Department of Physics SCS GDC Mendhar

FYUP-NEP2020

Program Outcomes, Program Specific Outcomes and Course Outcomes

Programme Outcomes (PO):

Students will have the opportunity to learn and master the following components in addition to attaining essential skills and abilities:

PO	Component	Outcomes
PO-1	Basic knowledge	Capable of delivering basic disciplinary knowledge gained during the programme.
PO-2	In-depth knowledge	Capable of delivering advanced knowledge gained during the programme.
PO-3	Critical thinking and problem-solving ability.	Capable of analysing the results critically and applying acquired knowledge to solve problems.
PO-4	Creativity and Innovation	Capable of identifying, formulating, investigating, and analysing scientific problems and innovatively designing, creating products and solving real-life issues.
PO-5	Research aptitude and global competency	Ability to develop a research aptitude and apply knowledge to find research problems in the concerned and associated fields at the national and international levels.
PO-6	Holistic and multidisciplinary education.	Ability to gain knowledge with a holistic multidisciplinary approach across the fields.
PO-7	Skills enhancement	Learn disciplinary or multidisciplinary skills and advanced techniques and apply them for the employment in Govt and private sector and also being the contributed citizen of India.
PO-8	Leadership and teamwork abilities	Ability to learn and work in groups and capable of leading a team.
PO-9	Environmental and human health awareness	Learn important aspects associated with environmental and human health. Ability to develop eco-friendly technologies.

PO-10	Ethical thinking and social awareness	Inculcate the professional and ethical attitude and ability to relate to social problems.
PO-11	lifelong learning skills and Entrepreneurship	Ability to develop lifelong learning skills which are important to provide better opportunities and improve quality of life. Capable of establishing independent startup/innovation centres etc.

Programme Specific Outcomes (PSOs) in Physics:

Programme-specific outcomes include subject-specific skills and generic skills, including transferable global skills and competencies, the achievement of which the students of a specific programme of study should be able to demonstrate for the award of the degree. The programme-specific outcomes would also focus on knowledge and skills that prepare students for further study, employment and becoming a concerned citizen. They help to ensure the comparability of learning levels and academic standards across universities and provide a broad picture of the level of competence of graduates of a given programme of study. The attainment of PSOs for a programme is computed by accumulating PSO attainment in all the courses comprising the programme.

PSOs	Component	Outcomes
PSO-1	Basic Concept	Ability to interpret and analyse various concepts of advanced Physics so that students will be able to demonstrate proficiency in mathematical concepts generally needed for a proper understanding of Physics.
PSO-2	Understanding Problems	Proper understandings are required in Physics which will inculcate the analytical approach and logical thinking.
PSO-3	Understanding of the subject	Students will acquire core knowledge in the different major fields of Physics, including the major premises of Modern Physics, Quantum and Classical mechanics, Digital Electronics, Atomic, Molecular and Nuclear Physics, Solid-State Physics, Mechanics and Properties of Matter, Electricity and Magnetism, Optics, Relativity, Heat and Thermodynamics, Mathematical and Statistical Physics, Laser, and non-conventional energy sources.

PSO-4	Laboratory Knowledge	Students will learn how to apply the theoretical concepts into the practical fields of Physics. Moreover, students will develop proficiency in handling laboratory instruments.
PSO-5	Application of the subject	Students will realize and develop an understanding of the impact of Physics on society and apply conceptual understanding of physics in real life.
PSO-6	Motivation for research	Students will develop an aptitude for doing research through undertaking small projects and various research activities in different fields of Physics.

COURSE OUTCOMES IN PHYSICS

Modern Physics

Completion of this course will enable the students

CO1: to understand the importance of modern physics and its concepts.

CO2: to understand Einstein's relativity phenomena and Newtonian Mechanics.

CO3: to know about the behaviour of Plasma, a fourth state of matter and their behaviour in electric and magnetic fields.

CO4: to understand medical instruments working on the concepts of physics laws, about the sun and its atmosphere.

Quantum Mechanics

Completion of this course will enable the students

CO1: to understand the importance of quantum mechanics compared to classical mechanics at a microscopic level.

CO2: to understand various tools to calculate Eigenvalues and total angular momentum of particles.

CO3: to understand Schrodinger’s equation for spherical symmetric potential, a complete solution of the hydrogen atom.

