

AP PHYSICS B

Course Syllabus

2007-2008

Teacher: Mr. Hoffmann
Room: A 110
Conference Period: 1st and 8th Period
Phone: 548-7600 (Hanna HS)

Course description:

This course provides an introduction to both classical and modern physics. AP Physics B is a 2nd year physics course that will prepare the student for the AP Physics B exam. This non-calculus, college-level physics course will cover Newtonian mechanics, fluid mechanics, thermodynamics, waves, sound, optics, electricity, magnetism, atomic physics, nuclear physics, and special topics. Students will build upon their first year of Physics and as a result, the student will gain both a deeper appreciation of the concepts of Physics and additional problem-solving skills. Computer based labs will help the student understand the concepts covered in the course and deepen the student's appreciation of the scientific method. The course focuses on developing conceptual understanding and problem-solving abilities using algebra and trigonometry.

Course Goals and Expectations:

Students are expected to spend at least five hours a week on homework or independent studies in addition to the daily 50-minute class period. Tutorial will be offered before and after school on a continuous base. Students are urged to buy a study guide to review, practice, and prepare for the AP exam. Students will take the AP exam by the end of the course.

Labs:

Labs are a required part of the AP Physics B course (The College Board requires that AP courses include a lab component). All AP Physics labs are hands-on labs or computer based and in a format that includes lab reports. Some colleges will only grant credit to students who have completed the labs and may require completed lab reports as proof of actual lab experiments. Students are required to do the labs in a laboratory setting while supervised by the teacher and will work in a group setting as well as on individual assignments. Labs are designed for at least two class periods.

Textbook: “PHYSICS: Principles with Applications” Fifth Revised Edition by Douglas C. Giancoli (PRENTICE HALL, Upper Saddle River, New Jersey)

Lab Materials: MBL (Microcomputer Based Laboratory)
Vernier Software & Technology (“Physics with Computers”)
PASCO

Class Materials: 2 Spiral Notebooks college ruled
2” Binder
Graphing Calculator
Ruler

Course Outline:

I. MECHANICS (12 weeks)

Kinematics-Motion in one and two dimensions (4weeks)

Textbook Ch. 2, 3

Example Labs:

- Graphical Analysis
- Dynamics Cart on an Incline
- Modern Galileo Experiment
- Picket Fence Free
- Projectile Motion

Newton's Laws of Motion (2weeks)

Textbook Ch. 4

Example Labs:

- Newton's Second Law
- Newton's Third Law
- Atwood's Machine
- Static and Kinetic Friction
- Air Resistance

End of 1st 6 Weeks. 6 weeks exam.

Work, Energy, and Power (1 week)

Textbook Ch. 6

Example Labs:

- Rollercoaster Lab, Conservation of Energy
- Energy in Simple Harmonic Motion
- Work and Energy
- Hooke's Law

System of Particles, Linear Momentum (1 week)

Textbook Ch. 7

Example Labs:

- Momentum, Energy, and Collision
- Impulse and Momentum

Circular Motion (2 weeks)

Textbook Ch. 5, 8

Example Labs:

- Centripetal Force

Oscillation and Gravitation (2 weeks)

Textbook Ch. 5, 11.1-11.6

Example Labs:

- Oscillating Pendulum
- Vibratory Motion of a Spring

End of 2nd 6 Weeks. 6weeks exam.

II. FLUID MECHANICS and THERMAL PHYSICS (3 weeks)

Fluid Mechanics (1 week)

Textbook Ch. 10

Temperature and Heat (1 week)

Textbook Ch. 13, 14

Example Labs:

- Newton's Law of Cooling

Linear and Volumetric Expansion of Solids
Specific Heat
Change of Phase-Heat of Fusion and Vaporization

Thermodynamics (1 week)

Textbook Ch. 15

Example Labs:

Pressure and Volume
Pressure and Temperature
Boyle's Law

III. WAVES and OPTICS (7 weeks)

Wave Motion (3 weeks)

Textbook Ch. 11.7-11.13, 12

Example Labs:

Speed of Sound
Standing Waves

End of 3rd 6 Weeks; end of 1st Semester. Final Exam.

Physical Optics (3 weeks)

Textbook Ch. 22, 23.2-23.6, 24

Example Labs:

Polarization of Light
Light, Brightness, and Distance
Snell's Law
Diffraction, Young's Double-Slit Experiment

Geometric Optics (1 week)

Textbook Ch. 23.1, 23.2, 23.7-23.10, 25

Example Labs:

Lenses
The Compound Microscope

IV. ELECTRICITY and MAGNETISM (8 weeks)

Electrostatics (1 week)

Textbook Ch. 16

Example Labs:

The Electric Field

Conductors, Capacitors, Dielectrics (1 week)

Textbook Ch. 16.3, 16.9, 17

Example Labs:

Capacitors

End of 4th 6 Weeks. 6 weeks exam.

Electric Circuits (3 weeks)

Textbook Ch. 18, 19

Example Labs:

Series and Parallel Circuits
Resistors and Ohm's Law
Internal Resistance of a Cell
Resistivity/Resistance
The Wheatstone Bridge

Magnetic Fields (1.5 weeks)

Textbook Ch. 20

Example Labs:

The Magnetic Field of a Permanent Magnet

Electromagnetism (1.5 weeks)

Textbook Ch. 21

Example Labs:

The Magnetic Field in a Coil

End of 5th 6 Weeks. 6 weeks exam.

V. ATOMIC and NUCLEAR PHYSICS

(2 weeks)

Atomic Physics and Quantum Effect (1 week)

Textbook Ch. 27

Example Labs:

Planck's Constant

Nuclear Physics (1 week)

Textbook Ch. 30, 31

Review for AP Exam

(1 week)

AP Exam

VI. SPECIAL TOPICS in PHYSICS (after AP Exam)

(3 weeks)

Lab Extensions, Projects and Hands-On Activities, Multimedia Presentations

Elementary Particles Ch. 32

Astrophysics and Cosmology Ch.33

Radiation and Medicine Ch. 31.5-31.9

Fluorescence and Phosphorescence, Lasers, Holography Ch. 28.10-28.12

End of 6th 6 Weeks; end of 2nd Semester. Semester exam.

Lab Report Style:

1. TITLE and DATE

2. INTRODUCTION-- The introduction must clearly state the objectives of the lab.

3. PROCEDURE--First list ALL lab equipment used in performing the lab. Draw a sketch of the lab setup and label all equipment used. Then list numerically the steps used in completing the gathering of the data required for the lab. Be sure to mention how many trials were taken in the lab.

4. DATA-- Clearly list and label all raw data taken in the lab. Use a table or some other such method for presenting measurements. Make sure units are clearly labeled for all measurements.

5. CALCULATIONS-- Briefly explain what quantity is being calculated and why. Then show all formulas needed, including algebraic manipulations of standard equations where necessary. Then show the calculations for each trial. In this section also include all graphs and charts when required. This section will also contain the error calculation when required.

6. ANALYSIS-- Here, in a single section, ALL questions posed throughout the lab should be answered in order. Answer questions in full sentences and ALWAYS give reasons for Yes or No answers. If the question posed requires a calculated answer, be sure to show all standard equations along with working equations, inserted values and final answer. This section will also contain an error analysis.

7. CONCLUSION-- In one paragraph each, explain which of the objectives were met in this lab and why, and which objectives failed to be met and why. In another paragraph describe how the lab could be improved by modifying the procedure or analysis.