

Common Course Outline

PHYS 105

How Things Work

3 Semester Hours

The Community College of Baltimore County

Description

PHYS 105--3 Credits--How Things Work introduces physics of everyday life, considering objects (roller coasters, bicycles, airplanes, woodstoves, etc.) from our daily environment and focusing on their principles of operation, histories, and relationships to one another, concerning primarily mechanical and thermal objects. For students needing a lab PHYS 111 Physical Science Lab serves as the accompanying lab.

3 lecture hours per week

Prerequisites: (ENGL 052 or ESOL 052) and (RDNG 052 or ESOL 054) and

MATH 082

Overall Course Objectives

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

1. implement the scientific method and see how to apply it to solve a problem;
2. describe inertia and its relationship to mass;
3. analyze falling bodies and see how to calculate speed and distance of fall;
4. calculate the components of forces and apply this to ramps;
5. analyze moment of inertia and torque and apply this to seesaws;
6. analyze friction and see how wheels make it easier to move objects;
7. analyze linear and angular momentum and apply this to bumper cars;
8. analyze Hooke's Law and apply it to spring scales;
9. define the coefficient of restitution;
10. analyze centripetal force and apparent weightlessness encountered in roller coasters;
11. examine how center of mass and torque are used in understanding the motion of bicycles;
12. apply Archimedes' principle and the ideal gas law to hot air and helium filled balloons;
13. analyze the effects of gravitational potential energy on water distribution;
14. analyze kinetic energy and pressure in faucets and hoses;
15. apply Bernoulli's Principle to the wing of an airplane;
16. apply the laws of thermodynamics and heat transfer to woodstoves; and
17. analyze harmonic systems in pendulum based and balance wheel clocks.

Major Topics

- I. Skating
- II. Falling Balls
- III. Ramps
- IV. Seesaws
- V. Wheels
- VI. Bumper Cars
- VII. Spring Scales
- VIII. Bouncing Balls
- IX. Carousels and Roller Coasters
- X. Bicycles
- XI. Balloons
- XII. Water Distribution
- XIII. Garden Watering
- XIV. Balls and Frisbees
- XV. Airplanes and rockets
- XVI. Woodstoves
- XVII. Incandescent Light Bulbs
- XVIII. Air Conditioners
- XIX. Automobiles
- XX. Clocks
- XXI. Violins and Pipe Organs
- XXII. Sea and Surfing

Course Requirements

Grading/Exams: Grading procedures will be determined by the individual faculty member teaching the course but include the following:

1. minimum of two examinations.
2. minimum of two quizzes.
3. two written reports on the two assigned computer projects.
4. final examination

Writing: Additional writing assignments may be given by the faculty member teaching the course.

Other Course Information

This course and PHYS 111 (General Physical Science Lab) may be used to fulfill four credits of the General Education requirement in Biological and Physical Sciences.

Individual faculty members may include additional course objectives/topics.

The assessment activities may take many different forms, such as surveys, standardized or faculty-developed tests, discussion groups or portfolio evaluations.

Date Revised: 3/26/07