MEWAR UNIVERSITY

B.SC. (PCM)

Program Outcomes

At the end of the program, the student will be able to:

PO	Outcome
PO-1	**Disciplinary knowledge:** The basic objective of this programme to impart knowledge of science
PO-2	**Designing Solutions:** To develop skill in practical work, experiments and laboratory materials and equipment's along with the collection and interpretation of scientific data to contribute to science.
PO-3	**Modern tool usage:** The students will be able to learn necessary computational skill, use of technology and use of ICT required for an effective learning experience
PO-4	**Employability:The**programme makes the students ready to take up jobs in various sectors such as research labs, chemical industry, testing laboratories, software company, banks, governments organizations, etc.
PO-5	**Lifelong Learning :** The students will be eligible to appear for the examinations for their jobs in government organizations
PO-6	**Communication Skill:** Communicate effectively on scientific activities by participating in science related activities, writing effective reports and making effective presentations.
PO-7	**Research Skills** Theprogramme leads the students to the advanced studies i.e. M. Sc and then do some research in multi and inter-disciplinary science for the welfare of the society.

MEWAR UNIVERSITY

B.SC. (PCM)

Program Specific Outcomes (PSOs):

After completing B.Sc. the student should have:

PSO1: Students should be able to do better and more effective communication of Mathematics, Physics and Chemistry.

PSO2: Students should be able to illustrate mathematical ideas from basic theorems and axioms.

PSO3: Students should be able to apply Mathematics/Physics/Chemistry to solve and analyze theoretical problems.

PSO4: Students should be able to identify applications of mathematics/Physics/Chemistry in other disciplines in the real world, leading to the enhancement of career prospects in a relevant field and research.

PSO5: Acquire ability to face competitive exams for higher study in a chosen subject and procedural knowledge required for professional engagement in research, industry, teaching or other service.

PSO6: Understand good laboratory practices and safety and develop research oriented skills

MEWAR UNIVERSITY

B.SC. (PCM)

COURSE OUTCOMES:

MATHEMATICS SUBJECTS:

Calculus

CO-1: Apply fundamental concepts of calculus to solve problems in real-life scenarios.

CO-2: Analyze and interpret functions, limits, and continuity using calculus techniques.

CO-3: Demonstrate proficiency in differentiating and integrating various types of functions.

CO-4: Apply calculus principles to solve optimization and related rate problems.

CO-5: Utilize calculus methods to model and solve problems involving growth, decay, and accumulation.

Differential Equations

CO-1: Apply the principles of differential equations to model and analyze real-world phenomena and systems.

CO-2: Solve ordinary and partial differential equations using appropriate methods and techniques, including separation of variables, integrating factors, power series, and Laplace transforms.

CO-3: Analyze and interpret the solutions of differential equations in terms of the underlying physical or mathematical concepts, and draw meaningful conclusions from the results.

CO-4: Employ numerical methods and computational tools to approximate solutions of differential equations when exact solutions are not feasible or readily available.

CO-5: Formulate and solve higher-order linear and nonlinear differential equations, including systems of differential equations, and assess the stability and behavior of their solutions.

Algebra

CO-1: Apply algebraic concepts and techniques to solve mathematical problems in various domains, including linear equations, quadratic equations, polynomial functions, and systems of equations.

CO-2: Analyze and interpret mathematical relationships using algebraic expressions, equations, and inequalities, and utilize them to model and solve real-world problems across different fields of study.

CO-3: Demonstrate proficiency in manipulating algebraic expressions, including simplifying, factoring, expanding, and solving equations involving radicals, logarithms, and exponents.

CO-4: Develop logical and critical thinking skills to solve complex algebraic problems by employing deductive reasoning, mathematical induction, and proof techniques.

CO-5: Apply algebraic concepts to comprehend and interpret graphs, functions, and their transformations, including linear, quadratic, exponential, and logarithmic functions, enabling the analysis of data and patterns in diverse contexts.

Real Analysis

CO-1: Apply fundamental concepts and theorems of real analysis to solve mathematical problems and analyze mathematical structures.

CO-2: Formulate and prove mathematical statements using rigorous logical reasoning and techniques from real analysis.

