ME 311 COURSE PROFILE

DEGREE PROGRAM: Mechanical Engineering

COURSE NUMBER: ME 311	**COURSE TITLE:** Strength of Materials
REQUIRED COURSE OR ELECTIVE COURSE: Elective	**TERMS OFFERED:** Fall, Winter
TEXTBOOK / REQUIRED MATERIAL: J. R. Barber, Intermediate Mechanics of Materials, McGraw-Hill	**PRE / CO-REQUISITES:** MECHENG 211, Math 216. I, II, IIIa (3 credits)
COGNIZANT FACULTY: W. Lu	**COURSE TOPICS:** 1. Castigliano's theorems 2. Rayleigh-Ritz methods 3. Beams with unsymmetric cross-sections 4. Buckling of columns 5. Elastic-plastic bending 6. Thermal Stresses
BULLETIN DESCRIPTION: Energy methods; buckling of columns, including approximate methods; bending of beams of asymmetrical cross-section; shear center and torsion of thin-walled sections; membrane stresses in axisymmetric shells; elastic-plastic bending and torsion; axisymmetric bending of circular plates.	
COURSE STRUCTURE/SCHEDULE: Lecture: 3 days per week at 1 hour	

COURSE OBJECTIVES: **for each course objective, links to the Program Outcomes are identified in brackets.**	1. To use beams to introduce advanced concepts in solid mechanics [1, 2, 6] 2. To introduce student to the concepts in solid mechanics [1, 2, 6] 3. To teach students how to use the theorem of minimum potential energy [1, 2, 6] 4. To teach students how to use Castiglianos second theorem [1, 2, 6] 5. To teach students how to estimate a critical buckling load using an equilibrium approach [1, 2, 6] 6. To teach students how to use energy methods to estimate a critical buckling load [1, 2, 6] 7. To teach student how to account for plastic deformations in beams [1, 2, 6]
COURSE OUTCOMES: **for each course outcome, links to the Course Objectives are identified in brackets.**	1. Apply the theorem of minimum potential energy [3] 2. Apply Castigliano's second theorem [4] 3. Recognize when to use the theorem of minimum potential energy and Castigliano's second theorem [4] 4. Estimate the buckling load of a beam-column using the equilibrium method 5. Estimate the buckling load of a beam-column using the potential energy method [6] 6. Calculate stresses in a beam for elastic-plastic materials [1, 2, 7] 7. Calculate the limiting plastic moment for beam with symmetric cross-sections [7]
ASSESSMENT TOOLS: **for each assessment tool, links to the course outcomes are identified**	1. Regular homework assignments 2. Exams

PREPARED BY: A. Wineman
LAST UPDATED: 6/5/2017 reviewed; no changes