



Radnor High School Course Syllabus



Advanced Physics Science 342

I. Course Description

1.0 Credit, Unweighted

Length: Year

Format: Meets Daily

Prerequisite(s): Adv Chemistry or higher

Co-requisite(s): Trigonometry or higher

Advanced physics is an algebra-based college preparatory course that provides a challenging examination of mechanics (motion, forces, energy, and momentum), optics (lenses and mirrors), waves and electricity (current, voltage, resistance, and circuits) and magnetism. Reading of the textbook and writing lab reports are expected of these students.

II. Materials & Equipment

Text used: Giancoli, Physics, 5th edition. Prentice Hall

Materials needed: A scientific calculator (or a graphing calculator), a protractor, and a ruler

III. Course Goals & Objectives

The goals of advanced physics include the following:

- Problem solving skills
- Understand relationships between physical quantities
- Understand the world through mathematical relationships
- Prepare students to perform experiments

IV. Course Topics (Summary Outline)

I. Mathematical Concepts

- A. Metric system, significant figures and unit analysis
- B. Graphical analysis
- C. Vector addition and subtraction
- D. Trigonometry
- E. Error Analysis

II. Newtonian Mechanics

- A. Kinematics

1. Motion in one dimension
 2. Graphing motion
 3. Projectile motion
 - B. Newton's Laws of motion
 1. First law
 2. Second law and Free body diagrams
 3. Third law
 4. Applications of Newton's Laws including friction
 - C. Circular motion and Gravitation
 1. Uniform circular motion
 2. Newton's Law of universal gravitation
 3. Origin of Solar System and Universe
 4. Life cycle of a star
 - D. Work, Energy, and Power
 1. Work and energy relationship
 2. Work done by springs
 3. Conservation of energy including PE and KE
 4. Power
 5. Simple Machines and mechanical efficiency
 - E. Momentum
 1. Impulse and momentum relationship
 2. Conservation of momentum
 3. Elastic vs. inelastic collision
- III. Electricity and Magnetism
- A. Electrostatics
 1. Coulomb's law
 2. Capacitors
 - B. Electric Circuits
 1. Ohm's Law
 2. Resistors in series and parallel circuits
 3. Electric power and cost of operating appliances
 4. Electrical efficiency
 5. Alternative energy sources
 - C. Magnetic fields
 1. Relationship between electricity and magnetism
 2. Applications of Magnetism
- IV. Waves and Optics
- A. Geometric Optics
 1. Reflection and refraction
 2. Mirrors and lenses
 - B. Waves and Vibrations
 1. Properties and types of waves
 2. Pendulums
 3. Young's Double Slit Experiment
 4. Electromagnetic waves

V. Assignments & Grading

A. Common Mid-term and Final Exams

B. Core Lab Activities

0. Graphical Analysis
1. Motion of a Motorized Cart
2. Motion down the incline plane
3. Free fall/Acceleration Due to Gravity
4. Map Exercise
5. Projectile motion
6. Newton's 2nd law of motion
7. Equilibrium
8. Friction
9. Hooke's Law
10. Conservation of Energy
11. Simple Machines/Mechanical efficiency
12. Conservation of Momentum and Kinetic energy
13. Torque
14. Ohm's Law
15. Series and Parallel circuits
16. Electric devices
17. Reflection
18. Snell's Law
19. Lenses
20. The pendulum