Syllabus

ESC 212 Dynamics

General Information

Date

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Author

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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

None

Grading Scheme

Letter

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