

# ADVANCED PLACEMENT PHYSICS

## COURSE OUTLINE AND ASSIGNMENTS

### TEXT - PHYSICS 3RD EDITION BY GIANCOLI

#### CHAPTER 2: Speed, units, velocity and acceleration.

Assigned reading:

- 2.1 Speed
- 2.2 Reference frames
- 2.3 Units of measure
- 2.4 Average velocity and displacement
- 2.5 Instantaneous velocity
- 2.6 Vectors and scalars
- 2.7 Acceleration
- 2.8 Uniform acceleration
- 2.9 Problem solving
- 2.10 Falling bodies
- 2.11 Graphical analysis

Assigned questions p37+: 2,3,4,5,6,7,9,10,11,12,13,14,15

Assigned problems p38+:

- 1,2,3,5,7,9,10 Speed and velocity
- 13,15 Acceleration
- 17,18,19,20,21,22,23,27,28 Uniform acceleration
- 30,31,32,33,34,37,38,41,42,43,45,46 Freefall - 1 dimension.
- 47,48,49,50,52,53,55,56 Graphing
- 58,59,61,62 General problems

Assigned lab: Measure the displacement, velocity and acceleration of a freefalling object.

#### QUIZ ON CHAPTER 2: ONE DIMENSIONAL MOTION

#### CHAPTER 3: Kinematics in two dimensions

Assigned reading:

- 3.1 Vector addition - graphical
- 3.2 Vector subtraction and multiplication
- 3.3 Vector addition - component method
- 3.4 Relative velocity
- 3.5 Projectile motion - 2 dimensions
- 3.6 Solving projectile problems

Assigned questions p60: 1,2,3,4,6,7,8,9,10,11,12,14

Assigned problems p60+:

- 1,2,9,12,13,14,15,16 Vectors
- 19,20,21,22,23,25,26,27,28,29,30,31,32,33 Relative velocities
- 34,35,36,37,39,40,41,45,46,47,48 Projectile motion
- 51,53,54,55,57,59,60 General problems

Assigned lab: Measure the range of a 2 dimensional projectile.

#### QUIZ ON CHAPTER 3: TWO DIMENSIONAL MOTION

#### CHAPTER 4: Newton's Laws of Motion and friction

Assigned reading:

- 4.1 Force
- 4.2 Newton's First Law of motion
- 4.3 Mass vs weight
- 4.4 Newton's Second Law of motion
- 4.5 Laws vs equations
- 4.6 Newton's Third Law of motion
- 4.7 Weight - force of gravity
- 4.8 Applications of Newton's Laws
- 4.9 Force of friction and inclined planes
- 4.10 Solving problem techniques

Assigned questions p91: 2,3,4,7,8,9,10,12,13,14,18,20,21,23,24

Assigned problems p92+:

- 1,2,3,5,6,7,8,9,10,11,13,15,16,17 Newton's Second Law
- 19,20,21,23,24,26,29,31 Force of friction
- 32,33,34,35,36,39,40,41,42,44,46,47,50,51,52 Newton's Laws of motion
- 54,55,56,57,61,63 General problems

Assigned lab: Verify Newton's Second Law of motion on air track.

#### QUIZ ON CHAPTER 4: NEWTON'S LAWS OF MOTION

#### CHAPTER 5: Centripetal force, universal gravitation and satellite

Assigned reading:

- 5.1 Centripetal force and acceleration
- 5.2 Dynamics of Uniform circular motion
- 5.5 Universal gravitation
- 5.6 Earth's gravity
- 5.7 Satellite motion
- 5.9 Kepler's Laws
- 5.10 Forces in nature

Assigned questions p119+: 1,2,5,7,9,10,12,14,15,16,17

Assigned problems p120+:

- 1,2,3,4,5,6,7,8,10,11,14,15,16 Centripetal force and acceleration
- 21-32,34,35,36,37,39 Universal gravitation and satellite motion
- 45,47 Kepler's Laws
- 52,56,57,60,61,62 General

Assigned lab: Measure the centripetal force on a spinning stopper.

