

Programme: BSc Physics

Course Outcomes

SEMESTER 1

PH1CRT01: METHODOLOGY AND PERSPECTIVES OF PHYSICS

This course will be an introduction to the pursuit of Physics, its history and methodology. The course also aims at emphasizing the importance of measurement which is central to physics.

CO 1: To understand the concepts and development of physics with reference to the contributions of various scientists

CO2: To understand number systems and its significance

CO3 : To apply the concept of vectors in Physics

CO4: To understand the physical significance of Gradient, divergence and curl

CO5: To compute line, surface and volume integrals of vectors and apply to different coordinate systems.

CO6: To understand experimental and measurement techniques in Physics

CO7: To understand different types of errors and its estimation in experimental and mathematical calculations

SEMESTER 2

PH2CRT02: MECHANICS AND PROPERTIES OF MATTER

This course would empower the student to acquire engineering skills and practical knowledge, which help the student in their everyday life. This syllabus will cater the basic requirements for their higher studies. This course will provide a theoretical basis for doing experiments in related areas.

CO 1: To understand and analyze the theory of wave motion

CO 2: To understand various aspects of oscillations

CO 3: To understand the basic concepts of angular velocity, angular acceleration and angular momentum and state parallel and perpendicular axes theorems.

CO 4: To calculate the moment of Inertia of different bodies

CO 5: To understand the basic principles of elasticity and to determine Young's modulus and Rigidity modulus by various methods.

CO6: To understand and analyze the basic concepts and principles of viscosity and surface tension.

SEMESTER 3

PH3CRT03: OPTICS, LASER AND FIBER OPTICS :This course aims to provide a necessary foundation in optics and photonics which prepare the students for an intensive study of advanced topics at a later stage.

CO1: To understand the basic ideas about interference and apply it to Young's double-slit & Newton's ring experiment

CO2: To explain the concept of Fresnel and Fraunhofer diffraction.

CO3: To understand the theory of transmission Grating and dispersive power.

CO4: To understand the concept of Polarisation and its applications in real life.

CO5: To understand the basic principle and working of different lasers and its applications in different areas

CO8: To understand the principle of optical fibers and its applications

SEMESTER 4

PH4CRT04: SEMICONDUCTOR PHYSICS We are living in a wonder world of Electronics. To know the physical principles and applications of Electronics is most necessary for a Physics student. This course is intended to provide this know-how.

CO 1: To understand the basics of transistors.

CO 2: To understand the application of diodes in rectifiers, regulators and wave shaping circuits.

CO 3: To analyze transistor configurations and basic principles of feedback.

CO 4: To understand different types of oscillators and amplifiers .

CO 5: To Know the characteristics and parameters of FET.

CO6: To study the characteristics and applications of an operational amplifier .

CO7: To understand different types of analog modulation.

SEMESTER 5

PH5CRT05: ELECTRICITY AND ELECTRODYNAMICS: Electricity and Electrodynamics have the key role in the development of the modern technological world. Without electric power and communication facilities, life on earth stands still. A course in electricity and electrodynamics is thus an essential component of a physics programme at graduate level. This course is expected to provide a sound foundation in electricity and electrodynamics.

CO 1: To understand the ideas regarding alternating currents and different circuits.

CO 2: To get an idea about different network theorems.

CO 3: To analyze the basic thermoelectric effect and various aspects of transient currents.

CO 4: To get the physical concepts of fundamental theorems of divergence and curl.

CO 5: To summarize the nature of electric and magnetic fields due to various elements.

CO6: Development of Maxwell's equations.

PH5CRT06: CLASSICAL AND QUANTUM MECHANICS: This course is a prelude to advanced theoretical studies in Condensed Matter Physics, Spectroscopy, Astrophysics, Electrodynamics and Nuclear Physics.

CO 1: To understand the basic ideas of generalized coordinates

CO 2: Examine the dynamics of classical and systems using Lagrangian and Hamiltonian methods

CO 3: To understand the historical development of quantum mechanics.

CO 4: To understand the basic postulates of Quantum Mechanics

CO 5: To apply Schrodinger equation in different problems.

CO6: To differentiate between time independent and dependent schrodinger equations

PH5CRT07: DIGITAL ELECTRONICS AND PROGRAMMING This course is expected to provide necessary background for applications of electronics in mathematical computation. This course also gives an insight to computer software and aims to develop programming and coding skills by familiarizing the features of C++.

