

Course Outline for: ENGR 2236 Dynamics

A. Course Description:

- 1. Number of credits: 3
- 2. Lecture hours per week: 3
- 3. Prerequisites: PHYS 1121 (C or better) and MATH 1520 (C or better)
- 4. Corequisites: None
- 5. MnTC Goals: None

An introductory course in engineering dynamics focusing on the kinematics and kinetics of particles and rigid bodies in the plane, Newton's laws, energy and momentum methods, planar linkages and mechanical vibrations. Students will gain a strong foundation for understanding the motion and forces within mechanical systems.

B. Date last reviewed/updated: January 2025

C. Outline of Major Content Areas:

- 1. Motion of a particle.
- 2. Newton's second law.
- 3. Linear and angular momentum.
- 4. Conservation of linear and angular momentum.
- 5. Kinetic energy and potential energy.
- 6. Conservation of mechanical energy.
- 7. Rotation of a rigid body.
- 8. Coriolis acceleration.
- 9. Plane motion of a rigid body.
- 10. Kinetic energy of a rigid body.
- 11. Principle of work and energy.
- 12. Vibrations and simple harmonic motion.

D. Course Learning Outcomes:

Upon successful completion of the course, the student will be able to:

- 1. Express the equations of motion for Newtonian dynamics in writing.
- 2. Apply kinematic and kinetic calculations for particles and systems of particles, to calculate relationships between loads and motion.
- 3. Communicate the equations of motion for Newtonian dynamics of rigid bodies.
- 4. Apply kinematic and kinetic calculations for rigid bodies, to calculate relationships between loads and motion.
- 5. Apply Newton's laws to calculate relationships between loads and motion of linkages.
- 6. Derive the equations of motion for simple vibrational systems.
- 7. Apply equations of motion for simple vibrational systems to calculate a body's motion over time.

E. Methods for Assessing Student Learning:

Methods for assessment may include, but are not limited to, the following:

- 1. Exams
- 2. Problem sets
- 3. Group projects

F. Special Information:

Students must have a graphing calculator.