

Department of Physics

S.B.M.S,College,Sualkuchi

Programme outcomes, Programme Specific Outcomes and Course outcomes:

The B.Sc.Physics Programme is designed as per Guwahati University syllabus

B.Sc. in Physics	
Programme outcomes	Apply the basic principles of Physics to the events occurring around us and also in the world.
	Try to find out or analyze scientific reasoning for various things.
	Use of computers and various software and programming skills.
	Apply the knowledge to develop the sustainable and eco-friendly technology for pollution free environment.
	Collaborate effectively on team-oriented projects in the field of Physics.
	Communicate scientific information in a clear and concise manner both orally and in writing or through audio video presentations.
	Earn the basic knowledge in designing logic circuit.
Programme Specific Outcomes	Students get acquainted with techniques which are useful in industry.
	Students get conceptual knowledge of entrepreneurships through the co-curricular activities.
	learn the organizational skills and working in group.
	Students will be well versed with use of computers.

Course Outcome:

Semester	Paper	Course Outcome
		THEORY

<i>B.Sc. First semester (Major)</i>	Mathematical Physics I: (PHY-HC-1016)	Successful students should be able to understand vector and its applications in various fields, Differential equations and its applications, different coordinate systems, concept of probability and error.
	Mechanics: (PHY-HC-1026)	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.
	PRACTICAL	
	Mathematical Physics I: (PHY-HC-1016)	On successful completion of the course students should be able to understand the basics of scientific computing, c++, Matlab, mathematical programming , random number generation, different solution of algebraic and transcendentng equation.
	Mechanics: (PHY-HC-1026)	To learn about the various measurement various pendulum, and different measurement technique.
<i>B.Sc. First semester (General)</i>	THEORY	
	Mechanics: (PHY-RC-1016)	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 teory of relativity. In the laboratory course, after acquiring knowledge of how to handle measuring instruments (like screw gauge, Vernier calipers, travelling microscope) student shall embark on verifying various principles.

	PRACTICAL	
	Mechanics (PHY-RC-1016 and PHY-HG-1016)	To learn about the various measurement various pendulum, and different measurement technique
<i>B.Sc. Second semester (Major)</i>	THEORY	
	Electricity & Magnetism : (PHY-HC-2016)	After successful completion of this course, students will be able to Understand electric and magnetic fields in matter, Dielectric properties of matter magnetic properties of matter, electromagnetic induction, and applications of Kirchhoff's law in different circuits, applications of network theorem in circuits.
	Waves & Optics: (PHY-HC-2026)	After successful completion of this course, students will be able to Understand superposition of harmonic oscillations, different types of wave motions, superposition of harmonic waves, interference and interferometer, diffraction, holography.
	PRACTICAL	
	Electricity & Magnetism : (PHY-HC-2016)	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.
	Waves & Optics: (PHY-HC-2026)	After finishing of this Lab course, students will be able to measure the frequency of a electric tuning fork , can study the Lissajous figures, can determine the refractive index of a material
	THEORY	

B.Sc. 2 nd semester(General)	Electricity and Magnetism: (PHY-HG-2016 /PHY-RC-2016)	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.
	PRACTICAL	
	Electricity and Magnetism: Practical (PHY-HG-2016 /PHY-RC-2016)	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.
Semester (Major)	THEORY	
B.Sc. 3 rd semester	Mathematical PHY-HC-3016 Physics II	After successful completion of the course, 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.
	PHY-HC-3026 Thermal Physics	: Upon successful completion, 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, behaviour of real gases.
	PHY-HC-3036 Digital Systems & Applications	After successful completion of the course student will be able to understand the working principle of CRO, develop a digital logic and apply it to solve real life problems, Analyze, design and implement combinational

