

Lesson Plan 2026-27 (Odd Semester)

(August 2026 to December 2026)

Subject: DSC- Physics (Mechanics and Theory of Relativity- 24PHYM401DS01)

Class: B.Sc (Physical Sciences) (Sem:- I)

Name: Dr. Neha Aggarwal

Department: Physics

MONTH	TOPICS TO BE COVERED
AUGUST	Basics of Mechanics: Mechanics of single and system of particles, Conservation law of linear momentum, Angular momentum and mechanical energy for a particle and a system of particles, Centre of Mass and equation of motion, Constrained Motion. Work and Kinetic Energy Theorem. Conservative and non-conservative forces.
SEPTEMBER	Potential Energy. Energy diagram. Stable and unstable equilibrium. Elastic potential energy. Force as gradient of potential energy. Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy. Generalized Notations: Degrees of freedom and Generalized coordinates, Transformation equations, Generalized Displacement, Velocity, Acceleration, Momentum, Force and Potential, Components of Velocity and Acceleration in Cylindrical and Spherical Coordinate Systems. Hamilton's variational principle, Lagrange's equation of motion from Hamilton's principle, Linear Harmonic oscillator, Simple pendulum, Atwood's machine. Test and Presentation.
OCTOBER	Rotational Dynamics: Rotation of Rigid body, moment of inertia, torque, angular momentum, kinetic energy of rotation. Theorems of perpendicular and parallel axes with proof. Moment of inertia of solid sphere, hollow sphere, spherical shell, solid cylinder, hollow cylinder and solid bar of rectangular cross-section. Acceleration of a body rolling down on an inclined plane. Kinetic energy of rotation. Motion involving both translation and rotation.
NOVEMBER	Special Theory of Relativity: Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of Physics in rotating coordinate systems. Centrifugal force. Coriolis force and its applications. Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Test and Presentation.
DECEMBER	Transformation of Energy and Momentum. Energy-Momentum Four Vector. Revision.

Lesson Plan 2026-27 (Odd Semester)

(August 2026 to December 2026)

Subject: DSC- Physics (Optics- 25PHYM403DS01)

Class: B.Sc (Physical Sciences) (Sem:- III)

Name: Dr. Neha Aggarwal

Department: Physics

MONTH	TOPICS TO BE COVERED
AUGUST	INTERFERENCE: Interference by Division of Wave front: Young's double slit experiment, Coherence, Conditions of interference, Fresnel's biprism and its applications to determine the wavelength of sodium light and thickness of a mica sheet, phase change on reflection.
SEPTEMBER	Interference by Division of Amplitude: Plane parallel thin film, production of colours in thin films, classification of fringes in films, Interference due to transmitted light and reflected light, wedge shaped film, Newton's rings DIFFRACTION Fresnel's diffraction: Huygens-Fresnel's theory, Fresnel's assumptions, rectilinear propagation of light, diffraction at a straight edge, rectangular slit and diffraction at a circular aperture. Fraunhofer diffraction: Single slit diffraction, double slit diffraction, plane transmission grating spectrum, dispersive power of grating, limit of resolution, Rayleigh's criterion, resolving power of telescope and a grating. Test and Presentation.
OCTOBER	POLARIZATION: Polarisation by reflection, refraction and scattering, Malus Law, Phenomenon of double refraction, Huygens's wave theory of double refraction (Normal and oblique incidence), Analysis of polarized Light. Nicol prism, Quarter wave plate and half wave plate, production and detection of (i) Plane polarized light (ii) Circularly polarized light and (iii) Elliptically polarized light. Optical activity, Fresnel's theory of optical rotation, Specific rotation, Polarimeters (half shade and Biquartz)
NOVEMBER	LASERS: Basic concept of absorption and emission of radiations, amplification and population inversion; Main components of lasers: (i) Active Medium (ii) Pumping (iii) Optical Resonator; Properties of laser beam: Monochromaticity, Directionality, Intensity, Coherence (Spatial & Temporal coherence); Metastable state, Excitation mechanism and Types of Lasers (He-Ne Laser & Ruby Laser), Applications of Lasers. FIBRE OPTICS: Optical fibres and their properties, Principal of light propagation through a optical fibre, Acceptance angle and numerical aperture. Types of optical fibres: Single mode and multimode fibres. Test and Presentation.
DECEMBER	Advantages and Disadvantages of optical fibres. Revision.

