

COURSE OUTLINE
PHYS-110
General Physics I (Calculus)
4 Semester Hours
Science Core Course

HOWARD COMMUNITY COLLEGE

Description

General Physics 110 is the first semester of a three-semester calculus-based physics course mainly for physics, physical science, engineering and related science majors. The course will enable the student to solve problems, using calculus methods when applicable, for the major concepts in physics to include: measurement; vector concepts; laws of motion, force, energy; principles of mechanics and statics; linear momentum; rotation; and fluid statics and dynamics. The student will develop the ability to interpret and apply the experimental laws and fundamental principles of physics to describe the behavior of the physical world. In the laboratory program, the student will develop the ability to appraise, use, and interpret data collected (often by MBL) to express mathematically and/or explain the physical phenomena observed. Prerequisite: Eligible to enroll in ENGL-121; Pre- or Co-requisite: MATH-140 or MATH-181. (3 hours lecture, 3 hours lab)

Statement on General Education and Liberal Learning

A liberal education prepares students to lead ethical, productive, and creative lives and to understand how the pursuit of lifelong learning and critical thinking fosters good citizenship. General education courses form the core of a liberal education within the higher education curriculum and provide a coherent intellectual experience for all students by introducing the fundamental concepts and methods of inquiry in the areas of mathematics, the physical and natural sciences, the social sciences, the arts and the humanities, and composition. This course is part of the general education core experience at Howard Community College.

Overall Course Objectives

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

1. Identify and address their physics alternate conceptions (misconceptions).
2. Interpret physics facts and principles.
3. Apply physics principles to solve problems using calculus methods and, where applicable, explain practical physics applications to include an oral explanation to the class.
4. Develop the ability to appraise, use, and interpret experimental laboratory and/or computer data collected to correctly solve and/or explain the physical phenomena observed (including one short lab group oral summary of the previous week's lab).
5. Understand the terminology of physics including units, name of equipment, and vocabulary.
6. Develop skill in performing elementary physics experiments to obtain satisfactory results and conclusions.
7. Operate correctly each piece of apparatus.
8. Observe all safety regulations in laboratory.
9. Write, using correct data collection, organization and analysis techniques, a complete formal laboratory report (written utilizing proper grammar techniques) to include: title of experiment, objectives, data and observations, results and conclusions.

10. Utilize a microcomputer for collection and analysis of lab data (microcomputer-based labs with probes), spreadsheets, simulation, and problem/concept drill.
11. Prepare and present a 10-20 minute oral lab group report to the class on a previous week's lab activity to include visual aides.

Major Topics

- I. Introductory Concepts in Physics
 - A. Measurement Systems and Units
 - B. Mathematics Review and Using Significant Figures
 - C. Dimensional Analysis to Convert Units
- II. Vector Mechanics and Motion (1, 2, and 3-D)
 - A. Vector Principles w/Applications
 - B. Speed, Velocity and Acceleration
 - C. Free-Fall and Acceleration Due to Gravity
 - D. Newton's Laws of Motion with Applications
 - E. Friction
 - F. Motion Under the Action of Forces including Projectiles
 - G. Circular Motion and Gravitation
- III. Energy, Momentum, and Equilibrium
 - A. Work, Energy, and Power including Conservation of Energy
 - B. Linear Momentum and Collisions (both inelastic and elastic)
 - C. Rigid Body Rotation including Angular Momentum
 - D. Static Equilibrium
- IV. Fluid Statics and Dynamics (if time permits)
 - A. Density and Pressure Concepts including Archimedes' Principle for Static Fluids
 - B. Fluid Flow including Bernoulli's Equation Applications

Course Requirements

Grading/exams: Grading procedures will be determined by the individual faculty member, but will be calculated on the basis of exams, assigned homework problems, and lab experiments.

This course includes a final exam. Written formal lab reports will be required.

Writing: Specific writing assignments will be determined by the individual faculty members, but will include formal lab reports.

Oral Communications: Specific oral communications assignments will be determined by the faculty member, but will include at least two of the following: an oral report to the class, a group lab oral summary, and problem solution explanation to the class.

Other Course Information

This course is a Science core course, a Science elective, and an Arts and Sciences elective.