#### QUIZ ON CHAPTER 5: CENTRIPETAL FORCE AND GRAVITATION

#### CHAPTER 6: Work, power and energy

Assigned reading:

- 6.1 Work done by a constant force
- 6.2 Work done by a varying force
- 6.3 Kinetic energy
- 6.4 Potential energy and Hooke's Law
- 6.5 Conservative forces - Work-Energy Theorem
- 6.6 Other forms of energy
- 6.7 Conservation of energy
- 6.8 Problem solving with energy conservation
- 6.9 Dissipative forces
- 6.10 Power
- 9.5 Simple machines

Assigned questions p143+: 2,3,4,5,6,8,9,11,15,19,22,23

Assigned problems p144+:

- 1,3,5,6,9 Work done by constant force
- 13,14,15 Work done by varying force
- 17-19,21,23,25,27 Kinetic energy (KE)
- 28,29,30,31 Potential Energy
- 33,34,35,36,37,39,41,43 Energy conservation
- 46,47,49,51,53,55 Power
- 57,58,59,62,63,65 General

Assigned lab: Use Hooke's Law to verify energy conservation

#### QUIZ ON CHAPTER 6: WORK, POWER AND ENERGY

#### CHAPTER 7: Momentum and its conservation

Assigned reading:

- 7.1 Momentum and impulse
- 7.2 Conservation of momentum
- 7.3 Collisions and impulse
- 7.4 Energy and momentum in collisions
- 7.5 Elastic collisions - 1 dimension
- 7.6 Elastic collisions - 2 dimensions
- 7.7 Inelastic collisions
- 7.8 Center of mass collisions

Assigned questions p167+: 1-6,9,10,11,12,13,20

Assigned problems p168+:

- 1,4,5,7,9,12 Momentum
- 13,14,15,16,17 Impulse
- 19,20,21,24 Elastic collisions
- 25,26,27,28,29 Momentum collisions - 2 dimensions
- 31,33,34,36,38 Inelastic collisions
- 40,48,49 Center of mass
- 52,56,58,61 General

Assigned lab: Verify the conservation of momentum on an air track.

#### QUIZ ON CHAPTER 7: MOMENTUM AND ITS CONSERVATION

## CHAPTER 8: Rotational motion and torque

Assigned reading:

- 8.1 Radians and angular quantities
- 8.2 Angular equations
- 9.3 Torque and rotational equilibrium
- 9.2 Conditions for rotational equilibrium
- 8.3 Problems involving opposing torques equal
- 8.4 Torque and rotational inertia
- 8.5 Problem solving
- 8.6 Rotational kinetic energy and conservation
- 8.7 Angular momentum and its conservation
- 8.8 Vector direction of rotational motion
- 8.9 Gyroscopic motion
- 8.10 Inertial frames of reference
- 8.11 Coriolis force

Assigned questions p197+: 3,5,8,11,13,14,17,18,21,25

Assigned problems p230+: 4,5,7,10,11,14,15,16,18,21,22,23,62,64,68,72,73  
Torques at equilibrium

Assigned problems p199+:

- 3,4,5,7,8,10,11,12,13 Angular quantities
- 15,16,17,18,21 Angular acceleration
- 23,24,25,26 Torque
- 27,28,30,31,33,35 Moment of inertia and Newton's Second Law
- 40,42,43,44,45 Rotational energy and work
- 47,48,49,50,51,53 Angular momentum conservation
- 55,63,66,68,71,74 General problems

Assigned lab: Verify rotational equations for acceleration bicycle wheel.

### TEST ON CHAPTER 8: ROTATIONAL MOTION

## CHAPTER10: Fluid statics and dynamics

Assigned reading:

- 9.7 Elasticity; Stress and Strain
- 10.1 Density and specific gravity
- 10.2 Pressure within a fluid
- 10.3 Absolute and gauge pressure
- 10.4 Pascal's Principle
- 10.5 Pressure measurement
- 10.6 Buoyancy and Archimede's principle
- 10.7 Fluids in motion - continuity
- 10.8 Bernoulli's equation
- 10.9 Applications of Bernoulli's equation
- 10.10 Viscosity
- 10.11 Flow in tubes
- 10.12 Sedimentation and drag
- 10.13 Surface tension and capillary action

Assigned questions p268+:

- 2,3,5,6,7,8,9,10,11,13,15,18,20,21,24,26,27,29,31,32

Assigned questions p234+:

- 44-47 Elasticity; Stress and Strain

Assigned problems p269+:

- 2,3,4 Specific gravity
- 5,6,7,9,10,11,12 Pascal's principle
- 19,20,21,22,23,24 Archimede's principle
- 31,32,33,34,35,37 Bernoulli effect
- 40,42,45,47,49 Flow through tubes
- 54,55,57,59 Surface tension
- 65,68,72,73,74,75,77 General problems

Assigned labs: Measure the density and specific gravity of a solid.