CO-3: Demonstrate a deep understanding of limits, continuity, and differentiability of real-valued functions and their applications in various mathematical contexts.

CO-4: Analyze and evaluate the convergence and divergence of sequences and series, including power series, and apply relevant convergence tests.

CO-5: Utilize techniques from real analysis to study the properties of functions, including their integrability, uniform convergence, and applications to the calculation of areas and volumes.

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PHYSICS SUBJECTS:

Mechanics

CO-1: Apply the principles of classical mechanics to analyze and solve problems related to the motion of particles and rigid bodies.

CO-2: Demonstrate proficiency in mathematical techniques and tools, such as calculus and vector algebra, to formulate and solve problems in mechanics.

CO-3: Evaluate and interpret experimental data to validate theoretical concepts and laws in mechanics, and effectively communicate the results through written and oral presentations.

CO-4: Analyze and design mechanical systems by applying the principles of statics and dynamics, including the equilibrium of forces and moments, and the study of motion under various conditions.

CO-5: Demonstrate an understanding of fundamental concepts in mechanics, such as kinematics, dynamics, work-energy theorem, conservation laws, and rotational motion, and their applications in practical engineering problems.

Electricity & Magnetism

CO-1: Apply the laws of electricity and magnetism to analyze and solve complex electrical and magnetic problems.

CO-2: Demonstrate an understanding of the principles and theories related to electric and magnetic fields, including Gauss's Law, Ampere's Law, and Faraday's Law.

CO-3: Design and analyze circuits involving resistors, capacitors, and inductors, taking into account the behavior of these components in both DC and AC circuits.

CO-4: Explain the phenomenon of electromagnetic induction and its applications in various devices and systems, such as generators and transformers.

CO-5: Evaluate the behavior of electric and magnetic fields in different media and understand the concept of electromagnetic waves, including their generation, propagation, and interaction with matter.

Thermodynamics

CO-1: Apply the laws of thermodynamics to analyze and solve problems related to energy transfer, heat, work, and the behavior of substances.

CO-2: Evaluate and interpret the properties of pure substances and mixtures using thermodynamic principles and equations of state.

CO-3: Analyze and design thermodynamic cycles and processes, such as power cycles, refrigeration cycles, and heat exchangers, for practical applications.

CO-4: Apply thermodynamic principles to analyze the performance and efficiency of various energy conversion systems, including engines, turbines, and power plants.

CO-5: Demonstrate proficiency in utilizing thermodynamic concepts to analyze and design systems for sustainable energy utilization and environmental impact assessment.

Optics

CO-1: Apply the principles of geometrical optics to analyze and predict the behavior of light in various optical systems.

CO-2: Demonstrate an understanding of the wave nature of light and its interactions with different materials and surfaces.

CO-3: Design and perform experiments related to optics, and analyze and interpret the obtained results using appropriate mathematical and statistical methods.

CO-4: Identify and explain the fundamental concepts and phenomena in the field of modern optics, including diffraction, interference, polarization, and optical instruments.

CO-5: Apply the principles of optics to real-world applications, such as optical communication systems, laser technology, and imaging devices, and evaluate their performance and limitations.

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MEWAR UNIVERSITY

B.SC. (PCM)

CHEMISTRY SUBJECTS:

ATOMIC STRUCTURE, BONDING, GENERAL ORGANIC CHEMISTRY & ALIPHATIC HYDROCARBONS

CO-1: Demonstrate a comprehensive understanding of the fundamental principles and theories of atomic structure, bonding, and general organic chemistry.

CO-2: Apply the knowledge of atomic structure and bonding to predict the properties and reactivity of elements, compounds, and molecules.

CO-3: Analyze and interpret the various types of chemical bonding, including covalent, ionic, and metallic bonding, to explain the formation and stability of chemical species.

CO-4: Describe the nomenclature, classification, and reactions of aliphatic hydrocarbons, including alkanes, alkenes, and alkynes, and predict their physical and chemical properties based on their structures.

CO-5: Apply the principles of aliphatic hydrocarbons and their reactions to solve problems related to organic synthesis, functional group transformations, and structure-activity relationships.

