AP PHYSICS B

AP Physics B is a college level course that uses advanced algebra and trigonometry as the primary tools for problem solving. The course covers topics in mechanics, waves, sound, light, electricity, magnetism, fluids, Thermodynamics, optics, quantum theory, and nuclear physics.

I. MATERIALS: Things to bring to class every day

1. Class Notes, Textbook, binder with graph notebook.
2. Utensils: mechanical pencil, ruler and **SCIENTIFIC CALULATOR**.

II. ASSIGNMENTS:

Homework: Students are expected to attempt all homework problems. All work must be shown.

Quizzes: Quizzes may or may not be announced. Quizzes may contain questions and/or problems from the reading

Tests: Tests will be given after each unit. All work must be shown. Partial credit may be awarded for solutions that are partially correct.

Labs: Labs are performed in groups for data collection purposes only. Your lab report should not be the result of shared writing, copying, or cooperative effort. Portions of reports should not be constructed of pieces written by different group members. Only your data should be the same. The procedure, analysis, apparatus, diagrams, data tables, sample calculation, graphs, explanations and conclusions must all be independently prepared.

IV. COURSE GOALS:

The College Board has stated the following:

"Goals of the AP Physics course
Students should develop the abilities to:

1. **Read, understand, and interpret physical information (verbal, mathematical, and graphical).**
2. **Describe and explain the sequence of steps in the analysis of a particular physical phenomenon or problem; that is,**
    a. **describe the idealized model to be used in the analysis, including simplifying assumptions where necessary,**
    b. **state the principles or definitions that are applicable,**
    c. **specify relevant limitations on applications of these principles,**
    d. **carry out and describe the steps of the analysis, verbally or mathematically,**
    e. **interpret the results or conclusions, including discussion of particular cases of special interest.**
3. **Use basic mathematical reasoning (arithmetic, algebraic, geometric, trigonometric, or calculus, where appropriate) in a physical situation or problem.**
4. **Perform experiments and interpret the results of observations, including making an assessment of experimental uncertainties. "**

Textbook: ***PHYSICS***
Douglas C. Giancoli
5th edition
Prentice Hall

COURSE SCOPE

Semester 1 study topics by chapter

(1 week) 1. Introduction: Physics and its Applications, Units

(2 weeks) 2. Describing Motion: Kinematics in One Dimension : Speed, Velocity, Acceleration and Free Fall

3. Kinematics in Two Dimensions; Vectors: Vectors and Scalars, Vector Addition, Graphical and Analytical Methods, Relative Velocity and Projectile Motion

(2 weeks) 4. Motion and Force: Dynamics: Newton's Laws of Motion and Friction

(2weeks) 5.Circular Motion and Gravitation: Centripetal force, Centripetal Acceleration, Gravitation, Satellites and Kepler's Laws

(2 weeks) 8. Rotational Motion: Torque, angular momentum, rotational dynamics

(2 weeks) 6. Work and Energy: Work, Potential Energy, Kinetic Energy and Conservation of Energy

(2weeks) 7. Linear Momentum: Impulse and Momentum, Conservation of Momentum, and Collisions

9. Bodies in Equilibrium: Translational Equilibrium

(2 weeks) 10. Fluids: Hydrostatic pressure, Buoyancy, Fluid flow continuity and Bernoulli's equation

(2 weeks) 13. Temperature and Kinetic Theory: Temperature, Thermometers, Thermal Expansion and Kinetic Theory

14. Heat: Internal Energy and Heat, Specific Heat Capacity and Calorimetry

(1 week) 15. The Laws of Thermodynamics: First and Second Laws of Thermodynamics, Heat Engines

Semester 2 study topics by chapter

(2weeks) 16. Electric Charge and Electric Field: Electrostatic Force, Coulomb's Law, and Electric Field.

(2weeks) 17. Electric Potential and Electric Energy; and Capacitance: Electric Potential Energy, Electric Potential Difference and Capacitance

(2 weeks) 18. Electric Current: Ohm's Law, Resistance and Power

19. DC Circuits: Series and Parallel Circuits and Kirchhoff's Rules

(2weeks) 20. Magnetism: Magnetic Field and Magnetic Forces

(1 week) 21. Electromagnetic Induction: Faraday's Law, Lenz's Law, and Transformers

22. Electromagnetic Waves: Electromagnetic Waves and Electromagnetic Spectrum

(3 weeks) 11. Vibrations and Waves: Simple Harmonic Motion, Elastic Potential Energy, the Simple Pendulum, Types of Waves, Boundary Behavior, Superposition Principle and Standing Waves

23. Light: Geometric Optics: Reflection, Refraction, and Total Internal Reflection, Image Formation, Lens/Mirror Equation and Magnification
24. The Wave Nature of Light: Interference, DoubleSlit, Diffraction Grating, and Thin Films

(2 weeks) 27. Early Quantum Theory: Quantum Theory, Photoelectric Effect, Atomic Spectra and Compton Effect
28. Nuclear Physics: Binding Energy
31. Nuclear Energy: Nuclear Reactions, Fission, Nuclear Reactors and Fusion

(2 weeks) Review for AP Examination

The following laboratory experiments will be done to help enhance student knowledge of the subject matter covered in class.

