Course Description

Presents approach to kinematics of particles in linear and curvilinear motion. Includes kinematics of rigid bodies in plane motion. Teaches Newton’s second law, work-energy and power, impulse and momentum, and problem solving using computers. Lecture 3 hours per week.

General Course Purpose

The course will give the student skills in analysis of particles of mass and rigid bodies moving in linear and curved paths under the influence of various forces and undergoing different types of acceleration. This is the second and last course offered in classical (Newtonian) mechanics, following EGR 240: Statics. It forms the foundation for later studies in fluid mechanics, thermodynamics, antenna design, vibration analysis, electro-acoustics and other engineering fields.

Course Prerequisites/Corequisites

Prerequisites: MTH 277 and EGR 240

Course Objectives

Upon completion of the course the student will be able to:

- Solve mechanics problems when particles and rigid bodies in are in motion
- Analyze bodies in linear and curvilinear motions
- Use energy equations and newton’s second law in solving problems involving particles and rigid bodies in motion.
- Apply concepts of kinetics and kinematics of particles and rigid bodies to engineering problems
- Relate the concepts of central forces to problems in space mechanics
- Solve engineering problems involving linear moment and angular momentums.
- Apply the concept of impact and impulse-momentum in particles and rigid bodies in motion

Major Topics To Be Included

- Kinematics of particles of mass in three dimensions
- Kinetics of particles
- Space mechanics (planar motion of particles of mass)
- Kinematics of rigid bodies (planar motion)
- Kinetics of rigid bodies
- Conservation of energy (conservative force systems)
- Conservation of linear and angular momenta; central forces
- Impact

EXTRA TOPICS (optional)

- Virtual work.
- Vibration of simple oscillators and rigid bodies: undamped, damped, unforced and forced.
- Rotating frames; Coriolis acceleration.