PHYSICS - 442
COURSE SYLLABUS
Elective- 11,12

Purpose: This course is designed to prepare the student to pursue science courses at the college level.

Course Objective: This course covers the principles of mechanics, energy, electricity and magnetism, wave mechanics sound, light, optics, and atomic and nuclear physics. The course emphasizes problems and laboratory experiments to explore, demonstrate and extend the principles covered.

Unit Objectives:

Introduction ...This Unit is designed to introduce the student to the primary objectives of the course. The teacher and student will discuss classroom procedures, homework assignments with deadlines, and course grading requirements. Students will become familiar with laboratory safety procedures from a formal handout and understand the reasons for each safety procedure. The principles of investigation using the scientific method will be introduced and each student will be expected to use the scientific method in modified form for all investigative work.

Unit - Mechanics.....This unit introduces the student to the study of kinematics. The student will examine speed, velocity, acceleration, uniform circular motion, momentum and impulse. Discussion and examples will provide the student with the opportunity to relate these concepts to everyday occurrences. The student explores the applications of Newton's Three Laws as the basic explanation of motion in the world around us. The student will examine various forces in terms of mass, density, and motion. Calculation of center of gravity will be used to predict the path of the force generated motion of bodies under various everyday conditions.

Unit - Properties of Matter .....This unit builds on the student's understanding of the atom as the basic building block of matter to examine the principles of hydrostatics and buoyancy. The student examines area, volume, pressure, Archimedes Principle, and Pascal's Principle.

Unit IV - Sound and Light ..... This unit introduces the student to waves by examining the cyclic, mechanical motion of vibrations and the pendulum. Sound waves, harmonics and resonance lead the discussion of uses of waves in everyday life. Earthquakes and tsunami discussion conclude the basic investigation of wave mechanics with the wave equation. This unit extends the discussion of waves to the visible spectrum and examines the field of optics. The student examines the phenomena of refraction and reflection of electromagnetic energy in the visible range, discusses images formed in mirrors and examines the formation of colors in the form of light and pigments. The unit culminates with the study of the lens as used in both camera and human applications.

Unit - Electricity and Magnetism .....This unit is intended to introduce the student to the principles and laws of electricity. The student will discuss simple circuits, examine the relationship between voltage, current and resistance and apply Ohm's Law. Discussion of motors, generators and transmission of electricity will culminate in a discussion of a typical electrical distribution system in a home.

Unit - Atomic and Nuclear Physics .....This unit introduces the student to the Quantum Theory of Physics by discussing the models of the atom and light in the form of photons. The student will examine the lines seen in atomic spectra and explain the relationship of atomic spectra lines to the currently accepted models of atomic structure. The student will compare nuclear forces to electrical forces and examine the three types of rays emitted by radioactive nuclei. Discussion of different types and uses of radioactive isotopes, and naturally occurring background radiation will be related to the student's environment. Examination of the role of Nuclear Fission and Fusion as past, current and future sources of energy will be discussed.

CURRICULUM

Text: Zitzewtiz, Paul & Robert Neff, PHYSICS-Principles & Problems, Glencoe/Macmillan/McGraw-Hill, 2002, New York

Unit I Mechanics

Chapter 1 Physics?

Chapter 2 A Mathematical Toolkit
2.1 The Measure of Science
2.2 Not All is Certain
2.3 Displaying Data

Chapter 3 Describing Motion
3.1 Picturing Motion
3.2 Where & When
3.3 Velocity & Acceleration

Chapter 4 Vectors
4.1 Properties of Vectors
4.2 Components of Vectors

Chapter 5 Math Model of Motion
5.1 Graphing Motion - One Dimension
5.2 Graphing velocity - One Dimension
5.3 Acceleration
5.4 Free Fall

Chapter 6 Forces
6.1 Force & Motion
6.2 Using Newton's Laws
6.3 Interaction Forces

Chapter 7 Forces & Motion -Two Dimensions
7.1 Forces in Two Dimensions
7.2 Projectile Motion
7.3 Circular Motion

Chapter 8 Universal Gravitation
8.1 Motion In The Heavens and On Earth
8.2 Using The Law of Universal Gravitation

Chapter 9 Momentum and Its Conservation
9.1 Impulse and Change in Momentum
9.2 The Conservation of Momentum

Chapter 10 Work, Energy, and Simple Machines
10.1 Work and Energy

Chapter 11 Energy
11.1 Energy In Its Many Forms
11.2 Conservation of Energy

Unit II States of Matter

Chapter 13 States of Matter
13.1 Pascal's Principle & Archimedes Principle
(Hydrostatic pressure and buoyancy)

Unit III Waves and Light

Chapter 14 Waves and Energy Transfer
14.1 Wave Properties
14.2 Wave Interference

Chapter 15 Sound
15.1 Properties of Sound
15.2 The Sound of Music

Chapter 16 Light
16.1 Light Fundamentals
16.2 Light and Matter

Chapter 17 Reflection and Refraction
17.1 How Light Behaves at a Boundary
17.2 Applications of Reflected and Refracted Light

Chapter 18 Mirrors
18.1 Mirrors
18.2 Lenses

Unit IV Electricity

Chapter 20 Static Electricity
20.1 Electrical Charges
20.2 Electrical Forces

Chapter 22 Current Electricity
22.1 Current and Circuits
22.2 Using Electrical Energy

Chapter 23 Series and Parallel Circuits
23.1 Simple Circuits
23.2 Applications of Circuits

Chapter 24 Magnetic Fields
24.1 Magnets: Permanent and Temporary
24.2 Forces Caused by Magnetic Fields

Chapter 25 EM Induction
25.1 Elec Current & Changing Magnetic Fields
25.2 Changing Magnetic Fields & EMF

Chapter 26 Electromagnetism
26.1 Interaction Elec & Magnetic Fields
26.2 Elec & Magnetic Fields in Space

Unit V Modern Physics

Chapter 27 Quantum Theory
27.1 Waves Behave Like Particles
27.2 Particles Behave Like Waves

Chapter 28 The Atom
28.1 The Bohr Model
28.2 The Present Model of the Atom

Chapter 30 The Nucleus
30.1 Radioactivity
30.2 The Building Blocks of Matter

Chapter 31 Nuclear Applications
31.1 Holding the Nucleus Together
31.2 Using Nuclear Energy

COURSE SCHEDULE -

Cycle	Physics 442	P-Day:
1	Intro, C 1, 2	Aug Q1
2	Ch 3	Sep
3	Ch 4	Sep I
4	Ch 5	Oct
5	Ch 6	Oct
6	Ch 7	Oct Q2
7	Ch 8	Nov
8	Ch 9	Nov
9	Ch 10, 11	Dec
10	Ch 13	Dec
	Exams	Jan
11	Ch 14	Jan Q3
12	Ch 15	Jan
13	Ch 16	Feb
14	Ch 17	Feb
15	Ch 18	Mar
16	Ch 20	Mar
17	Ch 22	Mar Q4
18	Ch 23	Apr
19	Ch 24	Apr
20	Ch 27, 28	May
21	Ch 29, 30	May
22	Review	May
	Exams	June