General Information

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Department
Science and Technology

Course Prefix
ESC

Course Number
212

Course Title
Dynamics

Course Information

Credit Hours
3

Lecture Contact Hours
3

Lab Contact Hours
0

Catalog Description
This course is the second semester of a two-semester sequence in Engineering Mechanics. It presents the fundamental laws of Newtonian dynamics for particles and rigid bodies, provides a rigorous methodology for solution of problems, and presents a wide variety of examples of application. Subject areas discussed are kinematics and kinetics of particles and rigid bodies including rectilinear, relative, curvilinear, rotational and, plane motion; Newton's Laws, dynamic equilibrium, angular momentum, work-energy principle, impulse-momentum principle, and angular momentum.

Key Assessment
This course does not contain a Key Assessment for any programs

Prerequisites
ESC 211

Co-requisites
First Year Experience/Capstone Designation

This course DOES NOT satisfy the outcomes applicable for status as a FYE or Capstone.

SUNY General Education

This course is designated as satisfying a requirement in the following SUNY Gen Ed category

None

FLCC Values

Institutional Learning Outcomes Addressed by the Course

Inquiry
Perseverance
Interconnectedness

Course Learning Outcomes

Course Learning Outcomes

1. Calculate the kinematic quantity of an object that is assumed to be a particle.

2. Calculate the kinetic quantity of an object that is assumed to be a particle.

3. Calculate the kinematic quantity of an object that is assumed to be a rigid body.

4. Apply the principles of dynamics to fundamental engineering problems.

Outline of Topics Covered

I. Introduction, rectilinear motion of particles, position, velocity, acceleration
II. Uniform and uniformly accelerated rectilinear motions, dependent motions
III. Curvilinear motion of particle, derivatives of vector functions,
IV. Rectangular components of velocity and acceleration, projectile motion
V. Tangential and normal components of curvilinear motion
VI. Radial and transverse components of curvilinear motion
VII. Newton's second law
VIII. Linear momentum
IX. Equations of motion
X. Angular momentum
XI. Newton's law of gravity
XII. Trajectory of a particle under central force, application to space mechanics
XIII. Energy method, work of a force, kinetic energy of a particle, work & energy principle
XIV. Potential energy, conservative forces, conservation of energy
XV. Momentum method, principle of impulse and momentum
XVI. Impact, direct and oblique central impact, problems involving energy and momentum
XVII. Translation, rotation about a fixed axis
XVIII. General plane motion, absolute and relative velocity in plane motion
XIX. Instantaneous center of rotation in plane motion
XX. Absolute and relative acceleration in plane motion
XXI. Plane motion of a particle relative to a rotating frame, Coriolis acceleration
XXII. Equations of motion for a rigid body in plane motion
XXIII. Principle of work and energy for the plane motion of a rigid body
XXIV. Principle of impulse and momentum for the plane motion of a rigid body