

Programme and Course Outcome CBCS

Department of Physics

S. B. DEORAH COLLEGE, Guwahati

DEPARTMENT OF PHYSICS	
B.Sc. (Physics) General and Honours	
Programme Specific Outcome	<p>PO1: Students will gain in depth knowledge of basic Physics both theoretical and practical.</p> <p>PO2: Students will develop computational skill which will help them in all future endeavors especially in higher studies and research.</p> <p>PO3: Students will have knowledge, ability, and skill to undertake further studies in Physics or in related multidisciplinary areas.</p> <p>PO4: Mold a responsible citizen who is aware of most basic domain-independent knowledge, including critical thinking and communication.</p> <p>PO5: Enable the graduates to compete in national/international competitive examinations for higher studies, such as IIT-JAM conducted by IIT's for admission in M.Sc. programme, GATE for admission in M.Tech. programme, GRE/TOEFL for studying abroad etc.</p> <p>PO6: Along with Civil services Examination a Physics graduate can apply for a scientist position in organization such as BARC, ISRO, DRDO etc.</p>

Course Outcomes of B.Sc. (Physics) General and Honours			
Semester	Course Category	Paper Code and Course Name	Outcomes
1 st	Generic/Regular	PHY-HG/RC-1016 Mechanics	<p>CO1: Upon completion of this course, students are expected to understand the role of vectors and coordinate systems in Physics, solve Ordinary Differential Equations, laws of motion and their application to various dynamical situations, Inertial reference frames their transformations, concept of conservation of energy, momentum, angular momentum and apply them to basic problems, phenomenon of simple harmonic motion, motion under central force, concept of time dilation, Length contraction using special theory of relativity.</p> <p>CO2: In the laboratory course, after acquiring knowledge of how to handle measuring instruments (like screw gauge, Vernier callipers, travelling microscope) student shall embark on verifying various principles and associated measurable parameters.</p>

	Honours	PHY-HC-1016 Mathematical Physics 1	<p>CO1: Will acquire knowledge about vector and its applications in various fields, differential equations and its applications, different coordinate systems, concept of probability and error.</p> <p>CO2: Students will be able to solve differential equation using power series solution method, solve differential equation using separation of variables method, special integrals, different properties of matrix, Fourier series.</p> <p>CO3: Skills to solve complex integrals using residue theorem, apply Fourier and Laplace transforms in solving differential equations, understand properties of Tensor like Transformation of coordinates contravariant and co-variant tensors, indices rules for combining tensors.</p> <p>CO4: Use C/ C++/ Scilab/ FORTRAN/ Mathematica/ Python for solving differential equations, graph fitting etc.</p>
		PHY-HC-1026 Mechanics	<p>CO1: On successful completion of the course students should be able understand Inertial and non-inertial reference frames, Newtonian motion, Galilean transformations, projectile motion, work and energy, Elastic and inelastic collisions, motion under central force, simple harmonic oscillations, special theory of relativity.</p>

2nd	Generic/Regular	PHY-HG/RC-2016 Electricity and Magnetism	<p>CO1: Upon completion of this course, students are expected to apply Gauss's law of electrostatics to solve a variety of problems, calculate the magnetic forces that act on moving charges and the magnetic fields due to currents, have brief idea of magnetic materials, understand the concepts of induction, and apply them to solve variety of problems.</p> <p>CO2: In the lab course, students will be able to measure resistance (high and low), voltage current, self and mutual inductance, capacitor, strength of magnetic field and its variation, study different circuits RC, LCR etc.</p>
	Honours	PHY-HC-2016 Electricity and Magnetism	<p>CO1: After successful completion of this course, students will be able to understand electric and magnetic fields in matter, dielectric properties of matter, electromagnetic induction, application of Kirchhoff's law in different circuits, application of network theorem in circuits.</p>
		PHY-HC-2026 Wave and Optics	<p>CO1: Understanding on superposition of harmonic oscillations, different types of wave motions, superposition of harmonic waves, interference and interferometer, diffraction, holography.</p>