PRACTICLE/TUTE: ATOMIC STRUCTURE, BONDING, GENERAL ORGANIC CHEMISTRY & ALIPHATIC HYDROCARBONS

CO-1: Apply principles of atomic structure to interpret and predict the behavior of elements and compounds in the laboratory.

CO-2: Analyze and differentiate between various types of chemical bonds and their effects on the properties and reactivity of substances.

CO-3: Demonstrate proficiency in laboratory techniques and procedures related to general organic chemistry and aliphatic hydrocarbons.

CO-4: Utilize spectroscopic methods and instrumentation to identify functional groups and characterize organic compounds.

CO-5: Design and perform experiments to synthesize and purify aliphatic hydrocarbons, and analyze their physical and chemical properties.

CHEMICAL ENERGETICS, EQUILIBRIA & FUNCTIONAL ORGANIC CHEMISTRY

CO-1: Analyze the principles and concepts of chemical energetics and equilibria in order to explain the thermodynamics and kinetics of chemical reactions.

CO-2: Apply the laws of thermodynamics and equilibrium concepts to solve numerical problems related to chemical reactions, including the calculation of enthalpy, entropy, and free energy changes.

CO-3: Evaluate the factors that influence chemical equilibria, such as temperature, pressure, concentration, and catalysts, and predict the direction of reactions based on Le Chatelier's principle.

CO-4: Demonstrate an understanding of functional organic chemistry by identifying and classifying different functional groups, as well as explaining their chemical reactivity and significance in organic compounds.

CO-5: Apply the principles of functional group transformations, reaction mechanisms, and organic synthesis to design and propose synthetic routes for the preparation of specific organic compounds.

PRACTICLE/TUTE: CHEMICAL ENERGETICS, EQUILIBRIA & FUNCTIONAL ORGANIC CHEMISTRY

CO-1: Apply principles of chemical energetics to analyze and interpret thermodynamic data in the context of chemical reactions.

CO-2: Demonstrate proficiency in performing laboratory experiments related to chemical equilibria, including determination of equilibrium constants and understanding factors that affect equilibrium.

CO-3: Analyze and predict the behavior of functional organic compounds through qualitative and quantitative analysis, using appropriate techniques and instrumentation.

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CO-4: Apply theoretical concepts and experimental techniques to investigate the reaction kinetics of organic compounds and determine rate laws and rate constants.

CO-5: Develop skills in data analysis, interpretation, and report writing, including the accurate documentation of experimental procedures, observations, and results in a scientific format.

SOLUTIONS, PHASE EQUILIBRIUM, CONDUCTANCE, ELECTROCHEMISTRY & FUNCTIONAL GROUP ORGANIC CHEMISTRY-II

CO-1: Analyze and apply the principles of solutions and phase equilibrium in chemical systems.

CO-2: Evaluate the conductance of electrolytes and its correlation to the concentration and temperature, applying the relevant theories and concepts.

CO-3: Examine the principles of electrochemistry and its applications in various chemical processes, including batteries, corrosion, and electroplating.

CO-4: Apply the knowledge of functional groups in organic chemistry to identify, classify, and predict the reactivity and properties of organic compounds.

CO-5: Formulate and solve problems related to the interplay between solution properties, phase equilibrium, conductance, electrochemistry, and functional group organic chemistry, demonstrating critical thinking and problem-solving skills.

PRACTICLE/TUTE: SOLUTIONS, PHASE EQUILIBRIUM, CONDUCTANCE, ELECTROCHEMISTRY & FUNCTIONAL ORGANIC Lab:

CO-1: Apply theoretical concepts and principles related to solutions, phase equilibrium, conductance, electrochemistry, and functional group organic chemistry to analyze and interpret experimental data accurately.

CO-2: Demonstrate proficiency in handling and manipulating laboratory equipment and apparatus, including various types of glassware, electrodes, conductivity meters, and pH meters, to perform experiments effectively and safely.

CO-3: Design and conduct experiments to determine various solution properties, such as colligative properties, pH, conductivity, and electrochemical parameters, while adhering to established laboratory protocols and safety guidelines.

CO-4: Analyze experimental results using appropriate statistical methods, graphical representations, and mathematical calculations to draw meaningful conclusions and identify trends or patterns in the data.