		logic circuits, Classify different semiconductor memories, Analyze, design and implement sequential logic circuits, Analyze digital system design using PLD, Simulate and implement combinational and sequential circuits.
	PRACTICAL	
	Mathematical PHY-HC-3016 Physics II	The aim of this Lab is to use the computational methods to solve physical problems. Course will consist of lectures (both theory and practical) in the Lab. Evaluation done not on the programming but on the basis of formulating the problem.
	PHY-HC-3026 Thermal Physics	The aim of the paper is to give the knowledge to the students about conductivity measurement and various method of temperature measurement.
	PHY-HC-3036 Digital Systems & Applications	Give the knowledge about the use of multimeter, about the knowledge of gate and various electronics knowledge.
B.Sc 3 rd Semester(Regular)	Paper(Theory)	
	PHY-HG-3016 (PHY-RC-3016) Thermal Physics & Statistical Mechanics	Upon completion of this course, students are expected learn the basic concepts of thermodynamics, the first and the second law of thermodynamics, the concept of entropy and the associated theorems, the thermodynamic potentials and their physical interpretations, Maxwell's thermodynamic

		relations, fundamentals of the kinetic theory of gases, Maxwell-Boltzman distribution law, equipartition of energies, mean free path of molecular collisions, viscosity, thermal conductivity, diffusion and Brownian motion, black body radiations, Stefan- Boltzmann's law, Rayleigh-Jean's law and Planck's law and their significances, quantum statistical distributions, viz., the Bose-Einstein statistics and the Fermi-Dirac statistics.
	PRACTICAL	
	PHY-HG-3016 (PHY-RC-3016) Thermal Physics & Statistical Mechanics	In the laboratory course, the students will be able to Measure of Planck's constant using black body radiation, determine Stefan's Constant, coefficient of thermal conductivity of a bad conductor and a good conductor, determine the temperature coefficient of resistance, study variation of thermo emf across two junctions of a thermocouple with temperature etc.
	Skill Enhancement Paper	
	PHY-SE-3044 Digital Photography & Editing	On successful completion of the course students will be able to indentify cameras according to formats and view finder systems, identify types of lenses and state what type of lenses to be used for different purposes, apply settings of shutter speed, control depth of field via aperture settings, apply suitable focal length, Use the light metering mechanism of the camera to take photographs.

B.Sc 4 TH Semester(Major)	THEORY	
	PHY-HC-4016 Mathematical Physics III	On successful completion of the course students will able 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.
	PHY-HC-4026 Elements of Modern Physics	On completion of the course students will be able to understand modern development in Physics, Starting from Planck's law, it 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	On successful completion of the course students will be able to understand about the physics of semiconductor p-n junction and devices such as rectifier diodes, zener diode, photodiode etc. and bipolar junction

PRACTICAL		
	PHY-HC-4016 Mathematical Physics III	To learned the student about the Transformation of coordinates, contravariant and co-variant tensors, indices rules for combining tensors.
	PHY-HC-4026 Elements of Modern Physics	To give the knowledge of the students about the idea of Planks constant, LED, Photocell and their applications.
	PHY-HC-4036 Analog Systems & Applications	On successful completion of the course students will be able to understand 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.
B.Sc 4 TH	THEORY	
Semester(Regular)	Honours Generic Paper PHY-HG-4016 (PHY-RC-4016) Waves & Optics	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. In the
	PRACTICAL	
		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.
	SKILL ENHANCEMENT PAPER	
	PHY-SE-4074 RENEWABLE ENERGY AND ENERGY HARVESTING	The aim of this course is not just to impart theoretical knowledge to the students but to provide them with exposure and hands-on learning wherever possible

B.Sc 5 th Semester(Major)	THEORY	
	PHY-HC-5016 Quantum Mechanics & Applications	On successful completion of the course students will be able to understand the principles in quantum mechanics, such as the Schrödinger equation, the wave function, the uncertainty principle, stationary and non-stationary states, time evolution of solutions, as well as the relation between quantum mechanics and linear algebra. Students will be able to solve the Schrödinger equation for hydrogen atom. Students will have the concepts of angular momentum and spin, as well as the rules for quantization and addition of these, spin-orbit coupling and Zeeman Effect.
	PHY-HC-5026 Solid State <u>Physics</u>	On successful completion of the course students should be able to explain the main features of 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.
	PHY-HE-5056 Nuclear and Particle Physics	Upon completion of this course, students will have the understanding of the sub atomic particles and their properties. They will gain knowledge about the different nuclear techniques and their applications in different branches of Physics and societal application. The course will develop problem based

