HONORATO C. PEREZ SR., MEMORIAL SCIENCE HIGH SCHOOL

SCIENCE DEPARTMENT

**COURSE SYLLABUS**

Course Title: Physics 2 (Advanced Physics)

Schedule: Monday-Friday

Faculty: **Sonny P. De Leon**

Master Teacher I

Consultation Hours: By appointment

Office: Physics Laboratory Room

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**0915-299-4676**

**Course Description:** This is a course intended for fourth year science high school students. Coverage includes advanced concepts in physics.

**Course Objectives:** The main goal of this course is to provide students adequate knowledge in physics. It is hoped that students will appreciate such popular but counterintuitive topics in physics. In particular, the students should be able to

1. Describe how a mechanical wave is produced and how it transmits energy;
2. Differentiate between mechanical and electromagnetic waves, and among and transverse, longitudinal, and circular waves;
3. Define, relate, and calculate the following measures of a wave: wavelength, period, frequency, and amplitude;
4. Explain how speed of a wave in a medium relates to the elasticity, density, and temperature of the medium.
5. Calculate the speed of a wave in a medium;
6. Relate the power and intensity of a wave with its amplitude;
7. Describe the reflection of, and interference between mechanical waves;
8. Explain how standing wave is produced and solved problem on standing waves;
9. Calculate the speed of sound in a given medium;
10. Calculate the decibel level of a sound when given its intensity ;
11. Explain what the Doppler effect is and solve problems involving this phenomenon;
12. Relate the following properties of light: frequency, wavelength, energy and color;
13. Recognize that the speed of light in vacuum is constant;
14. Describe and cite applications of the following: dispersion, reflection, and refraction of light and total internal reflection;
15. Explain how the speed of light is affected by the medium it is moving through;
16. Use the laws of reflection and refraction to predict the path of light moving through different medium;
17. Describe the different types of mirror and lenses;
18. Describe the images formed by mirrors and lenses according to nature, orientation, and magnification;
19. Use the principles of geometric optics in tracing the path of light rays in forming images using mirror and lenses;
20. Explain using ray diagrams how an image is formed by a simple magnifier, a compound microscope, and a camera.
21. Compare the way the human eye works with how camera works;
22. Explain the different kinds of eyesight defects and how lenses correct these defects;
23. Explain how an object become electrically charge;
24. Define electric current, electric potential, electric potential energy, voltage, resistance, and electric power;
25. Explain how charges flow in a circuit;
26. Describe the relationships among current, voltage, resistance, and electric potential, electric potential energy, voltage, resistance, and electric power;
27. Explain how charges flow in a circuit;
28. Describe the relationships among current, voltage, resistance, and electric power;
29. Compute electrical energy consumption;
30. Draw diagrams of circuit;
31. Differentiate a series connection from a parallel connection;
32. Apply Ohm’s law and Kirchhoff’s circuit laws on solving problems on circuit;
33. Describe the basic electrical wiring setup at homes;
34. Describe some devices used for avoiding electrical overload;
35. Discuss some mechanism for preventing electrical shock;
36. Describe electrostatic interactions using the concepts of electrostatic force and electric field;
37. Apply Coulomb’s law on solving problem on electrostatic interactions;
38. Calculate the work done on moving charge and relate it to the electric potential energy and electrostatic potential of charge;
39. Calculate the electric potential at a point within electric field;
40. Discuss the ways of electromagnetic inductions;
41. Discuss the contributions of Oersted, Ampere, and Faraday to understanding electromagnetism;
42. Explain how magnetic fields interact and how these are applied in the design of transformers, motors, and generators;

**Course Requirements:**

**1st Grading**

**2ND Grading**

**3rd Grading**

**4th Grading**

**Grading System:**

Quarterly Test 25%

Performance (recitation, activities, worksheets) 35%

Assignment, seat works 10%

Project 20%

Quiz 10%

T O T A L 100 %

Course Outline:

The following topics with the corresponding activity/ies and requirements are presented below on a per quarter basis.

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| --- | --- | --- | --- |
| **Quarter** | **Topics** | | **Activities and Requirements** |
| 1ST Grading | | Introduction to the course and course requirements  What is Physics?  How should I study Physics?  Physics 1 Review ( Mechanics)  Waves   * What is a Wave? * Types of Waves * Measure of a Wave * Speed of a Wave in a medium * Intensity and Power of a Wave * Behavior of a Waves at Boundaries * Interference * Sound * Standing Wave * Characteristic Frequencies * Speed of Sound * Perception of Sound Waves * Intensity of a Sound   Physics Connection   * Doppler Effect   Physics Connection  Optics   * The Nature of Light * Dispersion * Reflection and Refraction * Total Internal Reflection * Polarization * Scattering of Light | Lecture  Oral-Response activity, Board works  Lecture  Worksheets  Laboratory works  Video Watching  Performance Tests  Research Work  Long quiz  Guided Discussion  Activity Work/Lab work  Worksheets  Video watching  Insight sharing  Board Works  Long Quiz  Lecture  Guided Discussion  Worksheets  Laboratory Works  Insight sharing  Long Quiz  Quarterly Test |
| 2nd Grading | | Geometric Optics and Optical Instruments   * Reflection and Refraction at a Plane Surface * Image Formation by a Plane Mirror * Focal Point and Focal Length * Reflection at a Spherical surfaces * Refraction at Spherical Surfaces * Thin Lenses * Properties of a Lens * The Lens maker’s Equation * Camera * The Eye * The Magnifier * Microscopes and Telescopes   Nuclear Physics   * A Century With radio activity, Alpha, Beta, Gamma | Lecture  Power Point Presentation  Laboratory works  Board Works  Research Work  Worksheets  Long Quiz  Performance Test  Guided Discussion  Lecture  Group Reporting  Research Work  Long Quiz |
| 3rd Grading | | Electric Charge and Electric Fields   * Electric Charge * Conductors, Insulators, and Induced Charges * Coulomb’s Law * Electric Field and Electric Forces * Electric-Field Calculations * Electric Field Lines   Electric Potential   * Electric Potential, Electric Potential Energy * Calculating Electric Potential   Capacitance and Dielectrics   * Capacitors and dielectrics * Capacitors in Series and Parallel * Energy storage in Capacitors and Electric Field Energy   Current, Resistance, and Electromotive Force   * Electric Current * Resistivity * Resistance * Electromotive Force and Circuits * Energy and Power in Electric Circuits   Direct-Current Circuits   * Resistors in Series and Parallel * Current Flow in a Circuit * Ohm’s Law * Kirchhoff’s Rules * Electrical Safety at Home | Guided Discussion  Lecture  Board works  Laboratory work  Worksheets  Insight Sharing  Long quizzes  Quarterly Test |
| 4th Grading | | Magnetic Field and Magnetic Forces   * Magnetism * Magnetic Field * Magnetic Field Lines and Magnetic flux * Motion of Charged Particles in a Magnetic Field * Applications of Motions of Charged Particles * Magnetic force on Current-Carrying conduct or   Sources of Magnetic Field   * Magnetic Field of a Moving Charge * Magnetic field of a current element * Magnetic Field of a Straight Current-Carrying Conductor * Force Between Parallel Conductors * Magnetic field of Circular Current Loop * Ampere’s Law * Application of Ampere’s Law * Magnetic Materials   Electromagnetic Induction   * Induction Experiments * Faraday’s Law * Lenz’s Law | Lecture  Guided Discussion  Worksheets  Board works  Performance Test  Long Quizzes  Performance Test  Quarterly Test |