CO-5: Communicate scientific findings and observations effectively through well-organized laboratory reports, including concise summaries, detailed procedures, accurate calculations, and insightful discussions, following the standard format and scientific writing conventions.

TRANSITION METAL & COORDINATION CHEMISTRY, STATES OF MATTER & CHEMICAL KINETICS

CO-1: Analyze the principles of coordination chemistry and demonstrate a comprehensive understanding of the structure, bonding, and properties of transition metal complexes.

CO-2: Apply the theories and concepts of coordination chemistry to predict the geometries, electronic configurations, and magnetic properties of transition metal complexes.

CO-3: Evaluate the role of ligands in coordination chemistry and their effects on the reactivity, stability, and color of transition metal complexes.

CO-4: Investigate the physical properties of states of matter, including solids, liquids, and gases, and explain their behavior based on the underlying principles of intermolecular forces and molecular interactions.

CO-5: Examine chemical kinetics and reaction rates, and utilize mathematical models to analyze and predict the factors affecting the rate of chemical reactions, including temperature, concentration, and catalysts.

PRACTICLE: TRANSITION METAL & COORDINATION CHEMISTRY, STATES OF MATTER & CHEMICAL KINETICS

CO-1: Identify and describe the key properties and characteristics of transition metals and coordination compounds, including their electronic configurations, oxidation states, and bonding behavior.

CO-2: Apply spectroscopic techniques, such as UV-Vis and IR spectroscopy, to analyze and identify transition metal complexes and coordination compounds, and interpret the obtained spectra.

CO-3: Perform various laboratory techniques and procedures to synthesize and characterize transition metal complexes and coordination compounds, including the determination of their melting points, solubilities, and coordination geometries.

CO-4: Demonstrate an understanding of the principles and factors influencing the states of matter, such as intermolecular forces, phase transitions, and colligative properties, through experimental investigations and data analysis.

CO-5: Analyze and interpret experimental data to study chemical kinetics, including the determination of reaction orders, rate constants, and mechanisms, and apply mathematical models to predict reaction rates and design reaction schemes.

ANALYTICAL METHODS IN CHEMISTRY

CO-1: Apply mathematical and statistical methods to analyze chemical data and draw meaningful conclusions.

CO-2: Demonstrate proficiency in using various analytical techniques and instruments for qualitative and quantitative chemical analysis.

CO-3: Design and execute experiments to determine the composition and properties of chemical substances using appropriate analytical methods.

CO-4: Evaluate and interpret experimental data using statistical tools and present the results effectively in written and graphical formats.

CO-5: Apply critical thinking and problem-solving skills to troubleshoot analytical challenges and propose appropriate solutions in the field of chemistry.

PRACTICLE: ANALYTICAL METHODS IN CHEMISTRY

CO-1: Apply fundamental principles of analytical chemistry to perform accurate and precise measurements in a laboratory setting.

CO-2: Demonstrate proficiency in handling and utilizing various laboratory instruments and equipment commonly used in analytical chemistry.

CO-3: Analyze and interpret experimental data obtained from chemical experiments using appropriate statistical and mathematical methods.

CO-4: Develop practical skills in performing qualitative and quantitative analysis of chemical samples using standard analytical techniques and procedures.

CO-5: Demonstrate effective communication of laboratory findings through comprehensive and well-structured scientific reports.

INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS

CO-1: Demonstrate proficiency in utilizing various instrumental methods for chemical analysis, including spectroscopy, chromatography, and electrochemical techniques.

CO-2: Apply theoretical knowledge to analyze and interpret experimental data obtained from instrumental methods to determine the composition, structure, and properties of chemical substances.

CO-3: Develop practical skills in operating and maintaining advanced laboratory instruments used in chemical analysis, ensuring accuracy, precision, and safety.

CO-4: Evaluate and troubleshoot instrumental methods to identify potential sources of error, optimize analytical procedures, and enhance the reliability and sensitivity of chemical measurements.

CO-5: Apply critical thinking and problem-solving skills to design and execute experiments, validate analytical methods, and make informed decisions regarding the selection and application of instrumental techniques in chemical analysis.

PRACTICLE: INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS

CO-1: Perform accurate and precise chemical analysis using instrumental methods.

CO-2: Apply various instrumental techniques to identify and quantify chemical substances in complex samples.

