

Course Outline for: PHYS 1110 College Physics 1

A. Course Description:

- 1. Number of credits: 4
- 2. Lecture hours per week: 3 Lab hours per week: 2
- 3. Prerequisites: MATH 1100 (C or better); or placement into MATH 1500 or higher
- 4. Corequisites: None
- 5. MnTC Goals: Goal #3 Natural Sciences

In this first semester of a two-semester sequence covering introductory algebra-based physics, students explore the mathematical description of motion (kinematics) and use forces and torques to analyze the behavior of objects and systems (dynamics)—including applications to both rectilinear motion and rotating systems. Students will also explore topics such as conservation of momentum and conservation of energy, periodic oscillations, thermal physics and universal gravitation. This course uses algebra and trigonometry.

B. Date last reviewed/updated: February 2025

C. Outline of Major Content Areas:

- 1. Kinematics.
- 2. Dynamics.
- 3. Gravitation.
- 4. Momentum.
- 5. Energy.
- 6. Heat.
- 7. Fluids.

D. Course Learning Outcomes:

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

- 1. Apply the constant acceleration kinematic equations to appropriately identified motions to calculate relationships between a particle's position, velocity, and acceleration. (Goal 3a, 2a)
- 2. Perform calculations using vectors including translating direction and magnitude information into vectors by using trigonometry. (Goal 3a)
- 3. Communicate the directions of velocity, acceleration, force, and linear momentum vectors for particles. (Goal 3a)
- 4. Draw accurate free body diagrams for particles and rigid bodies. (Goal 3a)
- 5. Apply Newton's laws of motion to calculate relationships between force, mass, and acceleration for particles. (Goal 3a, 2a)

- 6. Determine the most useful approach to solving a given problem (e.g., the constant acceleration equations, Newton's 2nd Law, conservation of linear momentum, or conservation of mechanical energy). (Goal 3a, 2c)
- 7. Apply Newtonian rigid body equation of motion to calculate relationships between the net moment of force, mass moment of inertia, and angular acceleration for rigid bodies. (Goal 3a, 2a)
- 8. Test formulated hypotheses for experiments in lab based on analyzed data, error, and uncertainties. (Goal 3b, 2c)
- 9. Communicate solutions to physics problems related to measurements taken in lab both orally and in writing. (Goal 3c)

E. Methods for Assessing Student Learning:

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

- 1. Homework
- 2. Projects
- 3. Quizzes
- 4. Exams
- 5. Final Exam
- 6. Written and/or oral reports

F. Special Information:

None