CO 1: To understand Boolean algebra, logic gates and Karnaugh map.

CO 2: To understand different combinational logic circuits like adders, subtractors, multiplexers etc.

CO 3: To understand different sequential logic circuits and its practical applications.

CO 4: To understand the basic syntax of C++ programming and the structure of C++.

CO 5: To write simple C++ programs using loops and arrays.

PH5CRT08: ENVIRONMENTAL PHYSICS AND HUMAN RIGHTS: This course is designed according to UGC Directions to create an awareness of environmental science and environmental studies. This course also intends to give an insight about Human rights and duties.

CO 1: To understand about water resources and management.

CO 2: To understand the principle of remote sensing and its application in environmental monitoring and assessment.

CO 3: To understand different types of environmental pollution, consumerism and e-wastes - an emerging environmental threat.

CO 4: To explain about different disasters, its management and mitigation measures.

CO 5: To discuss various waste treatment and disposal methods.

CO6: To distinguish renewable and nonrenewable energy sources and to explain the principle and characteristics of solar cells.

CO7: To understand and comprehend the importance of human rights.

CO8: To develop the qualities as a responsible citizen.

PH5OPT02-Physics in Daily Life This course helps students acquire and understand the physics involved in the daily activities and equip them to apply physics and differentiate it from pseudo physics.

CO 1: To understand the basic ideas of basic units and dimensions.

CO 2: To understand different types of errors.

CO 3: To acquire different optical phenomena to relate them with daily life.

CO 4: To understand the basic ideas of dynamics.

CO 5: To differentiate between linear and rotational motion

CO6: To understand the ideas regarding elasticity

CO7: To calculate the energy of different home applications.

CO8: To get a basic idea of hydrodynamics and thermodynamics

CO9: To understand the basic ideas about the universe.

SEMESTER 6

PH6CRT09: THERMAL AND STATISTICAL PHYSICS This course is to develop a working knowledge of statistical mechanics and to use this knowledge to explore various applications related to topics in material science and the physics of condensed matter.

CO 1: To understand the basic ideas of properties of gases

CO 2: Understand different thermodynamic laws and processes

CO 3: To apply the laws of thermodynamics in real life applications.

CO 4: To differentiate between heat engine and refrigerators

CO 5: To understand the concept of entropy and different thermodynamic relations.

CO6: To differentiate between conduction and radiation.

CO7: To relate thermodynamic basics with statistical mechanics

PH6CRT10: RELATIVITY AND SPECTROSCOPY This course is intended to introduce principles of spectroscopy and special theory of relativity.

CO 1: To understand special theory of relativity and Lorentz transformations

CO 2: To get the introductory concepts of general theory of relativity.

CO 3: To understand the ideas of Light-matter interaction

CO 4: To discuss the evolution of atom models

CO 5: To understand the ideas of the Zeeman effect.

CO6: To differentiate between rotational and vibrational energies of a molecule.

CO7: To discuss the theory and applications of Raman effect.

CO8: To understand the basic principles of NMR and ESR spectroscopy and their application in medical fields

PH6CRT11: NUCLEAR, PARTICLE PHYSICS AND ASTROPHYSICS This course intended to explore the interior of nucleus and interaction between nucleons. It also helps the students to comprehend the Cosmos and its origin and to develop scientific aptitude.

CO 1: To understand the concept of nucleus and nuclear structure.

CO 2: To get a basic idea of interaction between energetic particles and matter

CO 3: To understand the principle and working of nuclear detectors, counters and particle accelerators.

CO 4: To distinguish between nuclear fission and fusion.

CO 5: To understand the idea of cosmic rays

CO6: To get the classification of elementary particles and its conservation laws.

CO7: To understand the ideas of classification and evolution of stars.

PH6CRT12: SOLID STATE PHYSICS This course is intended to provide an introduction to the physics of Condensed Matter. This study attempts to explain various types of phenomena like electro-magnetic properties, superconductivity and superfluidity.

CO 1: To differentiate between crystalline and amorphous materials, different types of crystal structures,

CO 2: To understand the ideas regarding bonding in solids

CO 3: To discuss free electron theory and elementary band theory in solids.

CO 4: To discuss the various semiconducting properties of materials.

CO 5: To differentiate between direct and indirect band gap materials and their applications in photonic devices

CO6: To discuss the various dielectric and magnetic properties of materials.