CO-3: Evaluate and interpret experimental data obtained from instrumental methods to draw meaningful conclusions.

CO-4: Demonstrate proficiency in the operation and maintenance of modern laboratory instruments used in chemical analysis.

CO-5: Apply quality control and assurance principles to ensure the reliability and validity of analytical results obtained through instrumental methods.

MEWAR UNIVERSITY

M.SC. PHYSICS

Program Outcomes

Graduates will be able to:

PO-1	**Disciplinary knowledge:** Acquired substantial and deep knowledge in Physics, with advanced knowledge in some specialized areas of physics.
PO-2	**Problem solving :**To apply knowledge of physics and to solve advanced scientific problems
PO-3	**Advance learning :**learn advanced condensed matter physics, nano science and material sciences.
PO-4	**Professional Ethics:** Attain the relevant knowledge and skills to identify unethical behavior and truthful actions in all aspects and demonstrate standard professional ethics in the discipline concerned.
PO-5	**Leadership Skills:** Devolve the ability of leadership and work with the team in multidisciplinary approach.
PO-6	**Research Skills:** Students have research experience within a specific field of physics, through a supervised project
PO-7	**Communication:** Communicate effectively on scientific activities by participating in science related activities, writing effective reports and making effective presentations.
PO-8	**Lifelong Learning:** Ability to seek new knowledge and skills and inculcate the habit of self-learning throughout life and adapting to contemporary demands of workplace.

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MEWAR UNIVERSITY

M.SC. PHYSICS

Program Specific Outcomes

PSO-1 Understand the basic and advance concepts of different branches of physics.

PSO-2 Perform and design experiments in the areas of electronics, atomic, nuclear, condensed matter, and computational physics.

PSO-3 Apply the concepts of physics in specialized areas of condensed, nuclear, particle physics, etc., in industry, academia, research and day today life.

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MEWAR UNIVERSITY

M.SC. PHYSICS

COURSE OUTCOMES

MATHEMATICAL METHODS IN PHYSICS

CO-1: Apply advanced mathematical techniques to solve complex problems in physics.

CO-2: Analyze and interpret mathematical models to describe physical phenomena and their relationships.

CO-3: Employ mathematical tools to formulate and solve differential equations, integral equations, and boundary value problems in physics.

CO-4: Utilize mathematical methods such as vector calculus, complex analysis, and Fourier analysis in the analysis of physical systems.

CO-5: Develop mathematical reasoning and critical thinking skills to assess the validity and limitations of mathematical models in physics.

CLASSICAL MECHANICS

CO-1: Apply the fundamental principles of classical mechanics to analyze and solve problems related to the motion of particles and rigid bodies.

CO-2: Demonstrate a deep understanding of Newtonian mechanics, including the laws of motion, conservation principles, and the concepts of work, energy, and power.

CO-3: Analyze and interpret the behavior of systems under various forces, such as gravitational, electromagnetic, and frictional forces, using mathematical and computational techniques.

CO-4: Critically evaluate and apply Lagrangian and Hamiltonian formalisms to describe and analyze complex mechanical systems, including constrained systems and oscillatory motion.

CO-5: Apply mathematical methods, such as differential equations and vector calculus, to model and solve problems in classical mechanics, including projectile motion, rotational dynamics, and orbital motion.

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M.SC. PHYSICS

QUANTUM MECHANICS – I

CO-1: Apply the principles of quantum mechanics to analyze the behavior of elementary particles and systems, demonstrating a deep understanding of wave-particle duality and the probabilistic nature of quantum phenomena.

CO-2: Utilize mathematical formalism, including the Dirac notation, matrix representations, and operator algebra, to describe and solve quantum mechanical problems, such as particle-in-a-box, harmonic oscillator, and angular momentum.

CO-3: Analyze and interpret experimental results and observations in the field of quantum mechanics, demonstrating the ability to connect theoretical concepts with experimental outcomes and evaluate the limitations of classical physics in explaining quantum phenomena.

CO-4: Apply the principles of quantum mechanics to explain and predict the behavior of simple quantum systems, including atomic and molecular systems, with emphasis on the calculation of energy levels, transition probabilities, and selection rules.