Lesson Plan 2026-27 (Odd Semester)

(August 2026 to December 2026)

Subject: DSC- Physics (Quantum Mechanics and Nuclear Physics- 26PHYM405DS01)

Class: B.Sc (Physical Sciences) (Sem:- V)

Name: Dr. Neha Aggarwal

Department: Physics

MONTH	TOPICS TO BE COVERED
AUGUST	Unit-I: Failure of Classical E.M. Theory, quantum theory of radiation (old quantum theory), Photon, photoelectric effect and Einstein's photoelectric equation. Compton effect (theory and result). Franck-Hertz experiment. Inadequacy of old quantum theory, de-Broglie hypothesis. Davisson and Germer experiment. Phase velocity group velocity, Heisenberg's uncertainty principle. Time-energy and angular momentum, position uncertainty. Uncertainty principle from de-Broglie wave, (wave-particle duality). Gamma Ray Microscope.
SEPTEMBER	Unit-II: Basic postulates and formalism: properties of Wave Function, Interpretation of Wave Function, Condition for physical acceptability of Wave Functions. Eigenvalues and Eigen functions, Probability current density, Expectation values of position and linear momentum. Time dependent and time independent Schrodinger equation, Mathematical consideration of Schrodinger equation: Normalization, Orthogonality, Observables. Application of Schrodinger equation in the solution of the following one-dimensional problems: (i) Free particle in one-dimensional box (solution of Schrodinger wave equation, eigen functions, eigen values, quantization of energy and momentum, nodes and anti-nodes, zero-point energy). Test and Presentation.
OCTOBER	Unit-III: Nuclear mass and binding energy, systematics nuclear binding energy, nuclear stability, nuclear size, spin, parity, statistics magnetic dipole moment, quadrupole moment (shape concept), Determination of charge by Mosley law Determination of size of nuclei by Rutherford Back Scattering. Interaction of heavy charged particles (Alpha particles), alpha disintegration and its theory Energy loss of heavy charged particle (idea of Bethe formula, no derivation), Energetics of alpha -decay, Range and straggling of alpha particles. Geiger-Nuttal law.
NOVEMBER	Unit-IV: Introduction of light charged particle (Beta-particle), Origin of continuous beta-spectrum (neutrino hypothesis) types of beta decay and energetics of beta decay, Energy loss of beta-particles (ionization), Range of electrons, absorption of beta-particles. Interaction of Gamma Ray, Nature of gamma rays, Energetics of gamma rays, passage of Gamma radiations through matter (photoelectric, Compton and pair production effect), electron position anhelation. Absorption of Gamma rays (Mass attenuation coefficient) and its application. Nuclear Reactors General aspects of Reactor design. Nuclear fission and fusion reactors (Principles, construction, working and use). Ionization chamber, proportional counter. Test and Presentation.
DECEMBER	G.M. counter detailed study. Revision.

Lesson Plan 2026-27 (Odd Semester)

(August 2026 to December 2026)

Subject: MDC- Physics (Physics Fundamentals – I- 24PHYX01MD01)

Class: B.A and B.Com (Sem:- I)