CO4: to understand atoms in external electric and magnetic fields.

CO5: to learn the mathematical tools needed to solve quantum mechanics problems. This will include complex functions Hilbert spaces, and the theory of operator algebra.

CO6: to understand ordinary and partial differential equations that arise in quantum mechanics will also be studied.

Nuclear and Particle Physics

Completion of this course will enable the students

CO1: to have an understanding of the basic properties of the nucleus and nuclear models to study the nuclear structure properties.

CO2: to understand various aspects of nuclear reactions will give an idea of how nuclear power can be generated.

CO3: to understand nuclear fission and fusion phenomenon and basic elementary particles.

Electronics

Completion of this course will enable the students

CO1: to understand the importance of electronic circuits from micro to nano levels and their working in the field of electronics.

CO2: to plays a pivotal role in the field of semiconductor devices in the present era.

CO3: to inculcate the creative aptitude among the students to design and re-design the electric signals in the field of communication and other technological advancement.

Digital Electronics and Applications

Completion of this course will enable the students

CO1: to understand the logical behaviour of digital circuits.

CO2: to understand the advantages and disadvantages of programmable logic devices Know how to describe digital hardware using a software-style language.

CO3: to understand how a basic digital circuit can be built from standard building blocks.

Mathematical Physics

Completion of this course will enable the students

CO1: to have an understanding of various techniques to solve differential equations.

CO2: how to use vector calculus in various physics problems.

CO3: to use advanced mathematical methods and theories on various mathematical and physical problems.

CO4: to understand matrix and partial differential equations.

Classical Mechanics

Completion of this course will enable the students

CO1: to articulate and describe relative motion, Inertial and non-inertial reference frames.

CO2: to understand parameters defining the motion of mechanical systems, study of the interaction of forces between solids in mechanical systems.

CO3: to have a deep understanding of the centre of mass of mechanical systems, laws of motion and conservation principles.

CO4: to understand Lagrangian and Hamiltonian formulation.

Electricity and Magnetism

Completion of this course will enable the students

CO1: to understand the relationship between electrical charge, electrical field, electrical potential, and magnetism.

CO2: to solve numerical problems involving topics covered, define the magnetic field and magnetic flux, and technical problems.

CO3: to calculate the magnitude and direction of the magnetic field for symmetric current distributions using the Law of Biot-Savart and Ampere's Law.

CO4: to understand the 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.

CO5: to solve mathematical problems involving electric and magnetic forces, fields, and various electromagnetic devices and electric circuits.

Waves and Optics

Completion of this course will enable the students

CO1: to understand the role of the wave equation and the universal nature of wave motion.

CO2: to understand the superposition of harmonic waves. Understand interference and diffraction (Fraunhofer and Fresnel diffraction).

CO3: to understand optical phenomena such as polarization through the lab course, understand the principles of measurement and error analysis and develop skills in experimental design.

Statistical and Thermal Physics

Completion of this course will enable the students

CO1: to know the basics of thermal physics and make use of different problem-solving techniques in the field.

CO2: to understand the kinetic theory of gases: Maxwell –Boltzmann distribution law, Brownian motion etc.

CO3: to understand the behaviour of real gases, and to understand how statistics of the microscopic world can be used to explain the thermal features of the macroscopic world.

CO4: to use thermal and statistical principles in a wide range of applications. Learn a variety of mathematical techniques. Understand Bose-Einstein and Fermi Dirac statistics.

Electromagnetic Theory

Completion of this course will enable the students

CO1: to apply vector calculus to understand the behaviour of static electric and magnetic fields in standard configurations.

CO2: to describe and analyze electromagnetic wave propagation in free space.

CO3: to describe and analyze transmission lines, and understand the basics of fiber optics.

Solid State Physics

Completion of this course will enable the students

CO1: will have an understanding of structures in solids and their determination using XRD.

CO2: to analyze the behaviour of electrons in solids including the concept of energy bands and the effect of the same on material properties.

CO3: will understand the magnetic and dielectric properties of solids, and practice problem-solving by using selected problems in solid-state physics.

Spectroscopy

Completion of this course will enable the students

CO1: to understand the importance of atoms and molecular structure and their behaviour of rotation, vibration, and interatomic distances through spectroscopy.