**Course Descriptions – Physics**

This class is a survey class covering the basics of classical physics: mechanics, heat, light, sound, electricity, and magnetism. The class is a combination of lecture, application problems, hands-on demonstration, and laboratory work. We will also do computer simulations of physics principles using Yenka software. Text: Holt Physics (2000 ed), Raymond A. Serway and Jerry S. Faughn.

**Physics A (Trimester 1)**

Unit 1 **Introduction to Physics.** Scientific method. SI Units. Measurement and uncertainty. Interpretation of data.

Unit 2 **Motion in One Dimension.** The relationship between displacement, velocity and acceleration. Free fall.

Unit 3 **Motion in Two Dimensions.** Vectors. Projectile motion. Relative motion.

Unit 4 **Forces and the Laws of Motion.** Newton’s three laws of motion.

Unit 5 **Work and Energy.** Definition of work. Kinetic energy. Potential energy. Conservation of energy.

Unit 6 **Momentum.** Conservation of momentum, inertia, and Newton’s third law. Elastic and inelastic collisions.

Unit 7 **Rotational Motion.** Angular displacement, velocity and acceleration. Centripetal force. Newton’s universal law of gravitation.

Unit 8 **Rotational Dynamics.** Torque. Lever arms. Center of mass. Angular momentum. Simple machines. Mechanical advantage.

**Physics B (Trimester 2)**

Unit 9 **Fluid Dynamics.** Buoyant force and Archimedes’ principle. Forces within a fluid. Pascal’s principle. Fluid flow and Bernoulli’s equation. Ideal gases.

Unit 10 **Heat.** Temperature and kinetic energy. Thermal expansion. Mechanisms of heat transfer.

Unit 11 **Thermodynamics.** Thermal processes. Laws of thermodynamics. Heat engines.

Unit 12 **Vibrations and Waves.** Simple harmonic motion. Frequency, period. Transverse and longitudinal waves. Constructive and destructive interference. Standing waves.

Unit 13 **Sound.** Frequency and pitch. Propagation of sound waves. Sound intensity, decibel level. Harmonics. Vibrating strings and pipes.

Unit 14 **Light and Reflection.** Electromagnetic radiation. Speed of light. Wave properties of light. Reflection. Plane and spherical mirrors. Additive and subtractive colors. Polarization.

Unit 15 **Refraction.** Transmission of light across media boundaries. Snell’s Law. Properties of thin lenses. Total internal reflection.

Unit 16. **Interference and Diffraction.** Coherent light waves. Additive and subtractive interference. Single and double slit interference. Diffraction gratings. Lasers.

**Physics C (Trimester 3)**

Unit 17. **Electric Forces and Fields.** Electric charge. Coulomb’s Law. Electric field strength. Electrostatic equilibrium.

Unit 18. **Electric Energy and Capacitance.** Electric potential. Electrical potential energy. Potential difference. Capacitance and stored energy.

Unit 19 **Current and Resistance.** Properties of electric current. Resistance and Ohm’s Law. Electric power.

Unit 20 **Circuits and Circuit Elements.**  Simple circuits diagrams. Kirchoff’s rules for calculating current and potential difference in circuits.

Unit 21 **Magnetism.** Basic properties of magnetic materials. Magnetic fields. Force on a charge due to a magnetic field.

Unit 22 **Induction.** Induced currents. Lenz’s Law. Faraday’s Law of induction. Electric motors and generators. Transformers.