In all laboratory experiments, the students will be given a problem they must solve. For each experience, they will work together to develop a hypothesis, or possible solution to the problem presented. In the course of determining their possible solution, they will identify what materials they will use, what data they will be able to measure, and what equations they will need to solve for unknown variables. After they have completed their experiment, students will be expected to develop a conclusion that ties together the results that they have found in their experiment, the validity of their hypothesis, and the knowledge that they have learned in class. Lastly, students will be presented with the expected results of their experiment. As a group, they will need to compare their experimental results to the theoretical results, discuss the differences, and determine a possible explanation for any difference between the two results.

A) Air track demonstration. Week 1 of kinematics unit. Teacher demonstrated. Displays motion in 1 dimension. Used to give a visual representation and generate discussion of speed, velocity, acceleration, distance and displacement.

B) Projectile Lab. Week 2 of kinematics unit. Student conducted. Observe motion in 2 dimensions. Use kinematic equations to evaluate horizontal and vertical components of a projectile.

C) Mouse trap car. Week 2 of Newton's Laws unit. Student conducted. Design a mouse trap car, observe and/or calculate distance traveled, time of travel, acceleration and force based on Newton's Laws. Compare ideal to experimental data.

D) Windmill Lab. Week 2 of Work/Energy unit. Student conducted. Design a windmill to generate the most power. Perform calculations of work and energy following the Law of Conservation of Energy and the WorkEnergy Theorem.

E) Discovering Center of Mass. Week 1 of linear momentum unit. Teacher demonstrated. Demonstrate method for determining the center of mass for irregularly shaped objects.

F) Collisions Lab. Week 2 of momentum unit. Student conducted. Calculate initial momentum of a moving ball after a collision with a stationary ball. Uses Law of Conservation of Momentum in 2dimentional collisions, and

vector analysis.

G) Angular momentum demonstration. Week 1 of circular motion unit. Teacher demonstrated. Display angular momentum using a bicycle wheel and a gyroscope. Student help/discussion with understanding of effects & uses.

H) Torque Mobile Lab. Week 2 of circular motion unit. Student conducted. Students design a mobile using items of different mass. They must calculate the torque exerted by each object, net torque on each level, and net torque for the mobile. Calculations will show where objects should be hung to achieve perfect balance.

I) Pendulum Lab. Week 1 of vibration and waves unit. Student conducted. Investigate effects of changing mass and length of a pendulum on period. Perform KE and PE calculations to check conservation of energy.

J) Buoyancy Lab. Week 1 of fluid unit. Student conducted. Design a boat to hold the most weight. Students must demonstrate knowledge of the principles of buoyancy. Analyze boat design and it effect on buoyancy.

K) Bernoulli's Principle demonstration. Week 2 of fluid unit. Teacher & student demonstrated. Show examples of Bernoulli's Principle and discus where this can be seen in the world and how it could be useful.

L) Specific Heat lab. Week 2 of temperature unit. Student conducted. Students will determine the specific heat of unknown objects using a calorimeter and multiple unknown materials.

V: EVALUATION

Grading Scale:

	Tests	40%
A = 100-90	Labs/Projects	20%
B = 89-80	Assignments	20%
C = 79-70	Quizzes	20%
D = 69-60		
F = 59 or less		

Testing: 40%

Quizzes: 20%

There will be chapter tests at the end of units as well as paper quizzes and online reading quizzes.

Assignments: 20%

Will be assigned two to three times a week and will contain vocabulary, calculations, as well as lab write ups. Spelling and grammar will be an important consideration in all written work.

Labs/Projects: 20%

These items show progressive assessment in a unit and a student's ability to apply knowledge to real situations.

Citizenship Grading Scale:

All citizen ship grades are based on the student's contribution to the classroom society.

Criteria for this grade include, but are not limited to, self control, respect, attitude, cooperation, preparedness, excellent attendance, and playing an active role in the classroom society.
Grades given: "O " – Outstanding performance, **"S"** – Satisfactory performance,
"N " – Needs Improvement, and **"U "** – unsatisfactory performance

The semester grade will be calculated with the following weighted averages.
Quarter 1/3 = 45%, Quarter 2/4 = 45%, Semester Exam = 10%
The school's integrity code is in effect for all assignments and tests