9/15/2022 DATE
☐ REQUIRED COURSE
☐ ELECTIVE COURSE

MSD DIVISION
☑ NEW COURSE
☐ REVISION

Lake Land College

Course Information Form

COURSE NUMBER:	PHY-245			TITLE: *(30 Characters Max)*			Solid Mechanics						
SEM CR HRS:	3	Lecture:		3		Lab:	0					ECH:	3
Course Level:	☐ Gen Ed / IAI ☑ Baccalaureate /Non-IAI		☐ Career/Technical ☐ Dev Ed/ Not in Degree Audit			Clinical Practicum:	0	SOE/ Internship:	0	SOE ECH:	0		
COURSE PCS #	11 - 14.1101			IAI Code						Contact Hours (Minutes Per Week)			
Repeatable (Y/N):	N	Pass/Fail (Y/N):	N	Variable Credit (Y/N):	N	Min:		Max:		16 Wks	150	8 wks	300
Prerequisites:	PHY-239 with grade of 'C' or higher and corequisite MAT-243												
Catalog Description: (40 Word Limit)	This course is the study of the relationship between the external loadings on a deformable object and the resulting deformations and internal stresses and strains.												

List the Major Course Segments (Units)	Contact Lecture Hours	Contact Lab Hours	Clinical Practicum	Non-Clinical Internship/ SOE
Stress, strain, and properties of materials	5			
Axially loaded bars	5			
Torsion	8			
Internal forces and moments in beams	6			
Shearing stresses	6			
Transformation of stress & strain (Mohr's circle)	5			
Beam design and deflections	7			
Buckling of columns	3			
TOTAL	45	0	0	0

EVALUATION							
QUIZZES	☐	EXAMS	☑	ORAL PRES	☐	PAPERS	☐
LAB WORK	☐	PROJECTS	☐	COMP FINAL	☑	OTHER	☑ homework

COURSE MATERIALS		
TITLE:	Mechanics of Materials	
AUTHOR:	Russell C. Hibbeler	
PUBLISHER:	Prentice Hall	
VOLUME/EDITION/URL:	6th	
COPYRIGHT DATE:	2009	

MAJOR COURSE SEGMENT	HOURS	LEARNING OUTCOMES
		The student will be able to:
Stress, strain, and properties of materials: Stress: normal & shear Deformation & strain Stress-strain relationship in materials	5	• Each student will understand the basic concepts of stress and strain, and how they are related through the mechanical properties of a material.
Axially loaded bars: Elastic deformations Statically indeterminate systems Thermal stresses	5	• Each student will analyze an axially loaded member by determining normal stresses, deformations and support reactions. They will also evaluate systems under thermal stresses and those with stress concentrations.
Torsion: Stress & deformation of circular shafts Statically indeterminate systems Thin-walled tubes	8	• Each student will evaluate the effects of applying a torsional loading to a shaft by determining stress distributions and angles of twist. They will also analyze indeterminate systems and thin-walled tubes.
Internal forces and moments in beams: Shear & bending moment diagrams Bending deformation	6	• Each student will be able to demonstrate how to calculate the internal shear and bending moment in beams due to external loadings and the deformations resulting from bending.
Shearing stresses: Shear stress Shear stresses in beams Built-up and thin-walled members Combined loadings	6	• Each student will be able to analyze the shear stress distribution in prismatic beams and understand the concept of shear flow in built-up members and thin-walled members. Finally, students will apply knowledge of each type of loading to evaluate stresses of systems with multiple loadings.

Transformation of stress and strain: Plane-stress transformation Principal stresses & maximum shear Plane-strain transformation Mohr's circle representations	5	• Each student will understand how transform stress and strain components to a coordinate system with a different orientation, and then explain how to calculate maximum normal and shear stresses. Students will understand the graphical representation of these quantities in Mohr's circle.
Beam design and deflection: Beam design to resist bending & shear Determination of beam deflection Method of superposition	7	• Each student will utilize the concepts learned to design beams that resist both bending and shear loads. Students will calculate deflections of beams and shafts using direct integration and the method of superposition.
Buckling of columns:	3	• Each student will understand the Euler theory of buckling for columns and analyze systems with various end supports.
	45	

COURSE OUTCOMES*	At the successful completion of this course, students will be able to:
	• Calculate stresses and deformations on axially loaded members
	• Calculate stresses and deformations on axially loaded members
	• Calculate normal and shear stresses on a beam under bending.
	• Transform stress components and determine maximum values using both analytic (equations) and graphical (Mohr's circle) methods.
	• Determine the deflection and slope at specific points on loaded beams

** Course Outcomes will be used in the Assessment Software for Outcomes Assessment. Limit to 3 - 5.*