Syllabus

PHYS 1410

Elementary General Physics I

2025

Committee Members:

N/A, Central Community College
Joe Sherwin, Metropolitan Community College
Jared Daily, Mid-Plains Community College
David Heidt, Northeast Community College
Paul Haar, Michael Harrison, & Kent Reinhard, Southeast Community College
Erandi Gunapala & Lorin King, Western Nebraska Community College
N/A, Little Priest Tribal College
N/A, Nebraska Indian Community College

Facilitator: Paul Haar

The Institution agrees to the contents in this syllabus including course prefix, number, course description and other contents of this syllabus.

Chief Academic Officer, Central Community College	11/26/2024	Adopt
Theresa Billiot Chief Academic Officer, Little Priest Tribal College	11/13/2024	Adopt
Tom McDonnell Chief Academic Officer, Metropolitan Community College	11/13/2024	Decline
Jody Tomanek Chief Academic Officer, Mid-Plains Community College	11/12/2024	Adopt
Chief Academic Officer, Nebraska Indian Community College	11/26/2024	Adopt
Charlene Widener Chief Academic Officer, Northeast Community College	11/14/2024	Adopt
Joel Michaelis Chief Academic Officer, Southeast Community College	11/13/2024	Adopt
Grant Wilson Chief Academic Officer, Western Nebraska Community College	11/12/2024	Adopt

I. CATALOG DESCRIPTION

PHYS1410
Elementary General Physics I with algebra and trigonometry

Prerequisite/Corequisite: trigonometry or instructor permission

Credit Hours: 5 (Semester) 7.5 (Quarter)
Contact Hours: Lecture 60 Lab 30

Course Description: Detailed algebra and trigonometry study of one and two dimensional motion. Topics will include kinematics, Newton's Laws, energy, momentum, and rotational motion. Additional topics from the areas of oscillations and waves, fluids, and thermal physics may also be covered.

II. COURSE OBJECTIVES/COMPETENCIES

Course will:

1. Distinguish between vector and scalar quantities and teach vector operations.
2. Provide methods of analysis for 1-dimensional kinematics.
3. Introduce methods of analysis for multi-dimensional kinematics.
4. Define and apply Newton's laws of motion.
5. Use the concepts of work and energy to solve problems.
6. Apply the concepts of impulse and momentum.
7. Implement the laws of conservation of energy and momentum.
8. Employ kinematics and dynamics in rotational systems.
9. Utilize laws of conservation of energy and momentum for rotational systems.
10. Present techniques for analysis of experimental data.
11. Provide experience communicating experimental results.

III. STUDENT LEARNING OUTCOMES

Students will be able to:

1. Conduct dimensional analysis.
2. Perform vector analysis.
3. Compare and contrast scalars and vectors.
4. Use displacement, velocity, acceleration, and time to analyze 1-dimension motion.
5. Analyze objects in multi-dimensional motion.
6. Determine relative velocity vectors from multiple points of reference.
7. Distinguish the relationship between motion and Newton's three laws of motion.
8. Analyze forces and motion using Newton's three laws of motion.
9. Determine forces and motion in situations that involve static and kinetic friction.
10. Use the work-energy theorem to relate work and energy.
11. Apply the properties of work, kinetic energy, gravitational potential energy, and spring potential energy using conservation of energy and the work-energy theorem.
12. Calculate properties of work, energy, and power.
13. Analyze the relationship between momentum, impulse, and collisions.
14. Demonstrate the conservation of momentum of objects before and after collision.

15. Analyze properties of angular displacement, angular velocity, angular acceleration, and centripetal acceleration.
16. Use torque, angular acceleration, and moment of inertia to analyze rotational motion and static equilibrium.
17. Apply the properties of conservation of energy and conservation of angular momentum.

IV. COURSE CONTENT/TOPICAL OUTLINE

(Sequence may vary)

1. Units and Measurement
2. Vectors
3. Linear Motion
4. Motion in Two and Three Dimensions
5. Newton's Laws of Motion
6. Applications of Newton's Laws
7. Work and Kinetic Energy
8. Potential Energy and Conservation of Energy
9. Linear Momentum and Collisions
10. Rotational Motion
11. Angular Momentum
12. Static Equilibrium

V. INSTRUCTIONAL MATERIALS

SUGGESTED TEXTBOOKS AND/OR MATERIALS

OpenStax College Physics or other appropriate Open Educational Resource
College Physics – Knight, Jones, and Field
Physics – Giancoli
College Physics – Young

VI. METHODS OF PRESENTATION

Methods of presentation may include lecture, small group activities, videos, lab activities, worksheets, quizzes, online exploration, and student presentations.

VII. METHODS OF EVALUATION

1. Unit Tests
2. Comprehensive Final Exam
3. Quizzes
4. Assignments
5. Lab Activities

VIII. INSTITUTIONAL DEFINED SECTION

To be used at the discretion of each community college as deemed necessary.