Course Syllabus

Course: *Engineering Mechanics: Dynamics*
Department: *Engineering*
Host Institution: *University of Nicosia, Cyprus*

UNIVERSITY of NICOSIA | Global Semesters

Course Summary

Course Code	Course Title	ECTS Credits
MENG-252	Engineering Mechanics: Dynamics	6
Subject	**Contact Hours**	**Prerequisites**
Engineering	42-45	Engineering Mechanics: Statics
Department	**Level of Course**	**Language of Instruction**
Engineering	Upper-Division	English

Course Description

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.

After completion of the course students are expected to be able 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.

Prerequisites *(if applicable)*

Engineering Mechanics: Statics

Course Outline

• 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

• Vibration and time response.

Evaluation

Homework assignments	20%
Midterm Examination	25%
In-Class Participation	5%
Final Exam, comprehensive	50%

Reading and Resources

Engineering Mechanics: Dynamics, A. Bedford W. Fowler, Pearson Ed, 2009, ISBN 9810679408

Other Academic Policies

Class attendance is compulsory. If unable to attend a class, students must inform the course lecturer in advance. A maximum of 20% excused absences is tolerated; however beyond this percentage, students will be withdrawn from the course. Moreover, any work missed due to absence must be completed on return to class.