

# Physics Class Syllabus

- I. Introduction:
  - A. Study Methods
  - B. The Scientific Method
  - C. SI units
  - D. Conversions, measurements and mathematical recording
  
- II. Linear Motion
  - A. Speed, velocity and acceleration
  - B. Free fall
  - C. Air resistance and falling objects
  
- III. Projectile Motion
  - A. Vector and Scalar Quantities
  - B. Vector problems
  - C. Rockets and Satellites
  
- First Test
  
- IV. Law of Inertia
  - A. Ancient views of earth and the heavens
  - B. Galileo
  - C. Mass
  - D. Net force and equilibrium
  
- V. Acceleration
  - A. Newton's second law
  - B. Friction
  - C. Pressure
  - D. Free fall and air resistance
  
- VI. Newton's 3<sup>rd</sup> law
  
- VII. Momentum
  - A. Impulse
  - B. Conservation of momentum
  - C. Collisions
  - D. Momentum vectors
  
- VIII. Energy and Work
  - A. Work
  - B. Power
  - C. Mechanical, Potential and Kinetic energy
  - D. Machines

Second test

- IX. Circular motion and center of gravity
  - A. Rotation
  - B. Centripetal and centrifugal forces
  - C. Center of gravity
  - D. Balance
  
- X. Rotational Mechanics and Gravitation
  - A. Torque
  - B. Universal gravitation law
  - C. Planetary movement
  - D. Tides
  - E. Black holes
  
- XI. Space and special relativity

3<sup>rd</sup> Test

- XII. Atomic nature of matter
  - A. Evidence for atoms
  - B. Atomic structure
  - C. Elements molecules and compounds
  - D. Phases of matter
  - E.
- XIII. Solids, liquids and gases
  - A. Crystal structure
  - B. Elasticity compression and tension
  - C. Liquids pressure and buoyancy
  - D. Pascal's Principle
  - E. Gases
  - F. Boyle's law
  - G. Bernoulli's Principle

4<sup>th</sup> Test

- XIV. Atomic Theory
  - A. Photoelectric effect and the quanta
  - B. Duality of nature
  
- XV. Atomic nucleus
  - A. Radioactive decay
  - B. Isotopes and Half-Life
  - C. Transmutation
  - D. Carbon and Uranium dating
  - E. Radioactive tracers

- XVI. Fission and Fusion
  - A. Fission
  - B. Fusion

5<sup>th</sup> Test

- XVII. Heat, Temperature and Expansion
  - A. Thermal energy and molecular movement
  - B. Specific heat
  - C. Special properties of water

- XVIII. Heat Transfer
  - A. Conduction, Convection and Radiation
  - B. Absorption and Emission
  - C. Newton's Law of cooling
  - D. Global warming

- XIX. Change of Phase
  - A. Evaporation and condensation
  - B. Boiling, freezing and sublimation
  - C. Energy changes

- XX. Thermodynamics
  - A. Absolute zero
  - B. 1<sup>st</sup> and 2<sup>nd</sup> laws of thermodynamics
  - C. Heat engines
  - D. Entropy

6<sup>th</sup> Test

- XXI. Vibrations and Waves
  - A. Pendulum motion
  - B. Transverse and longitudinal waves
  - C. Interference
  - D. Doppler Effect

- XXII. Sound
  - A. Media
  - B. Speed of Sound
  - C. Resonance
  - D. Interference and beats
  - E. Musical instruments

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- XXIII. Light
- A. Speed of light
  - B. Electromagnetic waves
  - C. Opaque, translucent and transparent
  - D. Polarization

- XXIV. Color
- A. Spectrum
  - B. Complimentary colors
  - C. Pigments
  - D. Atomic spectra
  - E. The eye

- XXV. Reflection and Refraction
- A. Law of reflection
  - B. Refraction and prisms
  - C. The rainbow

- XXVI. Lenses
- A. Convergent and divergent lenses
  - B. Glasses

- XXVII. Diffraction and interference
- A. Interference
  - B. Lasers and Holograms

7<sup>th</sup> Test

- XXVIII. Electrostatics
- A. Charge
  - B. Coulomb's law
  - C. Electrical fields and potential
  - D. Grounding and shielding

- XXIX. Electric Current
- A. Current
  - B. Voltage sources
  - C. Ohm's law
  - D. DC and AC
  - E. Electrical Power

- XXX. Circuits
- A. Battery and bulb
  - B. Parallel and series circuits
  - C. Electric power

8<sup>th</sup> Test

XXXI. Magnetism

- A. Poles
- B. Motors

XXXII. Electromagnetic Induction

- A. Faraday's Law
- B. Generators
- C. Transformers

XXXIII. The car

- A. 4 Cycle engine
- B. Electrical system
- C. Cooling system
- D. Tires, drive and steering
- E. Integration

9<sup>th</sup> Test