# Department of Physics

## Programme Specific outcomes

**PSO1** Students are expected to acquire acore knowledge in physics, including the major premises of classical mechanics, quantum mechanics, electromagnetic theory, electronics, optics, special theory of relativity and modern physics.

**PSO2** Students are also expected to develop a written and oral communication skills in communicating physics-related topics.

**PSO3** Students should learn how to design and conduct an experiment (or series of experiments) demonstrating their understanding of the scientific method and processes. Not only that they are expected to have an understanding of the analytical methods required to interpret and analyze results and draw conclusions as supported by their data.

**PSO4** Students will develop the proficiency in the acquisition of data using a variety of laboratory instruments and in the analysis and interpretation of such data.

**PSO5** Students will learn the applications of numerical techniques for modeling physical systems for which analytical methods are inappropriate or of limited utility.

**PSO6** Students will realize and develop an understanding of the impact of physics and science on society.

**PSO7** Apply conceptual understanding of the physics to general real-world situations.

**PSO8** Describe the methodology of science and the relationship between observation and theory.

**PSO9** Learn to minimize contributing variables and recognize the limitations of equipment.

**PSO10** Discover of physics concepts in other disciplines such as mathematics, computer science, engineering, and chemistry.

**PSO11** Develop the following experimental tools: Numerically model simple physical systems using Euler's method, curve fitting, and error analysis.

**PSO12** Analyze physical problems and develop correct solutions using natural laws.

## Course Outcomes

**Principles of Physics:**

**Modern Physics:**

**CO1:** Develop the concepts of modern physics: basic knowledge of special theory of relativity and general theory of relativity, elementary quantum mechanics, nuclear physics, and particle physics.

**CO2:** Understand the relationship between observation and theory and their use in building the basic concepts of modern physics.

**CO3:** Understand how major concepts developed and changed over time.

**CO4:** Capable of analyzing and solving problems using oral and written reasoning skills based on the concepts of modern physics.

**CO5:** Ability to prepare and organize a presentation on the application of modern physics to modern technology.

**Wave optics**

**CO1:** Understand the basic concepts of wave optics and an ability to compute basic quantities in optics.
**CO2:** Learn to use methods for solving differential equations.
**CO3:** Experience the diverse applications of the wave equation.

**Solid State Physics**

**CO1:** Understand basic concepts and mathematical methods of solid state physics.
**CO2:** Practice problem solving by using selected problems in solid state physics.
**CO3:** Explore important connections between theory, experiment, and current applications.
**CO4:** Develop a basis for future learning and work experience.

**Nuclear and Particle Physics**

**CO1:** Acquire knowledge in the content areas of nuclear and particle physics, focusing on concepts that are commonly used in this area.
**CO2:** Develop and communicate analytical skills in subatomic physics.
**CO3:** Develop familiarity with the vast areas of nuclear and particle physics as well as develop an interest in these subjects.

**Classical Mechanics**

**CO1:** Understand the terminology used in Classical Mechanics.
**CO2:** Employ conceptual understanding to make predictions, and then approach the problem mathematically.
**CO3:** Understand the important connections between theory and experiment.
**CO4:** Connect concepts and mathematical rigor in order to enhance understanding.

**Electricity and Magnetism**

**CO1:** Know the vocabulary and concepts of physics as it applies to: Principles of Electric Fields, Gauss's Law, Electric Potential, Capacitance and Dielectrics, Current and Resistance, Direct Current Circuits, Magnetic Fields, Sources of Magnetic Fields, Faraday's Law, Inductance, Alternating Current Circuits, and Electromagnetic Waves.
**CO2:** Understand the relationship between electrical charge, electrical field, electrical potential, and magnetism.
**CO3:** Be able to use electromagnetic theory and principles in a wide range of applications.
**CO4:** Learn a variety of advanced mathematical methods and computer techniques.
**CO5:** Develop skill to solve numerical problems on it.

**CO6:** Solve mathematical problems involving electric and magnetic forces, fields, and various electro-magnetic devices and electric circuits.
**CO7:** Develop explicit problem-solving strategies that emphasize qualitative analysis steps to describe and clarify the problem.
**CO8:** Gain confidence in their ability to apply mathematical methods to understand electro-magnetic problems to real-life situations.

**Principles of Optics**

**CO1:** To develop an understanding of the principles of optics.
**CO2:** To build connections between mathematical development and conceptual understanding.

**Thermal and Statistical Physics**

**CO1:** Understand how statistics of the microscopic world can be used to explain the thermal features of the macroscopic world.
**CO2:** Be able to use thermal and statistical principles in a wide range of applications.
**CO3:** Learn a variety of mathematical and computer techniques.

**Quantum Mechanics**

**CO1:** Learn the mathematical tools needed to solve quantum mechanics problems. This will include complex functions and Hilbert spaces, and the theory of operator algebra. Solutions of ordinary and partial differential equations that arise in quantum mechanics will also be studied.
**CO2:** Develop problem solving methods that will include mathematical as well as numerical computations and solutions.
**CO3:** Build connections between mathematical development and conceptual understanding.

**Atomic Physics**

**CO1:** Apply the mathematical tools developed to various quantum mechanics problems.
**CO2:** Develop problem solving methods that will include mathematical as well as numerical computations and solutions.
**CO3:** Build connections between mathematical development and conceptual understanding.