EASTERN ARIZONA COLLEGE
General Physics I
Course Design
2018-2019

Course Information

Division	Science
Course Number	PHY 111 (SUN # PHY 1111)
Title	General Physics I
Credits	4
Developed by	Madhuri Bapat
Lecture/Lab Ratio	3 Lecture/3 Lab

Transfer Status

ASU	NAU	UA
PHY 111 (3) & PHY 113 (1) , Natural Science - Quantitative (SQ), Natural Science - Quantitative (SQ)	PHY 111;Lab Science [LAB]	PHYS 181 –and-- PHYS 102

Activity Course	No
CIP Code	40.0801
Assessment Mode	Pre/Post Test (7 Questions/50 Points)
Semester Taught	Fall
GE Category	Lab Science
Separate Lab	Yes
Awareness Course	No
Intensive Writing Course	No

Prerequisites

MAT 181 with a grade of "C" or higher, or concurrent enrollment in MAT 181, or MAT 187 with a grade of “C” or higher, or concurrent enrollment in MAT 187, or placement test score as established by District policy, or division approval

Educational Value

This course is valuable for students who are interested in the medical or engineering field, or majoring in math, physics, or chemistry.

Description

This course covers the fundamental principles of mechanics, waves, thermodynamics, fluids, and periodic motion. Problem solving is on the trigonometric level.

Supplies

Scientific calculator

Competencies and Performance Standards

1. Quantify one and two-dimensional motion.

Learning objectives

What you will learn as you master the competency:

a. Analyze motion using velocity and acceleration model.

b. Learn to draw motion diagrams, vector diagrams.

c. Analyze position vs. time, velocity vs. time and acceleration vs. time graphs.

d. Solve problems using equations of motion.

e. Identify the correspondence in equations of motion and the graphs of them.

Performance Standards

You will demonstrate your competence

- on tests
- during labs
- homework
- class discussions

Your performance will be satisfactory when:

- learner demonstrates ability to distinguish between x and y components of vectors
- learner adds vectors trigonometrically, graphically and experimentally
- learner identifies component responsible for motion, and friction
- learner solves simple one or two step problems using equations of motion
- learner draws velocity vs. time graph from position vs. time graph; acceleration vs. time graph from velocity vs. time graph

2. Analyze forces as interaction between two objects.

Learning objectives

What you will learn as you master the competency:

a. Draw vector diagrams, free body diagrams.

b. Apply Newton's second law.

c. Solve for unknown quantity.

Performance Standards

You will demonstrate your competence

- on tests
- during class discussions
- on homework
- during labs

Your performance will be satisfactory when:

- learner draws free body and force diagram
- learner writes expression for net force using Newton's second law
- learner solves for unknowns

3. Quantify momentum and its conservation.

Learning objectives

What you will learn as you master the competency:

a. Describe momentum as inertia of motion and as a vector quantity.

b. Compute total momentum of a system.

c. Demonstrate that momentum is conserved during any type of collision - elastic or inelastic.

d. Apply law of conservation of momentum to predict velocity of an object after or before collision.

Performance Standards

You will demonstrate your competence

- o on homework
- o during labs
- o on tests
- o during class discussions

Your performance will be successful when

- o learner determines proper directions of momentum in a system
- o learner applies law of conservation of momentum for collision or explosion
- o learner solves for unknowns

4. Quantify energy and its conservation.

Learning objectives

What you will learn as you master the competency:

a. Determine kinetic and potential energy of given system.

b. Apply law of conservation of energy to the situation.

c. Determine unknown quantity.

