spring
TEXTBOOK / REQUIRED MATERIAL: Statics & Mechanics of Materials by Hibbler (recommended)	**PRE / CO-REQUISITES:** Enforced pre-req of C in Phys 140 or equivalent (Phys 160), enforced pre-req of C in Phys 141 or equivalent (Phys 161), enforced pre-req of C in Math 116 or equivalent (Math 119, 121, 156, 176, 186, or 296) (4 credits) Students are limited to attempting any ME course at most twice without permission of Undergraduate Chair. An attempt includes, but is not limited to, a notation of any letter grade ("A-E"), withdraw ("W"), Pass/Fail ("P/"F"), Transfer ('T'), or Incomplete ("I") posted on student U-M transcript.

COGNIZANT FACULTY: A. Liu	**COURSE TOPICS:**
BULLETIN DESCRIPTION: Statics: moment and force resultants, equilibrium. Mechanics of deformable bodies: stress/strain, classification of material behavior, generalized Hooke's law. Engineering applications: axial loads, torsion of circular rods and tubes, bending and shear stresses in beams, deflection of beams, combined stresses, stress and strain transformation. Four lecture classes per week.	1. Properties of forces and force systems 2. Equilibrium conditions and determination of forces on structures 3. Determination of internal force systems in structures 4. Definitions of stress and strain 5. Mechanical properties of solid materials 6. Structural components under axial loads 7. Structural components under torsional loads 8. Structural components under bending 9. Structural components under combined loads 10. Deflections in beams. 11. Stress transformation under rotations of axes.
COURSE STRUCTURE/SCHEDULE: Lecture: 3 days per week at 1 hour, Discussion: 1 day per week at 1 hour	

COURSE OBJECTIVES: for each course objective, links to the Program Outcomes are identified in brackets.	1. To teach the basics and applications of the laws of equilibrium [1] 2. To teach the basics and applications of stress, strain, and material properties [1] 3. To teach the determination of stresses in structures under common applied loads. [1,2, 6] 4. To teach the determination of deformations in structures under common applied loads [1,2, 6] 5. To teach students how to identify and describe a component of an engineering structure [1, 2, 6] 6. To teach students how to formulate and solve a structural engineering problem [1, 2, 6] 7. To teach how structural components under common applied loads have interpretations in a wide range of engineering applications [1]
COURSE OUTCOMES: for each course outcome, links to the Course Objectives are identified in brackets.	1. Draw free body diagrams of an assembled structure and its components [1,5,6] 2. Apply the laws of equilibrium to solve for the forces and moments on a structure [1,5,6] 3. Apply the laws of equilibrium to determine the system and distribution of internal forces in a structure [1,2,3,6] 4. Distinguish between normal and shear stresses, extensional and shear strains and the corresponding material properties [2,3,4,5,6] 5. Recognize the qualitative features of the stresses, strains, material properties and area properties associated with axial loading, torsion and bending [2,3,4] 6. Solve for stresses in a structural component due to axial load, torsion, and bending, acting individually or in combination [1,3,6,7] 7. Solve for the deformation of a structural component due to axial load, torsion, and bend loads, acting individually or in combination [2,4,6,7] 8. Solve for the principal stresses in structural components subjected to a combined state of loading [3,6,7] 9. Recognize, formulate and solve statically indeterminate structural components [1,2,4,6,7]
ASSESSMENT TOOLS: for each assessment tool, links to the course outcomes are identified	1. Regular homework problems 2. Exams

PREPARED BY: A. Liu, ASO Staff
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