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

MSD DIVISION
☐ NEW COURSE
☑ REVISION

Lake Land College

Course Information Form

COURSE NUMBER:	PHY-140		TITLE: *(30 Characters Max)*		University Physics I					ECH:	6
SEM CR HRS:	4	Lecture:	3	Lab:	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 - 40.0801		IAI Code		P2 900L			Contact Hours (Minutes Per Week)			
Repeatable (Y/N):	N	Pass/Fail (Y/N):	N	Variable Credit (Y/N):	N	Min:		Max:		16 Wks	300	8 wks	600
Prerequisites:	Calculus MAT241										
Catalog Description: (40 Word Limit)	This is a study of Newtonian Mechanics. The course is for physics majors and minors, engineering students and the mathematically oriented student. This is the first of a three-course sequence.										

List the Major Course Segments (Units)	Contact Lecture Hours	Contact Lab Hours	Clinical Practicum	Non-Clinical Internship/ SOE
Units	1	3		
Motion in One Dimension	4	6		
Vectors	3	3		
Motion in a Plane	4	3		
Laws of Motion	6	6		
Work and Energy	6	6		
Systems of Particles and Collisions	4	3		
Rotational Motion	5	6		
Static Equilibrium and Elasticity	3	3		
Oscillatory Motion	3	3		
Gravity	2	3		
Fluid Mechanics	4	0		
*Lab hours will be a combination of experiments, demonstrations and problem sessions.				
TOTAL	45	45	0	0

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

COURSE MATERIALS		
TITLE:	Fundamentals of Physics	
AUTHOR:	Halliday, Resnick & Walker	
PUBLISHER:	Wiley	
VOLUME/EDITION/URL:	9th	
COPYRIGHT DATE:	2011	

MAJOR COURSE SEGMENT	HOURS	LEARNING OUTCOMES
		The student will be able to:
Systems of Units Unit Conversion Dimensional Analysis Significant Figures LAB: Metric Measurement and Measuring Devices	3	• Convert between different systems of units • Estimate physical quantities and demonstrate how dimensional analysis can help in solving problems.
Motion in One Dimension		
Average Velocity and Speed Average Acceleration Instantaneous Velocity & Acceleration Using Derivatives and Slopes with Motion Constant Acceleration Model LAB: 1-D motion with the motion detector LAB: Constant acceleration with fan carts	10	• Demonstrate displacement, velocity, and acceleration and their interrelationships through derivatives. • They will also determine an object's behavior under constant acceleration.
Vectors		
Unit Vectors (i,j,k) and Vector Components Vector Addition Scalar Product Vector Product LAB: Force Vectors and Force Tables	6	• Convert vectors to component form and perform addition as well as dot and cross products. • They will also demonstrate the physical interpretations of vector addition and products.

Motion in a Plane		
Displacement, Velocity, and Acceleration Vectors Projectile Motion Uniform Circular Motion Radial and Tangential Acceleration LAB: Projectile Motion	7	• analyze motion in two dimensions, both projectile and circular.
Laws of Motion		
Mass and Newton's First Law: Inertia Newton's Second Law(F=ma) Gravity and Weight Newton's Third Law: Action-Reaction Friction Applications of Newton's Laws LAB: Force and Newton's Laws LAB: Frictional Forces	12	• Demonstrate Newton's laws of motion and use them to determine unknown forces and accelerations of objects. • They will also evaluate effects on objects due to friction
Work and Energy		
Work-Constant and Variable Forces & Directions Power Kinetic Energy Conservative Forces and Potential Energy Gravitational Potential Energy Hooke's Law and Potential Energy in a Spring Energy Conservation in Isolated Systems Systems with Non-conservative Forces LAB: A Bow and the Work-Energy Relationship LAB: Problem Session with F=ma and Energy	12	• Demonstrate the work-energy relationship as well as conservation of energy • Students will apply these concepts in order to determine unknown motions and velocities of objects.
Systems of Particles and Collisions		
Impulse and Momentum Conservation of Momentum Collisions Center of Mass LAB: 2-D Collision Analysis	7	• Demonstrate the impulse and momentum as well as conservation of momentum principles • Apply these to systems of objects.
Rotational Motion		
Kinematics of Rotational Motion Rotational Inertia and Energy of Rotation Torque Rotational Motion and Newton's 2nd Law Angular Momentum LAB: Torque and Newton's 2nd Law	8	• Demonstrate rotational position velocity and acceleration & their relationships. • Will determine unknown motions of objects through • Demonstrate conservation of energy and angular momentum.
Static Equilibrium and Elasticity		
Force and Torque in Static Equilibrium Elasticity LAB: Reaction Forces in a Static System	6	• Apply equilibrium ideas to static systems to determine forces. • They will also calculate internal stresses.
Oscillatory Motion		
Simple Harmonic Motion-position, v, a, energy Block-Spring System & Pendulum LAB: Simple Pendulum	6	• Determine the position velocity, acceleration, and energy of an object in simple harmonic motion
Gravity		
Newton's Universal Law of Gravitation Gravitational Potential Energy Motion of Planets & Satellites LAB: Cavendish Balance	5	• Demonstrate the law of gravitation, determine the gravitational potential energy of an object and explain the motion of satellites.
Fluid Mechanics		
Pressure Buoyancy Fluid Dynamics Bernoulli's Principle and Applications	4	• Demonstrate pressure, how it varies in fluids, how fluids flow and how pressure is related to fluid velocity

COURSE OUTCOMES*	At the successful completion of this course, students will be able to:
	• Analyze the motion (acceleration, velocity and position) of an object both analytically and graphically.
	• Demonstrate Newton's three laws of motion and apply to objects to find unknown forces or accelerations.
	• Use work-energy and impulse-momentum methods to analyze systems of objects.
	• Calculate the net torque acting on a rigid body and its resulting motion.
	• Demonstrate and apply the universal law of gravitation.
	• Demonstrate the behaviors of objects in simple harmonic motion.

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