Make and calibrate an open ended manometer.

Test the Bernoulli equation in a wind tunnel.

Test the equation of continuity in a wind tunnel.

## CHAPTER 13: Temperature and kinetic theory

Assigned reading:

- 13.1 Atomic structure
- 13.2 Temperature
- 13.3 Thermal expansion
- 13.4 Thermal stress
- 13.5 Gas laws and absolute temperature
- 13.6 Ideal gas law
- 13.7 Molecular motion and the ideal gas law
- 13.8 Kinetic theory and temperature
- 13.9 Distribution of molecular speeds
- 13.10 Real gases and phase transitions
- 13.11 Vapor pressure and humidity
- 13.12 Diffusion of gases and kinetic theory

Assigned questions p365+: 4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,20

Assigned problems p366+: 2,3,4,5 Temperature measurement

- 6,8 Linear thermal expansion
- 19 Thermal stress
- 21,22,23 Kelvin scale
- 24,25,26,27,28,29,30,31,33 Gas laws
- 34,35,36 Ideal gas law
- 37,38,39,40,41 Kinetic theory of gases
- 64,65,68,69,71,72,75 General problems

Assigned lab: Measure absolute zero.

### QUIZ ON CHAPTERS 10 & 13: PRESSURE, TEMPERATURE & KINETIC THEORY

## CHAPTER 14: Heat and its transfer

Assigned reading:

- 14.1 Heat as energy transfer
- 14.2 Heat vs temperature
- 14.3 Internal energy of a gas
- 14.4 Specific heat
- 14.5 Solving problems involving specific heat
- 14.6 Latent heat
- 14.7 Heat transfer - conduction
- 14.8 Heat transfer - convection
- 14.9 Heat transfer - radiation

Assigned questions p387+:

- 1,3,4,5,6,7,9,10,11,12,13,14,15,16,17,18,19,20,21,25

Assigned problems p388+:

- 1,3,5,6 Heat generation
- 7,8,9,11,12,13,14,15,16,17 Heat and specific heat
- 18,20,21,22,23,24 Latent heat
- 26,29,33 Heat transfer
- 35,36,37,46,47 General problems

Assigned labs: Measure the specific heat of a substance

Measure the rate of heat conduction through a solid

## CHAPTER 15: The Laws of Thermodynamics

Assigned reading:

- 15.1 First Law of Thermodynamics
- 15.2 Applications of the first law
- 15.4. Second Law of Thermodynamics
- 15.5 Heat engines and refrigerators
- 15.6 Entropy and the Second Law of Thermodynamics
- 15.7 Order to disorder
- 15.8 Heat death
- 15.11 Thermal pollution

Assigned questions p412+: 2,3,4,5,6,7,9,10,11,14,15,16,17,18,19,20,21,22,23

Assigned problems p413+:

- 1,3,4,5,6,7,8 First law of thermodynamics
- 12,13,14,15,16,17,18 Thermal efficiency
- 20,21,23,24,25,26 Entropy changes
- 33,36,37,38,39,41,43,45 General problems

### TEST ON CHAPTERS 13-15: HEAT AND THERMODYNAMICS

## CHAPTER 11: Simple Harmonic motion (SHM) and wave properties

Assigned reading:

- 11.1 Introduction to simple harmonic motion (SHM)
- 11.2 Energy in SHM
- 11.3 SHM and rotation
- 11.4 The simple pendulum
- 11.5 Damped harmonic motion
- 11.6 Forced vibrations - resonance
- 11.7 Wave motion
- 11.8 Types of waves
- 11.9 Energy transmission in waves
- 11.10 Identifying characteristics of waves
- 11.11 Standing wave patterns - resonance