Name: Dr. Neha Aggarwal

Department: Physics

MONTH	TOPICS TO BE COVERED
AUGUST	Unit 1: Physics-Nature, scope & excitement, Major discoveries in physics, major contribution by Indian Physicists, Fundamental physical constants, Physics in relation to other sciences, impact of physics on society and on latest development in science & technology. System of Measuring Units-Need for measurement, measuring process, concept of mass, length, time; Fundamental and derive units, system of units, concepts of error, types of error (only definition), Accuracy and precision in measurement, least count and applications of measuring instruments -Vernier calliper, Screw Gauge.
SEPTEMBER	Unit 2: Motion of objects in one dimension- position of the object, origin/reference point, frame of reference, definitions and examples of motion in one, two and three dimension, Scalar and Vector quantities, description of motion along a straight line- distance and displacement, uniform motion and non-uniform motion, average and instantaneous speed, average and instantaneous velocity, acceleration; graphical analysis of straight line motion- distance- time graph, velocity-time graph, equation of motions and their applications. First Assignment Submission.
OCTOBER	Unit 3: Causes of motion- concept of force, Ist law of motion, inertia and mass; Newton's 2nd law of motion, momentum and force; Newton's 3rd law of motion, daily life applications of Newton's laws of motion. Universal law of gravitation and its importance, acceleration due to gravity and free fall of a body; mass and weight of an object on earth and moon, concept of thrust and pressure and importance in daily life, buoyancy and Archimedes principle-the physics behind floating of objects on water.
NOVEMBER	Unit 4: Work, energy, types of energy-Kinetic energy and Potential energy, P.E. of an object at a height; law of conservation of energy and its applications. Conservation of linear and angular momentum, collision (elastic and inelastic) and conservation laws in collisions- importance in daily life; concepts of centre of mass-Physics behind cycling, rock climbing and skating. Second Assignment Submission.
DECEMBER	Revision. Tests and Presentation.

Lesson Plan 2026-27 (Odd Semester)

(August 2026 to December 2026)

Subject: MDC- Physics (Physics Fundamentals – III- 25PHYX03MD01)

Class: B.Com (Sem:- III)

Name: Dr. Neha Aggarwal

Department: Physics

MONTH	TOPICS TO BE COVERED
AUGUST	Unit 1: Electric charge: Properties of charge, comparison of charge and mass, conservation of charge, Quantization of charge, Coulomb's law, Coulomb's law in vector form, Force on a point charge due to multiple charges, Electric field intensity, Electric field due to an isolated point charge, uniformly charged long thin wire and charged ring, Electric dipole and dipole moment. Electric intensity on axial line and equatorial line of an electric dipole, Electric field lines, Electric flux, Gauss's law, Derivation of Coulomb's law from Gauss's law.
SEPTEMBER	Capacitance, Capacitance of an isolated spherical conductor, Capacitor and its principle, Capacitance of a parallel plate capacitor, Combination of the capacitor, energy stored in a charged capacitor Unit 2: Electric current, Charge carriers in different materials, Ohm's law, resistivity and conductivity. Resistors, types of resistors, Classification of materials based on resistivity, temperature dependence of resistivity, Superconductivity, Combination of resistors, Cell and Battery, the electromotive force of a cell, the internal resistance of a cell, Grouping of cells. Measurement of electric current, Kirchoff's rules, electric energy, electric power, Joules's law of heating, electrical power transmission, electric fuse
OCTOBER	Unit 3: Magnetic field due to current, motion of a charged particle in a magnetic field, Lorentz force, cyclotron, force on a current carrying conductor in a magnetic field, Torque on a rectangular current loop in a uniform magnetic field, Biot-Savart law and its applications, Ampere's circuital law and its applications, Coulomb's law of force between two magnetic poles, Magnetic field lines and magnetic flux, Gauss's law in magnetism, Magnetic dipole and dipole moment, Magnetic field at a point an axial line and equatorial line of a bar magnet, Torque on a bar magnetic in uniform magnetic field. Time period of vibration of a freely suspended magnet in a uniform magnetic field, The earth magnetism, Classification of magnetic materials, Hysteresis, Permanent magnets and electromagnets.
NOVEMBER	Unit 4: Dual nature of radiation, Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation-particle nature of light, Experimental study of photoelectric effect, Matter waves-wave nature of particles, de-Broglie relation, Alpha-particle scattering experiment; Rutherford's model of atom; Bohr model of hydrogen atom, Expression for radius of nth possible orbit, velocity and energy of electron in nth orbit, Energy bands in conductors, semiconductors and insulators (qualitative ideas only) Intrinsic and extrinsic semiconductors- p and n type, p-n junction, Semiconductor diode - I-V characteristics in forward and reverse bias, application of junction diode -diode as a rectifier.
DECEMBER	Revision. Tests and Presentation.