Physics 1 Syllabus Text: W. Thomas Griffith, *The Physics of Everyday Phenomena*, 5th Ed., 2007

One-Dimensional Motion

Motion at constant speed Definition and distinction of terms Graphical description of motion Algebraic description of motion Free fall

Vectors and two-dimensional motion Vectors and scalars Graphical addition of vectors Trigonometric addition of vectors Projectile motion

Statics and Forces

Newton's First and Third Laws Inertial coordinate system Static equilibrium and free-body diagrams Mass and Weight Friction and Normal Forces Spring force

Torque and Rotational Equilibrium Fulcrum and Lever-arm Rotational equilibrium Center of mass

Dynamics

Newton's Second Law Multiple Body Problems Elevators

Circular motion

Centripetal acceleration Required centripetal force Uniform circular motion Vertical circles Universal gravity and satellite motion Kepler, angular momentum and ice skaters

Impulse and Momentum

Newton's Second Law Revisited Impulse and linear momentum in one-dimension Conservation of momentum Elastic and Inelastic collisions Momentum in two dimensions Work and Energy Work Work and Kinetic Energy Power Gravitational Potential Energy Elastic Potential Energy Conservation of Energy Static electricity Electric charge, electroscopes, induction and conduction Insulators, conductors and conservation of charge Coulomb's Law Fields, field lines and electric field Dipoles and capacitors **Electrical potential** Work and PE in gravitational and electrical fields Field lines and equipots Electric potential — concept and formula Electron-volt Parallel plate capacitors — field and potential Simple Harmonic Motion Spring force and potential energy revisited Observable properties and required conditions for SHM Analogy to uniform circular motion Position, velocity and acceleration Period, frequency and amplitude; trig notation Simple pendulum Other oscillations — physical pendulum, torsional, damped Waves and Sound Waves in nature, types and purpose of waves Wave pulses on a string Principle of superposition, interference Standing waves, resonance, beats Speed, frequency and wavelength Intensity of sound; response of the ear Doppler effect **Geometric Optics** Reflection Plane mirrors, real and virtual images Spherical and Parabolic mirrors Refraction Snell's Law and index of refraction Lenses Combination optics and vision

Physical Optics and Electromagnetic Waves Nature of light; atomic emission Types of em waves Reflection and refraction revisited Apparent depth, fish-eye lens and total internal reflection Interference, diffraction and Young's double-slit experiment Diffraction grating and rainbows Thin film effects Scattering and polarization Intensity of light

Current electricity

Current, potential and resistance Analogies — water in pipes, traffic Batteries, switches and bulbs Resistance and resistivity Ohm's Law and electric power Resistors in combination, equivalent circuits Kirchoff's laws Ammeters, voltmeters and galvanometers

Magnetism

Magnets, compasses and the earth Magnetic materials, domains and poles Magnetic field and right-hand-rule Magnetic force on a moving charge — mass spec and TV Magnetic force on a current — motor effect Magnetic field of a wire and solenoid — right-hand-rule Force between two wires

Electromagnetic induction

Motional emf in a moving wire Generator effect Flux, Faraday's law and Lenz's Law Transformers