Assigned questions p302+: 1,2,3,6,8,9,10,11,16,17,23,25,27

Assigned problems p303+:

- 1,4,7,8,9,11,13,14,17,18 Simple harmonic motion
- 23,24,25,26,27 Simple pendulum
- 29,30,31,34,36 Wave properties
- 38,39 Wave energy
- 43,44,45 Wave refraction
- 48,49,50,51,52,53,54 Laws of strings
- 61,62,63,64,67,71 General problems

Assigned labs: Determine the relationship between the period of a simple pendulum and its physical properties.

Measure the resonant frequency of a standing wave on a string.

## CHAPTER 12: Sound and its wave characteristics

Assigned reading:

- 12.1 Characteristics of sound
- 12.2 Intensity of sound - decibels
- 12.3 Intensity, amplitude and pressure
- 12.4 The human ear and hearing response
- 12.5 Vibrating strings and air columns
- 12.6 Sound quality
- 12.7 Interference of sound - beats and resonance
- 12.8 Doppler effect
- 12.9 Sonic booms

Assigned questions p333+: 1,2,5,6,7,12,16

Assigned problems p334+: 1,3 Speed of sound waves

- 4,5,6,7,8,9,11 Sound intensity - decibels
- 13,15 Intensity of sound waves
- 22-24 Range of human hearing
- 21,22,23,24,25,26,28,29,31 Resonance in strings and tubes
- 33,34,35,36,37,40 Interference of sound waves - beats
- 42,43,44,45,46 Doppler effect
- 55,56,57,59,60,61,63,65,66 General problems

Assigned labs: Measure the speed of sound.

Measure the frequency of a sound wave with an oscilloscope.

Measure the wavelength of a sound with a resonant tube.

Demonstrate the the speed of a sound wave is equal to the product of frequency and wavelength.

### TEST ON CHAPTER 11 & 12: WAVES, WAVE PROPERTIES, AND SOUND AS A WAVE

## CHAPTER 22-23: Light as a wave

Assigned reading:

- 22.3 Production of Electro-magnetic waves
- 22.4 Speed of EM waves
- 22.5 Electromagnetic spectrum
- 22.7 Radio and TV waves
- 23.1 Ray model of light
- 23.2 Speed of light and index of refraction
- 23.3 Reflection of light
- 23.4 Images and spherical mirrors
- 23.5 Refraction of light - Snell's Law
- 23.6 Total internal reflection
- 23.7 Thin lenses - ray tracing
- 23.8 Lens equation
- 23.9 Lenses and problem solving
- 23.10 Lens maker's equation

Assigned questions p615+:

- 2,3,4,5,7,9,11,12,13,14,15,16,17,19,20,21,22,23,26,27,29

Assigned problems p616+:

- 1-3,5 Speed of light
- 7,9 Plane mirrors
- 13,14,15,16,17,19,22,24 Concave and convex mirrors
- 25,26,27,28,29,31 Refraction of light rays
- 33,32,34,37 Critical angle
- 39,40,41,42,43,44,45,47,49,50 Lenses and ray diagrams
- 54,55,57,58,59 Lensmaker's equation
- 61,62,64,67,71 General

Assigned labs: Verify Snell's Law for light.

Verify the law of reflection.

Verify the mirror equation for concave and convex mirrors.

Verify the lens equation for concave and convex lenses.

## TEST ON CHAPTER 22-23: REFLECTION AND REFRACTION OF LIGHT

## CHAPTER 24: Interference, diffraction and polarization of light

Assigned reading:

- 24.1 Waves vs particles
- 24.2 Huygens' Principle and refraction
- 24.3 Double slit interference
- 24.4 Dispersion of light
- 24.5 Single slit diffraction
- 24.6 Diffraction grating
- 24.8 Interference of thin films
- 24.9 Michelson Interferometer
- 24.10 Polarization of light
- 24.11 Optical activity
- 24.12 Double refraction and birefringence
- 24.13 Scattering of light
- 25.1 The camera
- 25.2 Human eye and corrective lenses
- 25.3 Magnifying lenses
- 25.6 Lens aberrations
- 25.8 Telescopes

