Physics
0344

Credits: 1.0
Weighted: Unweighted
Length: Year
Format: Daily

Grades: 11 & 12
Prerequisite: Chemistry
Co-requisite: Algebra 2

Overall Description of Course

Physics is the study of matter and energy and their interactions. The fields of physics covered in the core curriculum include mechanics (motion, forces, energy, and momentum), optics (lenses and mirrors) and electricity (current, voltage, resistance, and circuits). In physics, quantities are measured and mathematical relationships and laws are discovered to better understand the world. All levels of physics are lab-based courses emphasizing the discovery of these laws and relationships. All courses emphasize problem solving and real life applications.

Student Objectives:

Physics 344 is an academic level course which approaches physics on a more conceptual level with less emphasis on mathematical relationships. However, some basic mathematical skills are needed for problem solving and laboratory work. The labs and activities help in the understanding of concepts, enhance basic science skills, and require students to organize and interpret data.

Materials & Texts

MATERIALS
- Either a scientific or graphing calculator
- Ruler
- Protractor
- Notebook (3-ring) & Notebook paper

TEXTS

Text: Hewitt, _Conceptual Physics_, Prentice Hall (2002)

ACTIVITIES

I. Mathematical Concepts
 1. Metric System
 2. Significant Figures
 3. Unit Analysis
 4. Graphical Analysis
 5. Error Analysis

II. Liner Motion
 1. Motion in One Dimension
 2. Graphing Motion
 3. Free Fall

III. Kinematics & Vectors
 1. Vectors and Scalars
 2. Naming Vectors
 3. Vector Operations

IV. Forces and Newton's Laws of Motion
 1. Weight vs. Mass
 2. Newton's First Law
 3. Newton's Second Law and Free Body Diagrams
 4. Newton's Third Law
 5. Applications of Newton's Laws including Friction

V. Motion in 2D
 1. Projectile Motion
 2. Circular motion
 3. Newton's Law of Universal Gravitation

VI. Work, Power and Energy
 1. Work and Power
 2. Potential and Kinetic Energy
 3. Conservation of Energy

VII. Momentum
 1. Impulse and Momentum Relationship
 2. Conservation of Momentum
 3. Elastic and Inelastic Collisions

VIII. Electricity and Magnetism
A. Electricity
 1. Electrostatics
 2. Electric Current
 3. Electric Circuits
   a. Ohm's Law

   b. Series and Parallel Circuits
 B. Electricity Use & Efficiency
  1. Electric Power and Cost of Operating Appliances
  2. Electrical Efficiency
  3. Alternative energy Sources
 C. Magnetism
  1. Relationship between Electricity and Magnetism
  2. Applications of Magnetism
  3. Generators and Motors

 IX. Waves and Sound
  1. Properties and Types of Waves
  2. Pendulums
  3. Electromagnetic Waves and Spectrum

 X. Light and Geometric Optics
  1. Reflection (mirrors)
  2. Refraction
  3. Lenses

ASSIGNMENTS

Class work, homework, tests, quizzes, lab work, projects

ASSESSMENTS

Evaluation is based on class work, homework, tests, quizzes, lab work, activities, projects, and class participation.

COMMON ASSESSMENTS

- ✓ Midterm Exam
- ✓ Final Exam
- ✓ Core Lab Activities

Core Lab Activities
1. Circumference of a Circle (Graphical Analysis)
2. Motion of a Dune Buggy
3. Motion Down an Inclined Plane
4. Free Fall (Acceleration Due to Gravity)
5. Travelling Around Pennsylvania Lab (Vectors Map Exercise)
6. Projectile Motion Lab
7. Projectile Motion Challenge
8. Mass vs. Weight
9. Newton's 1st Law of Motion
10. Newton's 2nd Law of Motion
11. Friction Lab
12. Power Lab

13. Conservation of Energy in Collisions
14. Conservation of Momentum in Collisions
15. Ohm's Law Lab
16. Getting a Charge Out of Circuits (Series and Parallel Circuits)
17. Efficiency of Appliances
18. Period of a Pendulum
19. Reflection in Plane Mirrors
20. Reflection in Spherical Mirrors
21. Snell's Law
22. Thin Lenses