MECH2020 Statics and Dynamics

Course Code: MECH2020	**Course Title:** Statics and Dynamics
Required Course Or Elective Course: Required Course	**Terms Offered (Credits):** Fall (3 credits)
Faculty In Charge: Robin MA	**Pre/Co-Requisites:** MATH1012 OR MATH1013 OR MATH1020 OR MATH1023 AND PHYS1111 OR PHYS1112

Course Structure: Lecture: 3 hours per week; Tutorial: 1 hour per week

Textbook/Required Material:

Vector Mechanics for Engineers: Statics

Vector Mechanics for Engineers: Dynamics

Beer & Johnston, McGraw-Hill

Course Description:

This is a required course for the BEng in Mechanical Engineering, focusing on fundamental analysis of the equilibrium and dynamic behavior of mechanical systems. Statics: equilibrium of particles and of rigid bodies; distributed forces; analysis of structures, e.g. trusses and beams. Dynamics: kinematics of particles; kinetics of particles, Newton's second law, energy, momenta, impact dynamics.

Course Topics:
1   Types of forces, moments and couples
2. Equilibrium and free body diagram
3. Description of forces and moments
4. Equilibrium equations
5. Trusses analysis, methods of joints and sections
6. Frames and machines
7. Kinematics of particles
8. Rectilinear and Curvilinear motions of particles
9. Kinetics of particles: Newton's second law
10. Angular momentum of particles
11. Kinetics of particles: energy and momentum methods
12. Conservation of energy

Course Objectives:	1. Study of mechanics, including both statics that investigates how structures maintain equilibrium and dynamics that describes the kinematics of dynamical systems. 2. Form the foundation in the discipline of mechanical engineering and equip the students with the basics of mechanics, which is one of the required courses for students in this area. 3. In addition to solving relevant problems, students can learn rigorously the fundamental principles of mechanics in a systematical approach. These principles will be used in subsequent classes, including Mechanism of Machinery, Solid Mechanics, Strength of Materials, Finite Elements etc.
Course Outcomes:	On successful completion of this course, students are expected to be able to: A. Identify the mechanics theory of equilibrium for mechanical systems. B. Analyze and compare different static structures, such as trusses, frames and machines. C. Identify the concepts of kinematics of particles and rigid bodies.

	D. Describe the motion for particles and associate its related equations. E. Evaluate kinetics of particles using energy and momentum methods. F. Analyze and construct simple mechanical systems.
Assessment Tools:	Homework 15% Mid-term examination 35% Final examination 50%