C-ID Descriptor
Dynamics

Descriptor Details

- **Descriptor Title**: Dynamics
- **C-ID Number**: 230
- **Units**: 3
- **Date of Last Revision**: 10/12/2017 11:44:08 PM GMT+0000

General Description

Fundamentals of kinematics and kinetics of particles and rigid bodies. Topics include kinematics of particle motion; Newton's second law, work-energy and momentum methods; kinematics of planar motions of rigid bodies; work-energy and momentum principles for rigid body motion; Introduction to mechanical vibrations (optional).

Prerequisites

Statics (C-ID ENGR 130)

Corequisites

None

Advisories

No information provided

Content

- Rectilinear Motion
- Curvilinear Motion
- Newton’s Second Law of Motion
- Work and Energy
- Impulse and Momentum
- Impact
- Kinetics of Systems of Particles
- Kinematics of Rigid Bodies: Translation, Rotation and Plane Motion
- Kinetics of Plane Motion
- Impulse-Momentum for Rigid Bodies
- Vibration (optional)

Lab Activities

None

Objectives

Upon successful completion of the course, students will be able to:

1. Derive and apply the relationships between position, velocity, and acceleration of a particle in rectilinear and curvilinear motion.
2. Derive relations defining the velocity and acceleration of any particle on a rigid body for translation, rotation and general plane motion.
3. Apply Newton's second law to analyze the motion of both a particle in rectilinear or curvilinear translation acted upon by forces and a rigid body in plane motion acted upon by forces and moments.
4. Apply the method of work and energy to engineering problems modeled as a single particle, a system of particles, or a rigid body in plane motion.
5. Apply the method of impulse and momentum to engineering problems modeled as a single particle, as system of particles, or a rigid body in plane motion.
6. Select the method of analysis that is best suited for the solution of a given problem. (Newton's Law, Work and Energy, Impulse and Momentum, or a combination of these methods.)
7. Describe and analyze the plane motion of a particle relative to a rotating frame. Determine the Coriolis acceleration in plane motion.

8. Apply the principle of impulse and momentum to problems of direct and oblique central impact, as well as eccentric impact.
9. To effectively communicate legible engineering solutions to be understood by engineers both in and out of their specific disciplines.

Evaluation Methods

Tests, examinations, homework or projects where students demonstrate their mastery of the learning objectives and their ability to devise, organize and present complete solutions to problems.

Textbooks

Beer and Johnston, Vector Mechanics for Engineers - Dynamics

Hibbler, Engineering Mechanics - Dynamics

Meriam and Kraige, Engineering Mechanics: Dynamics