B.Sc Physics

Course Outcomes

The B.Sc Physics program has 13 courses offered in Physics during 6 semesters. A Course in Physics is offered in each of the first four semesters. The fourth semester has 4 courses in Physics and the sixth has 5 courses. The course outcomes of the different courses are stated here.

Semester.1

PH1CRT01: METHODOLOGY AND PERSPECTIVES OF PHYSICS (2017 Admission onwards)

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. It aims at inculcating passion for the subject in its learners and to help them revisit basic concepts. In addition to being introduced to concepts and developments in physics, by the end of this course, students should be well versed in vector analysis; concept of different number systems and their use; and calculation of errors in measurement.

Semester.2

PH2CRT02: MECHANICS AND PROPERTIES OF MATTER

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

Practical's Paper1

The practical paper offered in the first two semesters are Mechanics and Properties of Matter. The students are trained to develop skills in setting up of the experiment, acquisition of data, systematic analysis of the data and to estimate errors in measurement.

Semester.3

PH3B01U ELECTRONICS

This course aims for the student to learn the physical principles and applications of Electronics which is most necessary for a Physics student. The basic concepts of semiconductor devices, Transistors and their applications are being imparted in the course. On successful completion, a student is expected to design and analyze of electronic circuits,

Semester.4

ELECTRICITY AND ELECTRODYNAMICS

A course in electricity and electrodynamics is an essential component of physics programme at graduate level. This course is expected to provide a sound foundation in electricity and electrodynamics to the students. It describes the basic concepts in electricity and magnetism such as potential and field, the relationship between electric and magnetic fields, and identify and apply appropriate theoretical techniques to solve a range of different problems in electromagnetism.

Practical's Paper 2

The practical paper offered in third and fourth semester mainly contains experiments in electricity, magnetism and Electronics. Students are expected to gain expertise in assembling electrical and electronic circuits and familiarize themselves with the use of Cathode Ray Oscilloscope.

Semester.5

PH5B01U – Classical and Quantum Mechanics

This course is a prelude to advanced theoretical studies in Condensed Matter Physics, Spectroscopy, Astrophysics, Electrodynamics and Nuclear Physics. Students are expected to gain understanding about classical mechanics and get introduced to quantum concepts. Applications of quantum dynamics to fundamental problems is also part of this course. After the successful completion of this course, a student should be able to pinpoint the historical aspects of development of quantum mechanics, understand and explain the differences between classical

and quantum mechanics, understand the idea of wave function, understand the uncertainty relations, solve Schrodinger equation for simple potentials, identify and relate the eigenvalue problems for energy, momentum, angular momentum.

PH5B02U – Physical Optics and Photonics

This course aims to provide necessary foundation in optics and photonics which prepare the students for an intensive study of advanced topics at a later stage. This course provides students with a working knowledge of optical physics, including diffraction, polarization, interference, laser physics and fibre optics. The course aims at the understanding of light as a wave and the relevance of this to optical effects such as interference and diffraction, and hence to lasers and optical fibres.

PH5B03U – Thermal and Statistical Physics

This course is to develop 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. Identifying and describing the statistical nature of concepts and laws in thermodynamics, in particular: entropy, temperature, chemical potential, Free energies, partition functions are essential to this course. It also aims at applying the concepts and laws of thermodynamics to solve problems in thermodynamic systems such as gases, heat engines and refrigerators etc.

PH5B04U - Digital Electronics

This course is expected to provide necessary back ground for applications of electronics in mathematical computation. It will introduce number representation and conversion between different representation. Logic circuits will be introduced and students are trained to analyze logic processes and implement logical operations using combinational and sequential logic circuits.

Semester.6

PH6B01U - Computational Physics

This course is intended to give an insight to computer hardware and computer applications. Fundamentals of microprocessors are discussed and students are trained to write simple

microprocessor programs. Training is given in programming language C++ and are wards are made capable to do programming. Numerical methods are also discussed in this course.

PH6B02U – Nuclear and Particle Physics

This course intended to explore the interior of nucleus and interaction between nucleons. The course gives an overview of modern nuclear and particle physics, stressing fundamental concepts and processes. Methods of measurement and applications within other sciences and technology will be reviewed. When the course is completed the student should be able to explain the different properties of nuclei, models of nuclear structure, forms of radioactivity and account for their occurrence, account for the fission and fusion processes and classify elementary particles according to their quantum numbers.

PH6B03U –- Condensed Matter Physics

This course is intended to provide an introduction to the physics of Condensed Matter. Students are introduced to Crystal structure, free electron theory, Dielectric and magnetic properties of solids, superconductivity and material science. It provides an understanding of the crystal lattice and how the main lattice types are described, and help students to appreciate electronic band structure of metals and be able to discuss theory of conduction. It also enables them classify materials and introduces to areas such as nanotechnology.

PH6B04U - Relativity and Spectroscopy

This course is intended to introduce principles of spectroscopy and special theory of relativity. Concepts of special theory of relativity is discussed with special emphasis to develop problem solving skills. Atomic as well as molecular spectroscopy is discussed and the student will acquire basic knowledge of the interaction of radiation with matter and will be able to use the principles to understand molecular spectra. The student will recognize the relationship between molecular/atomic spectra and their properties.

Choice Based course:

PH6B05.1U – Astronomy and Astrophysics

A good introduction to the basics of astronomy and astrophysics will be given in the course. Students will be able to further develop critical/logical thinking, scientific reasoning, and problem solving skills in the area of astrophysics. Students will learn fundamental concepts in

astrophysics that will equip them to better understand new scientific discoveries made in the coming years and decades. They will have an understanding of the techniques and methods used to gain new knowledge in physics and astronomy. It is expected that some of the students will opt for this specialization for their post-graduation.

Practicals Paper 3,4,5,6

Experiments in Mechanics, Electronics, Digital Electronics, Optics &Computer programming are done under four papers. The students gain expertize in setting the experiments, analyze results handling lab equipment and to trouble shoot devices and circuits.

PH5D01.2U – Open course

Energy and Environmental Studies

The course creates concern among the students on energy conservation and environmental protection. On completion of the course, student should be able to identify key challenges and technologies in energy use, utilization of energy resources, energy conversion and environmental conse-quences. Impact of environmental pollution on ecology will also be discussed so that