		skills and the acquire knowledge can be applied in the areas of nuclear, medical, archeology, geology and other interdisciplinary fields of Physics and Chemistry.
	PHY-HE-5016 Experimental Techniques	Upon completion of this course, students will be able to describe the errors in measurement and statistical analysis of data required while performing an experiment. Also, students will learn the working principle, efficiency and applications of transducers & industrial instruments like digital multimeter, RTD, Thermistor, Thermocouples and Semiconductor type temperature sensors.
B.Sc 5 th Semester(Major)	PRACTICAL	
	PHY-HC-5016 Quantum Mechanics & Applications	Students learned the use of C/C++/Scilab/FORTRAN/Mathematica/Python for solving the following problems based on Quantum Mechanics.
	PHY-HC-5026 Solid State <u>Physics</u>	Students can learned the knowledge of B-H curve, Use of CRO etc.
	PHY-HE-5016 Experimental Techniques	Students can learned the knowledge of Cliper and clamper and learned about the use of OPAM.
B.Sc 5 th Semester(Generic)	PHY-HE-5036	Upon completion of this course, students will be able to describe the errors in measurement and statistical analysis of data required while performing an experiment. Also, students will learn the working principle, efficiency and applications of transducers & industrial instruments like digital multimeter, RTD, Thermistor,

		Thermocouples and Semiconductor type temperature sensors.
	SKILL ENHANCEMENT PAPER	
	PHY-SE-5014 Weather forecasting	The aim of this course is not just to impart theoretical knowledge to the students but to provide them with exposure and hands-on learning wherever possible
Semester 6 th (Major)	THEORY	
	PHY-HC-6016 Electromagnetic Theory	On successful completion of the course 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	On successful completion of the course 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 Astronomy and Astrophysics	Upon completion of this course, students will be able to understanding the origin and evolution of the Universe. The course will give a comprehensive introduction on the measurement of basic astronomical parameters such as astronomical scales, luminosity and astronomical quantities. It will give an overview on key developments in observational astrophysics. Students will have the idea of the instruments implemented for astronomical observation, the formation of

		<p>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. Students will have the understanding of the origin and evolution of galaxies, presence of dark matter and large scale structures of the Universe.</p>
	<p>PHY-HE-6056 PHYSICS-DSE: CLASSICAL DYNAMICS</p>	<p>Upon completion of this course, 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.. By the end of this course, students will be able to solve the seen or unseen problems/numericals in classical mechanics.</p>
<p>Semester 6th (Generic)</p>	<p>PHY-HE-6056 PHYSICS-DSE: CLASSICAL DYNAMICS</p>	<p>Upon completion of this course, 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.. By the end of this course, students will be able to solve the seen or unseen problems/numericals in classical mechanics.</p>
<p>PRACTICAL</p>		
	<p>PHY-HC-6016 Electromagnetic Theory</p>	<p>In Lab the students learned about production and detection of different types of polarized EM waves, general information as waveguides and fibre optics</p>
	<p>PHY-HC-6026 Statistical Mechanics</p>	<p>They learned about the Stefan's constant and black body.</p>

Semester 6 th (Generic)	THEORY	
	PHY-HE-6056 <i>PHYSICS-DSE: CLASSICAL DYNAMICS</i>	Upon completion of this course, 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.. By the end of this course, students will be able to solve the seen or unseen problems/numericals in classical mechanics.
	SKILL ENHANCEMENT PAPER	
	THEORY	
	PHY-SE-6044 Graphic Design for digital advertising	On successful completion of the course students will be able to Understand aesthetics & visual appeal in design, Using impactful visual content which appeals to target audience, Conceptualize, Visualize and Create Graphic Designs for: Digital Ads, Posters, Banners and Flyers, Social Media Ads & Banners, <i>Websites and Blogs</i>
	PRACTICAL	
	PHY-SE-6044	This course will give you the skills to come up with innovative concepts and

	Graphic Design for digital advertising	visualization and further create Graphic Designs using the principles of Design, Composition & Colour theory. You will learn to create Graphic Design on the most popular and industry relevant design software, Adobe Photoshop.
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Submitted by

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