

## **Program outcomes, program specific outcomes and course outcomes**

### ***PROGRAM OUTCOMES***

The program is designed to attract ambitious and talented students to pursue a career in Physics. The course is intended to provide a broad framework to the need of the students to understand the nature of physical laws and to appreciate the ever evolving nature of those laws. Students are motivated to acquire skills and knowledge in the subject and to use them for the good will of the society and human civilisation.

The aims and objectives of our UG course in Physics is structured to

1. Help the student to acquire the skills to comprehend textual graphical and Mathematical information.
2. Impart skills required to gather information from books and Internet and other resources and use them.
3. Acquire experimental skills in the lab and interpret the results of observation, including making an assessment of experimental uncertainties.
4. To use computer programming to simulate Physical problems and to create models.
5. Provide an intellectually stimulating environment to develop skills and enthusiasms of students to the best of their potential.
6. Provide the idea of the methodology of research and ethics of research.
7. Acquaint the student the need of documentation and familiarise different documentation tools and techniques.
8. Acquaint them various disciplines of Physics and Motivate the student to pursue a career in physics.
9. Acquaint them various online resources like MIT OCW, NPTEL etc and encourage them to get benefit from them.

The course is framed in such a way that it bridges the gap between the elementary and advanced levels of Physics by providing a more complete and logical framework in almost all areas of basic Physics.

## **Course Outcomes**

### **SEMESTER 1 - METHODOLOGY OF SCIENCE AND BASIC MECHANICS**

1. Understand the features, methods and limitations of science
2. Understand and apply the basic concepts of Newtonian Mechanics to physical systems.
3. Understand and apply the basic idea of work-energy theorem to different physical systems.
4. Understand the basic ideas of elasticity
5. Understand and apply the rotational dynamics of rigid bodies.

### **SEMESTER 2 - MECHANICS**

1. Understand the features of non-inertial systems and fictitious forces
2. Understand and analyze the features of central forces with respect to planetary motion.
3. Understand the basic ideas of harmonic oscillations
4. Understand and analyze the basic concepts of wave motion

### **SEMESTER 3 & 4-ELECTRODYNAMICS**

1. Understand and apply the fundamentals of vector calculus
2. Understand and analyze the electrostatic properties of physical systems
3. Understand the mechanism of magnetic field in matter.
4. Understand and analyze the properties of electromagnetic waves
5. Understand the behavior of transient currents
6. Understand and apply electrical network theorems

### **SEMESTER 5-COMPUTATIONAL PHYSICS**

1. Understand the Basics of Python programming
2. Understand the applications of Python modules
3. Understand the basic techniques of numerical analysis
4. Understand and apply computational techniques to physical problems

### **SEMESTER 5-ELECTRONICS**

1. Understand the basic principles of rectifiers and dc power supplies
2. Understand the principles of transistor
3. Understand the working and designing of transistor amplifiers and oscillator.
4. Understand the basic operation of OpAmp and its applications
5. Understand the basics of digital electronics

### **SEMESTER 5-THERMODYNAMICS**

1. Understand the zero and first laws of thermodynamics
2. Understand the thermodynamics description of the ideal gas
3. Understand the second law of thermodynamics and its applications
4. Understand the basic ideas of entropy
5. Understand the concepts of thermodynamic potentials and phase transitions

### **SEMESTER 5-STATISTICAL PHYSICS, SOLID STATE PHYSICS**

1. Understand the basic principles of statistical physics and its applications
2. Understand the basic aspects of crystallography in solid state physics
3. Understand the basic elements of spectroscopy
4. Understand the fundamental ideas of photonics

#### SEMESTER 6-NUCLEAR PHYSICS AND PARTICLE PHYSICS

1. Understand the basics of Nuclear Physics and Nuclear Structure
2. Describe the different types of nuclear reactions and their applications
3. Understand the principle and working of particle detectors
4. Describe the principle and working of particle accelerators
5. Understand the basic principles of elementary particle physics

#### SEMESTER 6-RELATIVISTIC MECHANICS AND ASTROPHYSICS

1. Understand the fundamental ideas of special relativity
2. Understand the basic concepts of general relativity and cosmology
3. Understand the basic techniques used in astronomy
4. Describe the evolution and death of stars
5. Describe the structure and classification of galaxies

#### SEMESTER 6-PRACTICAL

1. Apply and illustrate the concepts of properties of matter through experiments
2. Apply and illustrate the concepts of electricity and magnetism through experiments
3. Apply and illustrate the concepts of optics through experiments
4. Apply and illustrate the principles of electronics through experiments

#### SEMESTER 6-PROJECT

1. Understand research methodology U P 18
2. Understand and formulate a research project
3. Design and implement a research project
4. Identify and enumerate the scope and limitations of a research project