Assigned questions p649+:

- 2,3,4,5,6,9,10,11,12,14,15,16,17,19,20,21,23,25,26,27,30,31

Assigned problems p650+:

- 2,3,4,5,6,7,8 Double slit interference
- 12,13,14 Dispersion
- 16,17,18,19,20,21 Single slits
- 23,24,25,26,27,28,29 Diffraction gratings
- 33,34,36,37,38 Thin film interference
- 47,48,49,50,51,53 Polarization of light
- 60,61,65,67 General problems

Assigned problems p682+:

- 1,2,3,7 Cameras and aperture
- 9,10,11,12,14,15 Eyes and corrective lenses
- 16,17,17 Simple magnifiers
- 22,23,24,25,26 Telescopes

Assigned labs: Measure single and double slit interference patterns.

Measure the wavelength of light with a diffraction grating.

Use interference to measure the thickness of a thin film.

Measure Brewster's angle for light reflected from a glass surface.

Measure the angle of rotation for polarized light passing through an optically active material.

## TEST ON CHAPTER 24-25: INTERFERENCE, DIFFRACTION ETC.

## CHAPTER 27: Light - wave or particle?

Assigned reading:

- 26.2 Michelson-Morley Interferometer
- 27.1 Max Planck and blackbody radiation
- 27.2 Einstein's photoelectric effect
- 27.4 Wave-particle duality
- 27.5 Momentum of light
- 27.10 The de Broglie hypothesis
- 28.3 Heisenberg Uncertainty
- 28.4 Probability vs determinism

Assigned questions p744+: 1,2,3,4,5,6,7,9,12,13,14,15,16,18,19

Assigned problems p744+: 2 Blackbody radiation

- 4,5,6,7,8,9,10,11,12,13,14 Photoelectric effect
- 16,17,18,19 Pair production
- 20,21,22,23 Matter waves

## TEST ON CHAPTER 27-28: WAVE-PARTICLE DUALITY OF LIGHT

## CHAPTER 16: Electrostatic forces and fields

Assigned reading:

- 16.1 Static electric charge
- 16.2 The atom and charge
- 16.3 Insulators and conductors
- 16.4 Induced charge -electroscope
- 16.5 Coulomb's Law
- 16.6 Vector solutions to Coulomb's Law
- 16.7 Electric fields
- 16.8 Lines of electric force
- 16.9 Electric fields and conductors

Assigned questions p436+: 1,2,3,4,5,7,10,11,13,16,17,18,21

Assigned problems p437+:

- 1,2,3,4,5,7,9,11,12,13 Static charges and Coulomb's Law
- 14,15,16,17,18,20,21,22,25,26,27,28 Electric fields
- 31,32,33,34,35,37,41 General problems

## CHAPTER 17: Electrostatic potential and capacitors

Assigned reading:

- 17.1 Electrostatic potential and potential difference
- 17.2 Electrostatic potential and electric fields
- 17.3 Equipotential lines
- 17.4 The electron volt
- 17.5 Radial electrostatic potential
- 17.7 Capacitors and capacitance
- 17.8 Dielectrics
- 17.9 Energy stored in electric fields

Assigned questions p455+: 1,2,3,5,6,7,8,9,10,13,16,18,19

Assigned problems p456+:

- 1,2,3,4,5,6,8,9,10 Electrostatic potential
- 11,12,13,14,15 Potential and point sources
- 22,23,24,25,26,27,29,30,31,32 Capacitors and capacitance
- 33,34,35,36,37 Energy stored in capacitors
- 39,41,42,45,46,47,50 General problems

Assigned labs: Measure the capacitance of a parallel plate capacitor.

