

Department of Chemistry

B.Sc. Chemistry

PROGRAM OUTCOMES (PO)

PO1: Effective Communication Skills

Graduates will demonstrate proficiency in both written and spoken communication, effectively utilizing formal communication techniques necessary for professional environments. They will be adept at conveying ideas clearly and confidently in English and other relevant languages.

PO2: Critical Analysis and Interpretation

Graduates will acquire and apply critical thinking skills to analyze diverse forms of information, including literary texts, financial statements, business operations, and legal frameworks. They will be capable of interpreting and evaluating data to make informed decisions in various contexts.

PO3: Technological Proficiency

Graduates will gain practical knowledge and skills in utilizing modern technology, including software applications, programming languages, and development tools. They will be able to manage and implement technological solutions for business, research, and professional practices.

PO4: Quantitative and Analytical Skills

Graduates will develop strong quantitative and analytical skills through the study of mathematics, statistics, and business mathematics. They will apply these skills to solve complex problems, conduct research, and make data-driven decisions in professional settings.

PO5: Research and Problem-Solving

Graduates will be equipped with comprehensive research skills, including problem definition, research design, data collection, and report formulation. They will be capable of conducting independent research and presenting their findings effectively.

PO6: Financial Acumen

Graduates will have a solid foundation in accounting, financial management, and taxation. They will be proficient in preparing and analyzing financial statements, understanding cost and management accounting, and making informed financial decisions.

PO7: Management Knowledge and Application

Graduates will comprehend and apply management principles and methodologies, including decision-making processes, modern management trends, and human resource management practices. They will be prepared to handle organizational leadership and entrepreneurial ventures.

PO8: Legal and Ethical Awareness

Graduates will possess a sound understanding of business laws, corporate laws, and intellectual property rights. They will navigate legal frameworks and appreciate ethical considerations in business practices, promoting social responsibility and sustainable practices.

PO9: Cultural and Social Awareness

Graduates will develop an appreciation for cultural diversity and social issues through the study of literature, history, and intercultural communication. They will be aware of contemporary issues such as environmental sustainability and human rights, integrating these principles into their professional conduct.

PO10: Marketing and Entrepreneurship

Graduates will gain insights into marketing management, brand building, consumer behavior, and entrepreneurial skills. They will be prepared to identify market opportunities, develop marketing strategies, and manage new business ventures.

PO11: Scientific and Environmental Literacy

Graduates will understand fundamental scientific principles and their applications, including environmental impacts and sustainability. They will be aware of biodiversity conservation, ecosystem functions, and sustainable agriculture practices.

PO12: Interdisciplinary Competence

Graduates will be adept at integrating knowledge from various disciplines, fostering a comprehensive understanding of complex issues. They will be equipped to approach problems from multiple perspectives and propose innovative solutions.

PO13: Practical and Vocational Skills

Graduates will acquire practical skills relevant to their field of study, including laboratory techniques, project management, and technical proficiency. They will be prepared for hands-on roles in industry, research, and self-employment opportunities.

PO14: Socio-Cultural Consciousness and Ethical Responsibility

Graduates will develop an awareness of major contemporary issues and ethical considerations. They will internalize values that promote social justice, ethical behavior, and global citizenship, responding positively to societal challenges.

Program Specific Outcomes (PSO)

Program Specific Outcome (PSO)	Students will be able to.....	Mapped Program Outcomes (PO)
PSO 1: Proficiency in Organic Compound Analysis	demonstrate proficiency in the analysis of organic compounds, including the identification of functional groups, structural isomerism, and characteristic chemical reactions, acquired through courses such as Organic Chemistry III and Qualitative Organic Analysis (Practical).	PO 2, PO 13
PSO 2: Competence in Chemical Bonding and Molecular Structure	understand and apply principles of chemical bonding, including hybridization, dipole moment, and molecular orbital theory, as well as interpret molecular structures using spectroscopic techniques, gained through courses like Theoretical and Inorganic Chemistry and Physical Chemistry II.	PO 2, PO 11
PSO 3: Practical Skills in Volumetric Analysis	possess practical skills in volumetric analysis, including the preparation of solutions, titration techniques, and estimation of unknown substances, developed through hands-on experience in Volumetric Analysis (Practical).	PO 4, PO 13