CO-5: Critically evaluate the foundational principles and interpretations of quantum mechanics, including the Copenhagen interpretation, wavefunction collapse, and the measurement problem, and demonstrate an awareness of current research and debates in the field.

ELECTRONICS

CO-1: Analyze and interpret the fundamental principles and concepts of electronics in the context of M.Sc. Physics.

CO-2: Apply theoretical knowledge of electronics to design and analyze electronic circuits and systems.

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CO-3: Evaluate and troubleshoot electronic devices, circuits, and systems using appropriate testing and measurement techniques.

CO-4: Investigate and critically evaluate the performance and limitations of electronic devices and circuits.

CO-5: Synthesize and develop innovative solutions for complex electronic problems using advanced theoretical concepts and practical techniques.

ELECTRODYNAMICS-I

CO-1: Apply Maxwell's equations to analyze the behavior of electric and magnetic fields in various situations.

CO-2: Describe the principles of electrostatics and magnetostatics and their relevance in understanding the behavior of charged particles and magnetic materials.

CO-3: Analyze the interaction between electric and magnetic fields, and the resulting phenomena, such as electromagnetic induction and electromagnetic waves.

CO-4: Demonstrate proficiency in mathematical techniques, such as vector calculus and differential equations, necessary for solving problems in electrodynamics.

CO-5: Apply theoretical concepts of electrodynamic principles to practical applications in areas such as electromagnetism, electronics, telecommunications, and power systems.

ELECTRONICS LAB

CO-1: Analyze and interpret the fundamental concepts of electronics, such as circuits, components, and devices, in the context of experimental setups.

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CO-2: Apply theoretical knowledge to design and construct electronic circuits, ensuring proper functioning and desired outcomes.

CO-3: Develop practical skills in using various electronic measurement instruments and tools for data acquisition and analysis.

CO-4: Demonstrate proficiency in troubleshooting electronic circuits, identifying faults, and implementing effective solutions.

CO-5: Evaluate and document experimental results, draw meaningful conclusions, and effectively communicate findings through written reports and presentations.

COMPUTATIONAL METHODS IN PHYSICS

CO-1: Apply computational techniques to solve complex problems in various branches of physics, such as classical mechanics, quantum mechanics, electromagnetism, and statistical mechanics.

CO-2: Analyze and interpret numerical results obtained from computational simulations and experiments, and effectively communicate the findings through written reports and presentations.

CO-3: Develop computer programs using appropriate programming languages and libraries, and utilize numerical methods to model and simulate physical phenomena accurately.

CO-4: Assess the limitations and sources of errors in computational models and simulations, and propose strategies to improve the accuracy and efficiency of numerical calculations in physics.

CO-5: Evaluate the ethical and social implications of computational methods in physics, including issues related to data privacy, scientific integrity, and the responsible use of computational tools in research and development.

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MEWAR UNIVERSITY

M.SC. PHYSICS

QUANTUM MECHANICS – II

CO-1: Apply advanced mathematical techniques to solve complex quantum mechanical problems, demonstrating proficiency in the use of linear algebra, differential equations, and calculus in the context of quantum mechanics.

CO-2: Analyze and interpret the behavior of quantum systems, including the calculation of energy levels, transition probabilities, and wave functions, using appropriate mathematical formalisms such as matrix mechanics and wave mechanics.

CO-3: Demonstrate a deep understanding of the principles and concepts of quantum mechanics, including wave-particle duality, the uncertainty principle, and the postulates of quantum mechanics, and apply this understanding to analyze and explain experimental phenomena.

CO-4: Design and conduct experiments to investigate quantum mechanical phenomena, effectively utilizing specialized laboratory equipment and techniques, and demonstrate the ability to analyze and interpret experimental data to validate or refute theoretical predictions.

CO-5: Evaluate and critically analyze advanced topics in quantum mechanics, such as quantum entanglement, quantum computing, and quantum information theory, and apply this knowledge to propose innovative solutions and applications in various fields, including quantum technology and quantum information science.

QUANTUM ELECTRODYNAMICS AND PLASMA PHYSICS

CO-1: Apply the principles of quantum electrodynamics to analyze and interpret the behavior of electromagnetic radiation and its interactions with matter.

