Mechanics I

Catalog: A mathematical treatment of the fundamentals of classical mechanics. Topics include particle dynamics in one, two and three dimensions; conservation laws; dynamics of a system of particles; motion of rigid bodies; central force problems; central force problems; accelerating coordinate systems; gravitation; Lagrange's equations and Hamilton's equations.

Hours: 3 hours (3 lecture/0 lab)

Prerequisites: University Physics II (pre-requisite)
Calculus III or Differential Equations (co-requisite)

Campus Numberings:

Midwestern State University	PHYS 3313	Texas A&M University-Corpus Christi	PHYS 3311
Prairie View A&M University	PHYS 3103	Texas A&M University-Kingsville	PHYS 3313
Tarleton State University	PHYS 331	Texas Southern University	PHYS 272
Texas A&M University-Commerce	PHYS 411	West Texas A&M University	PHYS 3330

COURSE LEARNING OBJECTIVES:

Course Goals Upon completion of this course, students will	**Assessment**
1. be able to apply vector mathematics including calculus to analyze mechanical systems.	Embedded Course Assessment
2. know the basic definitions of position, velocity, acceleration and be able to use them to describe the motion of simple physical systems.	Embedded Course Assessment
3. be able to state and apply Newton's Laws to analyze simple mechanical systems involving position and velocity dependent forces for both rectangular and non-rectangular coordinate systems.	Embedded Course Assessment
4. be able to apply work and energy concepts to solve either problems involving only conservative forces or systems with sliding friction.	Embedded Course Assessment
5. be able to apply the principle of conservation of linear momentum to solve problems involving isolated systems and collisions.	Embedded Course Assessment
6. be able to apply conservation of angular momentum to analyze systems either involving collision or in which no net external torque is applied.	Embedded Course Assessment
7. be able to apply transformation equations to compare measurements made by observers in reference frames which have	Embedded Course Assessment
8. be able to analyze harmonic system with and without damping or external excitation.	Embedded Course Assessment
9. be able to state Newton's Universal Law of Gravity and apply it to solve simple celestial mechanics problem.	Embedded Course Assessment
10. be able to use generalized coordinates to find the Lagrangian and Hamiltonian of a simple mechanical system.	Embedded Course Assessment
11. be able to apply Langrangian mechanics to solve for the motion of simple mechanical systems.	Embedded Course Assessment
12. be able to apply Hamiltonian mechanics to solve for the motion of simple mechanical systems.	Embedded Course Assessment