## TEST ON CHAPTERS 16 & 17: ELECTRIC FIELDS, POTENTIALS AND CAPACITANCE

## CHAPTER 18: Electric currents and Ohm's Law

Assigned reading:

- 18.1 Current and batteries
- 18.2 Electric current
- 18.3 Ohm's Law
- 18.4 Resistivity and conductivity
- 18.5 Superconductivity
- 18.6 Electrical power
- 18.7 AC electricity

Assigned questions p476+: 1,2,3,4,7,10,11,12,13,14,15,16,17

Assigned problems p477+:

- 1,2,4,5,6,7,8,9 Current flow and electrons
- 10,11,12,16,18 Resistance of wires - resistivity
- 20,21,22,23,24,25,26,27,28,29,30,31,32 Electrical power
- 33,34,35,36,37,38,39 AC electricity
- 44,45,46,49,50,51,52,54,55,57,58 General problems

## CHAPTER 19: Series and parallel circuits

Assigned reading:

- 19.1 Resistors in series and parallel
- 19.2 EMF and terminal voltage
- 19.3 Kirchoff's Rules
- 19.4 Solving problems with Kirchoff's Rules
- 19.5 EMF's in series and parallel
- 19.6 Circuits containing capacitors
- 19.7 Circuits containing resistors and capacitors
- 19.9 Electrical hazards
- 19.10 DC ammeters and voltmeters
- 19.11 Correcting for meter resistance!
- 29.6 Semi-conductor solids
- 29.7 Semi-conductors and doping
- 29.8 Diodes and transistors

Assigned questions p498+: 1,2,3,4,5,6,7,8,9,10,11,14,15,17,18

Assigned problems p499+:

- 1,2,3,4,5,6,8,9,10,12 Resistors in series and parallel
- 18,19 Terminal voltage and EMF
- 20,21,22,23,24,25,26,27,28 Kirchoff's Rules
- 29,30,31,33,34,35,36,37 Capacitors in series and parallel circuits
- 39,40,41 Capacitors in transient circuits
- 43,44,45,46,47 Voltmeters and ammeters
- 49,50,51,53 Correcting for meter resistance
- 56,57,58,60,61,63,64,69,70,71 General problems

Assigned labs: Multipart (17) lab on DC circuit properties.

## TEST ON CHAPTERS 18 & 19: SIMPLE DC CIRCUITS

## CHAPTER 20: Magnetism and magnetic effects

Assigned reading:

- 20.1 Magnets and magnetic fields
- 20.2 Electric currents and magnetic fields
- 20.3 Magnetism and matter - ferromagnetism
- 20.4 Electromagnets and solenoids
- 20.5 Magnetic force on a current carrying wire
- 20.6 Force on a charge moving through a magnetic field
- 20.7 Hall Effect
- 20.8 Applications of current and magnetism - torque
- 20.9 Electron properties
- 20.10 Cathode ray tubes
- 20.12 Magnetic field strength - Ampere's Law
- 20.13 Magnetic force between two current carrying wires.5

Assigned questions p532+:

- 1,3,5,6,7,9,10,11,12,14,15,16,19,21,22,23,27,29,30,31

Assigned problems p533+:

- 1,2,3,5,6,7,8,9,10,13 Magnetic force; wires and moving charges
- 20.22 Torque on loop in magnetic field
- 23,24,25,26 Charged bodies and uniform magnetic fields
- 35,36,37,40,42,46,48,49,50,51 Ampere's Law
- 54,55 General problems

Assigned labs: Measure the magnetic force acting on a charge moving through a uniform magnetic field.

Measure the strength of the magnetic field using a Hall Effect device.

Measure the magnetic force acting on a current carrying wire.

## CHAPTER 21: Electromagnetism and inductance

Assigned reading:

- 21.1 Induced EMF
- 21.2 Faraday's Law
- 21.3 EMF induced in moving conductors
- 21.4 Changing magnetic flux and electric fields
- 21.5 Electric generators
- 21.6 Counter EMF
- 21.7 Transformers
- 21.9 Inductance - self and mutual
- 21.10 Energy stored in magnetic fields
- 21.11 LR circuits
- 21.12 AC circuits and impedance
- 21.13 LRC series AC circuits
- 21.14 Resonance in LRC circuits

Assigned questions p565+:

- 1,2,3,4,5,6,7,9,10,13,14,15,16,17,19,20,21,22,25,26,28,30,31

Assigned problems p566+:

- 1,2,3,4,5,6,7,8,9,10,11,13 Induced EMF and Faraday's Law
- 14,15,17,18 Generators
- 19,20,22 Motors and counter EMF
- 23,24,25,26,27,28,31 Transformers and power
- 33,34,35,36,37,39,43,44 Self and mutual inductance
- 45,46 Energy stored in magnetic fields
- 49,51,52 LR circuits
- 54,55,58,59,60,61,62 Impedance; inductive/capacitive reactance
- 63,64,65,66,67,69,70,71 AC circuits and impedance
- 73,75,76 Resonance circuits
- 80,82,85,88 General problems

Assigned labs: Measure the impedance of an LRC circuit.