3rd	Generic/Regular	PHY-HG/RC-3016 Thermal Physics	CO1: Students will have the knowledge and skills to identify and describe the statistical nature of concepts and laws in thermodynamics, in particular: entropy, temperature, Thermodynamics potentials, Free energies, Maxwell's relations in thermodynamics, behavior of real gases.
	Honours	PHY-HC-3016 Mathematical Physics II	CO1: Will acquire knowledge about vector and its applications in various fields, differential equations and its applications, different coordinate systems, concept of probability and error. CO2: Students will be able to solve differential equation using power series solution method, solve differential equation using separation of variables method, special integrals, different properties of matrix, Fourier series. CO3: Skills to solve complex integrals using residue theorem, apply Fourier and Laplace transforms in solving differential equations, understand properties of Tensor like Transformation of coordinates contravariant and co-variant tensors, indices rules for combining tensors. CO4: Use C/ C++/ Scilab/ FORTRAN/ Mathematica/ Python for solving differential equations, graph fitting etc.
		PHY-HC-3026 Thermal Physics	CO1: Students will have the knowledge and skills to identify and describe the statistical nature of concepts and laws in thermodynamics, in particular: entropy, temperature, Thermodynamics potentials, Free energies, Maxwell's relations in thermodynamics, behavior of real gases.
		PHY-HC-3036 Digital Systems & Applications	CO1: Understanding on the working principle of CRO, develop a digital logic and apply it to solve real life problems, analyze, design and implement combinational logic circuits CO2: Classify different semiconductor memories, Analyze, design and implement sequential logic circuits, Analyze digital system design using PLD, simulate and implement combinational and sequential circuits
	Honours/Generic/Regular SEC	PHY-SE-3014 Physics Workshop Skills	CO1. The aim of this course is to enable the students to be familiar and experience with various mechanical and electrical tool through hands-on mode.

4th	Generic/Regular	PHY-HG/RC-4016 Wave and Optics	<p>CO1: Upon completion of this course, students are expected to understand Simple harmonic oscillation and superposition principle, importance of classical wave equation in transverse and longitudinal waves and solving a range of physical systems on its basis, concept of normal modes in transverse and longitudinal waves: their frequencies and configurations, interference as superposition of waves from coherent sources derived from same parent source, Demonstrate understanding of Interference and diffraction experiments, Polarization.</p> <p>CO2: In the laboratory course, student will gain hands-on experience of using various optical instruments and making finer measurements of wavelength of light using Newton Rings experiment, Fresnel Biprism etc. Resolving power of optical equipment, the motion of coupled oscillators, study of Lissajous figures and behaviour of transverse, longitudinal waves.</p>
	Honours	PHY-HC-4016 Mathematical Physics III	<p>CO1: Will acquire knowledge about vector and its applications in various fields, differential equations and its applications, different coordinate systems, concept of probability and error.</p> <p>CO2: Students will be able to solve differential equation using power series solution method, solve differential equation using separation of variables method, special integrals, different properties of matrix, Fourier series.</p> <p>CO3: Skills to solve complex integrals using residue theorem, apply Fourier and Laplace transforms in solving differential equations, understand properties of Tensor like Transformation of coordinates contravariant and co-variant tensors, indices rules for combining tensors.</p> <p>CO4: Use C/ C++/ Scilab/ FORTRAN/ Mathematica/ Python for solving differential equations, graph fitting etc.</p>

