COURSE NUMBER: Vm311	COURSE TITLE: Strength of Materials
CREDIT: 3	PREREQUISITES: Vm 211 and Vv 256 or Vv 286
TEXTBOOKS/REQUIRED MATERIAL: Recommended: J. R. Barber, Intermediate Mechanics of Materials, McGraw-Hill	INSTRUCTOR: Roberto Dugnani DATE OF PREPARATION: October 9, 2012 DATE OF UC APPROVAL: Oct. 30, 2013
INSTRUCTOR(S): Roberto Dugnani	SCIENCE/DESIGN: n/a
CATALOG 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 TOPICS: 1. Castigliano's theorems 2. Rayleigh-Ritz methods 3. Beams with unsymmetric cross-sections 4. Introduction to finite element analysis 5. Buckling of columns 6. Elastic-plastic bending and torque

COURSE STRUCTURE/SCHEDULE: Lecture twice per week, 90 minutes each;	

COURSE OBJECTIVES [Course Outcomes in brackets]	1. To use beams to introduce advanced concepts in solid mechanics [6] 2. To introduce student to the concepts in solid mechanics [6] 3. To teach students how to use the theorem of minimum potential energy [1] 4. To teach students how to use Castiglianos second theorem [2 ,3] 5. To teach students how to estimate a critical buckling load using an equilibrium approach [4] 6. To teach students how to use energy methods to estimate a critical buckling load [5] 7. To teach student how to account for plastic deformations in beams [6, 7]
COURSE OUTCOMES [Program Outcomes in brackets]	After completing Vm311, students should be able to: 1. Apply the theorem of minimum potential energy[a] 2. Apply Castigliano's second theorem [a] 3. Recognize when to use the theorem of minimum potential energy and Castigliano's second theorem [a, e] 4. Estimate the buckling load of a beam-column using the equilibrium method [a] 5. Estimate the buckling load of a beam-column using the potential energy method [a] 6. Calculate stresses in a beam for elastic-plastic materials[a] 7. Calculate the limiting plastic moment for beam with symmetric cross-sections[a].
ASSESSMENT TOOLS [Course Outcomes in brackets]	Homework and Quizzes [1-7] Final Exam [1-7]