PURDUE UNIVERSITY FORT WAYNE | Department of Civil and Mechanical Engineering

Course	ME 25100 – Dynamics
Cross-listed Course	CE 25100 – Dynamics
Type of Course	Required for ME program
Catalog Description	Kinematics of particles in rectilinear and curvilinear motion. Kinetics of particles, Newton's second law, energy and momentum methods. Systems of particles. Kinematics and plane motion of rigid bodies, forces and accelerations, energy and momentum methods. Introduction to mechanical vibrations.
Credits	3
Contact Hours	3
Prerequisite Courses	ME 25000 with a minimum grade of C-
Corequisite Courses	MA 36300
Prerequisites by Topics	Newton's laws, statics, vector algebra, calculus, differential equations
Textbook	Bedford and Fowler, *Engineering Mechanics: Dynamics*, Prentice Hall, current edition or Hibbeler, *Engineering Mechanics: Dynamics*, Prentice Hall, current edition
Course Objectives	To introduce the student to the analysis of the motion of particles and rigid bodies using the laws and principles of mechanics; to practice solving problems using techniques learned in the course; and to introduce the analysis of the motion of simple deformable bodies.

Course Outcomes

Students who successfully complete this course should be able to:

1. Analyze the kinematics of particles and rigid bodies in planar motion through understanding of **(1, 7)**:
   a. Different systems of coordinates
   b. Translational and rotational motion
   c. Absolute and relative motion
   d. Instantaneous center of zero velocity
   e. Fixed and non-fixed reference frames

2. Analyze the kinetics of particles and rigid bodies in planar motion through understanding and practicing of **(1, 7)**:
   a. Newton's Laws of Motion and Gravitational Attraction
   b. Free body diagrams
   c. Equation of motion
   d. Work and energy principle
   e. Impulse and momentum principle

3. Analyze free and forced vibrations of one-DOF oscillatory systems through understanding and practicing of **(1, 7)**:
   a. Application of the above laws of dynamics
   b. Solution of differential equation of motion
   c. Natural and damped natural frequency
   d. Resonance

Lecture Topics

1. Particle motion
2. Curvilinear particle motion
3. Particle force and acceleration
4. Particle work and energy
5. Particle impulse, momentum and impact
6. Rigid body velocities
7. Rigid body accelerations
8. Rigid body force and acceleration
9. Rigid body work and energy
10. Rigid body impulse, momentum and impact
11. Free vibrations
12. Forced vibrations
13. Viscously damped vibration
14. Applications

Computer Usage

None

Laboratory Experience	None
Design Experience	None
Coordinator	Bongsu Kang, Ph.D.
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