Performance Standards

You will demonstrate your competence

- o during lab
- o on tests
- o on homework
- o during class discussions

Your performance will be successful when

- o learner identifies a form (mechanical, elastic, gravitational, heat) and type (kinetic, potential) of energy in the system
- o learner writes down expression for respective energy
- o learner solves for energy involved in system
- o learner applies law of conservation of energy

5. Quantify projectile, circular, rotational, and simple harmonic motion.

Learning objectives

What you will learn as you master the competency:

a. Quantify projectile motion by determining components of velocity responsible for horizontal and vertical motion.

b. Quantify circular motion by determining centripetal acceleration and force.

c. Quantify rotational motion by determining rotational inertia, angular velocity, acceleration, momentum.

d. Quantify simple harmonic motion of pendulum and spring by determining period, frequency, equations of motion and applying conservation of energy.

Performance Standards

You will demonstrate your competence

- on tests
- on homework
- during class discussions
- during labs

Your performance will be successful when

- learner identifies parameters involved in the process and conceptually analyze
- learner writes down expressions for centripetal force, rotational inertia, angular momentum, rotational energy, and simple harmonic motion
- learner solves simple problems using these expressions

6. Describe basics of Wave mechanics and apply to sound waves.

Learning objectives

What you will learn as you master the competency:

a. Demonstrate that a wave is a product of simple harmonic motion and is an energy carrier.

b. Identify different types of waves and categorize into types of waves.

c. Identify parts of wave, and relationship between them.

d. Explain wave phenomena like resonance, interference and Doppler effect.

Performance Standards

You will demonstrate your competence

- on tests
- during labs
- on homework
- during class discussions

Your performance will be successful when

- learner relates waves with simple harmonic motion
- learner draws waves due to reflection, interference of original waves
- learner solves problems using basic relations in period, frequency, speed and wavelength
- learner explains the difference in transverse and longitudinal waves

7. Describe the basics of thermodynamics.

Learning objectives

What you will learn as you master the competency:

a. Distinguish between heat and temperature, specific heat and latent heat.

b. Explain how heat absorbed or released by an object depends on factors like mass, specific heat, latent heat, and temperature change.

c. Convert Celsius, Fahrenheit, and absolute temperatures back and forth.

d. Describe three effects of heat on matter: change of phase, expansion and change in temperature.

e. Explain linear and volume expansion and describe the relation between them.

f. Apply the laws of thermodynamics.

Performance Standards

You will demonstrate your competence

- on tests
- on homework
- during labs
- during class discussions

Your performance will be successful when

- learner distinguishes between heat and temperature
- learner distinguishes between specific heat, and latent heat
- learner applies Newton's law of cooling, and laws of thermodynamics
- learner determines heat gained or lost by an object

8. Describe the basics of hydrostatics and hydrodynamics.

Learning objectives

What you will learn as you master the competency:

a. Apply Archimedes's principle and Pascal's law.

b. Apply equation of continuity and Bernoulli's equation to flow of fluids.

Performance Standards

You will demonstrate your competence

- on homework
- on tests
- in group discussions

Criteria - Performance will be satisfactory when:

- learner solves for unknowns in the hydrostatic situations
- learner solves for unknowns in hydrodynamic problems

9. Use graphical analysis, Excel, and analytical software.

Learning objectives

What you will learn as you master the competency:

a. Use graphical analysis, Excel, and analytical software.

b. Use motion sensors and photogates in lab applications.

Performance Standards

You will demonstrate your competence

- during labs

Criteria - Performance will be satisfactory when:

- learner uses graphical analysis, excel and data studio adequately
- learner uses motion sensors and photogates in lab applications

Types of Instruction

Classroom presentations, demos, videos, discussions

Laboratory

Grading Information

Grading Rationale

Students are assessed for their ability to apply laws and principles in problem solving. Students are assessed for their critical thinking. Students are not tested on their memory. Students are expected to show all the work - diagrams, graphs, formulas, validity of answer.

Pretest	0%
Labs	25%
Homework	10%
Class worksheets	10%
Quizzes	10%
Tests	30%
Final Exam	15%

Grading Scale

A	88 - 100%
B	78 - 87.9%
C	68 - 77.9%
D	58 - 67.9%
F	Below 58%