CO-2: Demonstrate an understanding of plasma physics, including the fundamental properties of plasmas, their formation, and their behavior under various conditions.

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CO-3: Analyze and solve advanced problems in quantum electrodynamics and plasma physics using mathematical and computational techniques, including the application of quantum field theory.

CO-4: Evaluate the theoretical and experimental aspects of quantum electrodynamics and plasma physics, critically assessing the limitations and implications of different theoretical models and experimental techniques.

CO-5: Apply the knowledge of quantum electrodynamics and plasma physics to design and propose innovative solutions to real-world problems, such as plasma confinement, laser-matter interactions, and plasma-based technologies.

STATISTICAL MECHANICS

CO-1: Apply the principles of statistical mechanics to analyze and describe the behavior of macroscopic systems in equilibrium and non-equilibrium states.

CO-2: Analyze and interpret the statistical properties of microscopic particles and their distributions using probability theory and statistical methods.

CO-3: Utilize the concepts of statistical mechanics to calculate thermodynamic quantities such as entropy, energy, and temperature for various systems.

CO-4: Evaluate and explain the thermodynamic behavior and phase transitions of materials using statistical mechanics principles.

CO-5: Design and perform statistical mechanical calculations to investigate and understand phenomena such as quantum gases, phase equilibrium, and fluctuations in different physical systems.

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MEWAR UNIVERSITY

M.SC. PHYSICS

ATOMIC AND MOLECULAR PHYSICS

CO-1: Analyze the fundamental principles of atomic and molecular physics, including quantum mechanics, atomic structure, and molecular bonding.

CO-2: Apply mathematical and computational techniques to solve problems related to atomic and molecular physics, such as calculating energy levels, transition probabilities, and molecular spectra.

CO-3: Evaluate experimental methods and instrumentation used in atomic and molecular physics, and design and conduct experiments to investigate atomic and molecular phenomena.

CO-4: Critically analyze the behavior and interactions of atoms and molecules in different physical and chemical environments, and apply this knowledge to explain phenomena such as chemical reactions and phase transitions.

CO-5: Formulate theoretical models and numerical simulations to study the properties of atoms and molecules, and utilize these models to predict and interpret experimental results in the field of atomic and molecular physics.

COMPUTATIONAL PHYSICS LABORATORY

CO-1: Apply numerical methods and computational techniques to model and solve a wide range of physical problems encountered in experimental physics.

CO-2: Develop proficiency in using programming languages and computational tools to analyze and visualize experimental data, facilitating a deeper understanding of physical phenomena.

CO-3: Design and implement computational simulations to investigate complex physical systems and phenomena, allowing for the exploration of theoretical concepts beyond experimental limitations.

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CO-4: Acquire hands-on experience with scientific computing environments, programming languages, and software packages commonly used in computational physics, enhancing problem-solving skills and computational literacy.

CO-5: Demonstrate the ability to critically analyze and interpret computational results, assess the validity and limitations of numerical methods, and communicate findings effectively through written reports and presentations.

NUCLEAR AND PARTICLE PHYSICS

CO-1: Analyze the fundamental concepts and principles of nuclear and particle physics, including the structure of atomic nuclei, radioactive decay processes, and elementary particles.

CO-2: Apply mathematical and theoretical models to describe nuclear and particle phenomena, such as nuclear reactions, scattering processes, and decay rates.

CO-3: Evaluate experimental techniques used in nuclear and particle physics, including detectors, accelerators, and data analysis methods, to investigate and measure nuclear and subatomic particles.

CO-4: Critically assess the theories and experimental evidence related to the standard model of particle physics, including the properties and interactions of quarks, leptons, and gauge bosons.

CO-5: Synthesize the knowledge gained from nuclear and particle physics to understand and analyze real-world applications, such as nuclear power generation, medical imaging, and particle accelerator technologies.

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PO-6	**Research Skills:** Students have research experience within a specific field of physics, through a supervised project
PO-7	**Communication:** Communicate effectively on scientific activities by participating in science related activities, writing effective reports and making effective presentations.
PO-8	**Lifelong Learning:** Ability to seek new knowledge and skills and inculcate the habit of self-learning throughout life and adapting to contemporary demands of workplace.

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