UNIVERSITY of NICOSIA

Course Code	Course Title	ECTS Credits
MENG-252	Engineering Mechanics: Dynamics	6
Department	**Semester**	**Prerequisites**
Engineering	Fall, Spring	MENG-250, MATH-330
Type of Course	**Field**	**Language of Instruction**
Elective	Engineering	English
Level of Course	**Year of Study**	**Lecturer(s)**
1st Cycle	2nd	Dr Eftychios Christoforou
Mode of Delivery	**Work Placement**	**Co-requisites**
Face-to-face	N/A	None

Objectives of the Course:

The main objectives of the course are to:

- Introduce the fundamental principles governing the dynamics of particles and motion of rigid bodies in one, two and three-dimensional spaces.
- Study the motion of objects and the interaction between the forces acting on objects and the induced motion based on a Newtonian formulation of the governing equations.
- Develop an understanding of the physical principles governing rigid body motion and problem solving skills that can be applied to a variety of practical engineering problems.

Learning Outcomes:

After completion of the course students are expected to:

- Use free-body diagrams and apply vector analysis for obtaining relationships between displacement, velocity, and acceleration vectors for a particle, a system of particles and rigid bodies in two- or three-dimensions.
- Apply Newton's second law of motion in determining the dynamic response of a system to applied forces or perform analysis of the motion of a particle, system of particles or a rigid body.
- Apply energy and momentum methods for analyzing the dynamic behavior of mechanical systems.
- Analyze planar as well as three-dimensional kinematics and dynamics of rigid bodies and apply these methods to practical mechanical systems.

Course Contents:

- Drawing free-body diagrams
- Motion of a point: position, velocity and acceleration vectors, straight-line and

curvilinear motion of a particle

- Force, mass, acceleration, Newton's second law, equation of motion of the center of mass, inertial reference frames
- Work, kinetic energy, work-energy principle, power, work and potential energy, conservation of energy, conservative forces, relationship between force and potential energy
- Impulse, momentum, conservation of linear momentum, impacts, angular momentum
- Planar kinematics and dynamics of rigid bodies: types of motion, rotation about a fixed axis, velocities and accelerations in general motion, equations of motion
- Energy and momentum in rigid-body dynamics, principle of work and energy, kinetic energy, work and potential energy, power, principles of impulse and momentum
- Three-dimensional kinematics and dynamics of rigid bodies

Learning Activities and Teaching Methods:

Lectures, in-class examples and exercises.

Assessment Methods:

Homework, exams, final exam.

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
A. Bedford W. Fowler	Engineering Mechanics: Dynamics	Pearson Ed	2009	9810679408

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
R. C. Hibbeler	Principles of Dynamics	Pearson Ed	2013	9810692943
F. P. Beer E. R. Johnston Jr. P. J. Cornwell	Vector Mechanics for Engineers: Dynamics	McGraw-Hill	2013	9781259007934