Course Title **ERHS**

Physics A/B (P)

Description of Target Group

This course is designed for students in the 11th and 12th grades who intend to pursue careers in Math, Engineering, or Science.

Prerequisites: The completion of Chemistry B, Algebra 2 and Geometry, all with a grade of C or better.

Purpose

To present an advanced study of the physical properties of matter and energy. The course is divided into five major units: Mechanics, Properties of Matter; Waves, Sound and Light, Electricity and Magnetism; and Modern Physics.

Standards of Expected Student Achievement

Upon completion of this course, students will be able to successfully able to demonstrate the following skills:

1. Identify various types of light sources.
2. Find an image in all types of mirrors, by ray tracing methods.
3. Identify incident and reflected rays.
4. Apply the laws of reflections.
5. Recognize virtual and real images.
6. Apply mirror formulae.
7. Use Snell's Law to predict the passage of light through a medium.
8. Determine the index of a material by the standard lab technique of ray tracing.
9. Predict the properties of an image formed by a lens configuration.
10. Calculate the critical angle experimentally and mathematically.
11. Qualitatively predict the dispersion of white light through a prism.
12. State a hypothesis and then verify that statement in nature.
13. Derive mathematical statements to support the above.
14. Set up mechanical analogs to study a phenomenon.
15. Discriminate between a model and reality.
16. Apply the law of superposition to two intersecting wave pulses.
17. Describe the reflected and transmitted (refracted) pulse as it travels from one medium to another.
18. Apply wave behavior to light.
19. Identify the characteristics of wave phenomenon.
20. Demonstrate the phenomenon of light with the ripple tank in accordance with the principles of wave theory.

21. Apply observations and theory to problems.
22. Construct wave front diagrams.
23. Calculate the wavelength of an unknown light source using a double slit experiment.
24. Apply Interference and Diffraction equations.
25. Identify a single slit or a double slit source by its projected pattern.
26. Graphic analysis of d-t, v-t, and a-t curves.
27. Calculation of d, v, and a from raw data.
28. Use of Equations of Motion.
29. Perform a dimensional analysis on any equation.
30. Compute the sine, cosine, and tangent of an angle.
31. Set up vector diagram and solve for the resultant by the trig method.
32. Vector analysis of motion involving forces.
33. Application of the equations of motion to free fall, projectile, or harmonic motion problems.
34. Application of circular motion relationships.
35. Solve Newton's equation for the gravitational force between two bodies.
36. Solve satellite motion and equilibrium problems.
37. Solve collision problems by applying momentum concepts.
38. Perform collision experiments with carts and air track and analyze the data.
39. Apply work-energy relationships to almost all types of motion problems.
40. Identify an elastic collision.
41. Compute the net force of a system and compute the work.
42. Analyze collisions.
43. Compute the area under a curve and equate it to the work.
44. Apply potential energy concepts to analyze energy problems.
45. Compute the energy equivalent in a problem.
46. Compute the work done in moving a body from one point to another in a potential field.
47. Apply kinetic and potential energy concepts to planetary motion.
48. Apply the techniques of charging by conduction and induction.
49. Determine the forces on two or more charged particles using Coulomb's Law.
50. Calculate the electric potential of a test charge in an electric field.
51. Apply Ohm's Law to resistive systems.
52. Define ampere and coulomb in terms of elementary charges.
53. Apply the laws of electromagnetic induction.

Instructional Materials

Text: Physics. Principles and Problems

Activities

Lectures, demonstrations, laboratory exercises, classroom discussion, problem sessions, video presentations, and computer activities.