Measure the resonant frequency of an LRC circuit.

Measure the self inductance of an inductor.

## TEST ON CHAPTERS 20 & 21: MAGNETIC FIELDS, FORCES AND EMFS

## CHAPTER 30: Nuclear stability and radioactive decay

Assigned reading:

- 30.1 Nuclear structure and notation
- 30.2 Nuclear binding energy - curve of binding energy
- 30.3 Radioactivity
- 30.4 Alpha decay
- 30.5 Beta decay
- 30.6 Gamma decay
- 30.7 Nuclear conservation laws
- 30.8 Radioactive half-life
- 30.9 Calculating decay rates and half-life
- 30.10 Radioactive decay series
- 30.11 Radioactive dating
- 30.12 Stability and tunneling
- 30.13 Radioactive detectors

Assigned questions p822+: 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,21

Assigned problems p823+:

- 1,2,4 Nuclear matter
- 6,7,8,9,10,11,12 Nuclear binding energy
- 13,15,16,17,18,19,20,21,22 Results of radioactive decay
- 26,27,28,29,30,31,32,33,34,35,36,37,38,39,42 Half-life
- 50,52 General problems

Assigned labs: Measure the half-life of a radioactive isotope.

Measure the penetrating ability of alpha, beta and gamma radiation.

Measure the radioactive background radiation.

## CHAPTER 31: Nuclear energy - its effects and uses.

Assigned reading:

- 31.1 Transmutation of elements
- 31.2 Nuclear fission and nuclear reactors
- 31.3 Nuclear fusion
- 31.4 Biological radiation damage
- 31.5 Measurement of radioactive dosage
- 31.5 Radiation therapy

Assigned questions p849: 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,18,19,20,21

Assigned problems p850+:

- 1,2,3,5,7,9 Threshold energy in nuclear transformations
- 11,12,13,15,17 Nuclear fission - energy release
- 18,19,20,23,24 Nuclear fusion - energy release
- 28,29,30,31,32,33,36,37 Nuclear dosage and damage
- 40,41,42,45,47 General problems

## TEST ON CHAPTERS 30 & 31: NUCLEAR ENERGY AND RADIOACTIVITY

## CHAPTER 26: Einstein's Special Theory of Relativity

Assigned reading:

- 26.1 Galilean transformations
- 26.2 Michelson-Morley experiment - medium for light?
- 26.3 Postulates of the special theory
- 26.4 Simultaneity in relativity
- 26.5 Time dilation and twin paradox
- 26.6 Length contraction
- 26.7 Space - time
- 26.8 Mass expansion
- 26.9 Ultimate speed - the speed of light
- 26.10 Mass and energy equivalence
- 26.11 Relativistic addition of velocity
- 26.12 Lorentz transformations
- 26.13 Impact of Special Relativity

Assigned questions p715+: 1,2,4,5,6,7,8,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27

Assigned problems p716+:

- 1,2,3,4,5,6,7,8,9 Time and length effects
- 10,11,12,13,14 Relativistic mass
- 15,16,19,21,22,23,24,25,27,29,31,32 Mass-energy equivalence
- 35,36,37 Relativistic speeds
- 45,47,48,50,53,54,56 General problems

## TEST ON CHAPTER 26: SPECIAL THEORY OF RELATIVITY

**IN ADVANCED PLACEMENT PHYSICS THIS SCHEDULE WILL BE INTERRUPTED BY VARIOUS PERIODS OF REVIEW WITH CORRESPONDING TESTS AND SUPPLEMENTARY WORKSHEETS.**

**AFTER THE AP EXAMINATION IN MAY THE STUDENTS WILL SPEND THE BALANCE OF THE YEAR WORKING EITHER ALONE OR WITH A PARTNER ON FINAL PROJECTS.**