4 th		PHY-HC-4026 Elements of Modern Physics	CO1: Knowledge about modern development in Physics, Starting from Planck's law, its development of the idea of probability interpretation and the formulation of Schrodinger equation. Students will also get preliminary idea of structure of nucleus, radioactivity Fission and Fusion and Laser.
		PHY-HC-4036 Analog Systems & Applications	CO1: Understanding about the physics of semiconductor p-n junction and devices such as rectifier diodes, zener diode, photodiode etc. and bipolar junction transistors, transistor biasing and stabilization circuits, the concept of feedback in amplifiers and the oscillator circuits, students will also have an understanding of operational amplifiers and their applications.
	Honours/Generic/Regular SEC	PHY-SE-4014 Basic Instruments Skills	CO1. This course is to get exposure with various aspects of instruments and their usage through hands-on mode.
5 th	Regular (Elective)	PHY-RE-5056 Nuclear and Particle Physics	CO1. Students will have the understanding of the sub atomic particles and their properties, the different nuclear techniques and their applications in different branches of Physics and societal application. CO2. Develop the problem-solving skills and the acquired knowledge can be applied in the areas of nuclear, medical, archeology, geology and other interdisciplinary fields of Physics and Chemistry
	Honours	PHY-HC- 5016 Quantum Mechanics & Applications	CO1. Understanding on the principles in quantum mechanics: Schrödinger equation, the wave function, the uncertainty principle, stationary and non-stationary states, time evolution of solutions, and relation between quantum mechanics and linear algebra. CO2. Angular momentum and spin, as well as the rules for quantization and addition of these, spin-orbit coupling and Zeeman Effect. CO3. C/C++/Scilab/FORTRAN/Mathematica/Python for solving the following problems based on Quantum Mechanics

		<p>PHY-HC-5026</p> <p>Solid State Physics</p>	<p>CO1. Basic understanding on crystal lattices and phonons, understand the elementary lattice dynamics and its influence on the properties of materials, describe the main features of the physics of electrons in solids; explain the dielectric ferroelectric and magnetic properties of solids and understand the basic concept in superconductivity</p>
		<p>PHY-HE-5036</p> <p>Discipline Specific Elective (DSE)</p> <p>Advanced Mathematical Physics I</p>	<p>CO1. Upon completion of this course, students will be able to solve problems in Physics related to Linear Vector space, Matrix algebra, Tensor</p>
		<p>PHY-HE-5056</p> <p>Discipline Specific Elective (DSE)</p> <p>Nuclear and Particle Physics</p>	<p>CO1. Students will have the understanding of the sub atomic particles and their properties, the different nuclear techniques and their applications in different branches of Physics and societal application.</p> <p>CO2. Develop the problem-solving skills and the acquired knowledge can be applied in the areas of nuclear, medical, archeology, geology and other interdisciplinary fields of Physics and Chemistry.</p>
6 th	Regular (Elective)	<p>PHY-RE-6056</p> <p>Classical Dynamics</p>	<p>CO1. Students will have the overview of Newton's Laws of Motion, Special Theory of Relativity by 4-vector approach and fluids. Students will also have the understanding of the Lagrangian and Hamiltonian of a system.</p> <p>CO2. Students will be able to solve the seen or unseen problems/numericals in classical mechanics.</p>

6th	Honours	PHY-HC-6016 Electromagnetic Theory	CO1. Students will acquire the concepts of Maxwell's equations, propagation of electromagnetic (EM) waves in different homogeneous-isotropic as well as anisotropic unbounded and bounded media, production and detection of different types of polarized EM waves, general information as waveguides and fibre optics.
		PHY-HC-6026 Statistical Mechanics	CO1. Students will be learn the techniques of Statistical Mechanics to apply in various fields including Astrophysics, Semiconductors, Plasma Physics, Bio-Physics, Chemistry and in many other directions.
		PHY-HE-6046 Discipline Specific Elective (DSE) Astronomy and Astrophysics	CO1. Understanding the origin and evolution of the Universe, galaxies and dark matter. CO2. Comprehensive introduction on the measurement of basic astronomical parameters such as astronomical scales, luminosity and astronomical quantities. CO3. Developments in observational astrophysics and idea of the instruments implemented for astronomical observation, the formation of planetary system and its evolution with time, the physical properties of Sun and the components of the solar system; and stellar and interstellar components of our Milky Way galaxy.
		PHY-HE-6056 Discipline Specific Elective (DSE) Classical Dynamics	CO1. Students will have the overview of Newton's Laws of Motion, Special Theory of Relativity by 4-vector approach and fluids. Students will also have the understanding of the Lagrangian and Hamiltonian of a system. CO2. Students will be able to solve the seen or unseen problems/numericals in classical mechanics.