CO7: To understand the concept of superconductivity and their properties and applications

PH6CBT05: Astronomy and Astrophysics: A good introduction to the basics of astronomy and astrophysics will be given in the course. It is expected that some of the students will opt for this specialization for their post-graduation.

CO 1: To understand the different astronomical distance scales

CO 2: To get the principle and working of optical telescopes.

CO 3: To understand the concepts of different celestial bodies.

CO 4: To get the qualitative ideas of different time scales.

CO 5: To discuss the characteristics of sun and galaxies

CO6: To understand the ideas of classification and evolution of stars.

CO7: To discuss the structure of the universe.

COMPLEMENTARY PHYSICS FOR MATHEMATICS AND STATISTICS

SEMESTER 1

PH1CMT01: PROPERTIES OF MATTER & ERROR ANALYSIS

CO 1: To understand the basic principles of elasticity and to determine Young's modulus and Rigidity modulus by various methods.

CO2: To understand and analyze the basic concepts and principles of viscosity and surface tension.

CO3: To understand different types of errors and its estimation in experimental and mathematical calculations

SEMESTER 2

PH2CMT01: MECHANICS AND ASTROPHYSICS

CO 1: To understand the concept of velocity, acceleration and force

CO2: To understand the theory of Kater's pendulum and compound pendulum.

CO 3: To differentiate linear and angular motions

CO 4: To calculate the moment of Inertia of different bodies

CO 5: To understand and analyze the theory of wave motion

CO 6: To understand various aspects of oscillations

CO7: To understand the ideas of classification and evolution of stars.

SEMESTER 3

PH3CMT01: MODERN PHYSICS AND ELECTRONICS

CO1: To understand the ideas of Light-matter interaction

CO 2: To discuss the evolution of atom models

CO3: To differentiate between rotational and vibrational energies of a molecule.

CO4: To discuss the theory and applications of Raman effect.

CO5: To understand the basic principles of NMR and ESR spectroscopy and their application in medical fields

CO6: To understand the concept of radioactivity

CO7: To understand the historical development of quantum mechanics.

CO8: To understand the characteristics of semiconductor diodes and transistors

CO9: To understand Number systems and its significance and Boolean algebra

SEMESTER 4

PH4CMT01: OPTICS & ELECTRICITY

CO1: To differentiate interference and diffraction

CO2: To understand the concept of Polarisation and its applications in real life.

CO3: To understand the basic principle and working of different lasers and its application in different areas.

CO4: To understand the principle of optical fibers and its applications

CO5: To understand the different dielectric materials

CO6: To understand the ideas regarding alternating currents and different circuits.

COMPLEMENTARY PHYSICS FOR CHEMISTRY AND GEOLOGY

SEMESTER 1

PH1CMT02: PROPERTIES OF MATTER AND THERMODYNAMICS

CO 1: To understand the basic principles of elasticity and to determine Young's modulus and Rigidity modulus by various methods.

CO2: To understand and analyze the basic concepts and principles of viscosity and surface tension.

CO3: To understand different thermodynamic systems and processes

SEMESTER 2

PH2CMT01: MECHANICS AND SUPERCONDUCTIVITY

CO 1: To understand the concept of velocity, acceleration and force

CO2: To understand the theory of Kater's pendulum and compound pendulum.

CO 3: To differentiate linear and angular motions

CO 4: To calculate the moment of Inertia of different bodies

CO 5: To understand and analyze the theory of wave motion

CO 6: To understand various aspects of oscillations

CO7: To understand the idea and applications of superconductivity

SEMESTER 3

PH3CMT01: MODERN PHYSICS AND MAGNETISM

CO1: To understand the ideas of Light-matter interaction

CO 2: To discuss the evolution of atom models

CO3: To differentiate between rotational and vibrational energies of a molecule.

CO4: To discuss the theory and applications of Raman effect.

CO5: To understand the basic principles of NMR and ESR spectroscopy and their application in medical fields

CO6: To understand the concept of radioactivity

CO7: To understand the historical development of quantum mechanics.

CO8: To understand the characteristics of semiconductor diodes and transistors

CO9: To understand the properties of different magnetic materials

SEMESTER 4

PH4CMT01: OPTICS & SOLID-STATE PHYSIC

CO1: To differentiate interference and diffraction

CO2: To understand the concept of Polarisation and its applications in real life.

CO3: To understand the basic principle and working of different lasers and its application in different areas.

CO4: To understand the principle of optical fibers and its applications

CO5: To understand the different dielectric materials

CO6: To understand the ideas regarding different crystal structures.