<p>PSO 4: Understanding of Environmental Impacts and Sustainability</p>	<p>comprehend the environmental implications of chemical processes and materials, including issues related to pollution, resource depletion, and sustainability, gained through courses like Environmental Ecology and Human Rights.</p>	<p>PO 9, PO 11</p>
<p>PSO 5: Proficiency in Thermodynamics and Chemical Kinetics</p>	<p>demonstrate proficiency in thermodynamics principles, chemical equilibrium, and chemical kinetics, enabling them to analyze and predict chemical reactions and processes, acquired through courses like Physical Chemistry III and IV.</p>	<p>PO 2, PO 4, PO 11</p>
<p>PSO 6: Knowledge of Advanced Topics in Polymer Chemistry</p>	<p>acquire knowledge of advanced topics in polymer chemistry, including polymerization mechanisms, physical properties of polymers, and industrial applications, obtained through courses like Polymer Chemistry.</p>	<p>PO 2, PO 11</p>
<p>PSO 7: Effective Communication and Problem-Solving Skills</p>	<p>develop effective communication skills, both written and verbal, and demonstrate problem-solving abilities through seminar presentations, group activities, and projects, fostered through courses like Seminar/Assignment, Group Activity, and Project.</p>	<p>PO 1, PO 5, PO 12</p>

COURSE OUTCOMES (CO)

Course	Course Outcome (CO)	Bloom's Taxonomy	Mapped PSO
ORGANIC CHEMISTRY 1	CO1: Understand and apply IUPAC nomenclature to classify and name organic compounds.	Understanding	PSO1
	CO2: Understand and analyze the different types of reactions and the factors influencing reaction mechanisms and electronic displacements in organic compounds.	Analyzing	PSO1
	CO3: Comprehend stereochemistry, including optical isomerism, geometrical isomerism, and conformational analysis.	Understanding	PSO1
	CO4: Demonstrate knowledge of aromatic compounds, their preparation, and electrophilic aromatic substitution reactions.	Understanding	PSO1
	CO5: Understand the principles of pericyclic reactions, including electrocyclic reactions, cycloadditions, and rearrangements.	Understanding	PSO1
THEORETICAL AND INORGANIC CHEMISTRY	CO1: Introduction to various atomic models.	Understanding	PSO2
	CO2: Understand the phenomenon of black body radiation, photoelectric effect.	Understanding	PSO2
	CO3: Learn the basic concepts and types of chemical bonding, laws, rules, and equations for formation of chemical bonds.	Understanding	PSO2
	CO4: Understand the concept of solubility, hybridization and dipole moment of molecules.	Understanding	PSO2

	CO5: Study the modern approaches of chemical bonding (Molecular Orbital Theory, Metallic Bonding concept, Role of weak intermolecular forces).	Understanding	PSO2
	CO6: Classification of elements as s, p, d and Zero Group elements and their related chemistry.	Understanding	PSO2
VOLUMETRIC ANALYSIS (Practical)	CO1: Facilitate the learner to make solutions of various molar concentrations.	Applying	PSO3
	CO2: Estimate volumetrically the strength of unknown acid and base.	Applying	PSO3
	CO3: Estimate the strength of Mohr salt and Oxalic acid by permanganometric titration.	Applying	PSO3
	CO4: Estimate the strength of Zinc and Magnesium ions by complexometric titration.	Applying	PSO3
ORGANIC CHEMISTRY III	CO1: Understand the preparation and reactions of nitrogen-containing compounds, including nitro compounds and amines.	Understanding	PSO1
	CO2: Familiarity with the synthesis and reactions of heterocyclic compounds.	Understanding	PSO1
	CO3: Learn about active methylene compounds and their synthetic applications.	Understanding	PSO1
	CO4: Understand the classification and properties of carbohydrates, including their cyclic structures and interconversion.	Understanding	PSO1
	CO5: Knowledge of drugs, their therapeutic uses, and mode of action, along with drug addiction and treatment.	Understanding	PSO1

	CO6: Gain insights into the theories of color and chemical constitution of dyes, and their synthesis and applications.	Understanding	PSO1
	CO7: Learn about the classification, polymerization reactions, and applications of polymers, including conducting polymers and environmental considerations.	Understanding	PSO6
PHYSICAL CHEMISTRY I	CO1: Understand and apply the postulates of the kinetic theory of gases, deviations from ideal behavior, and the van der Waals equation of state.	Understanding	PSO5
	CO2: Analyze collision properties of molecules and their relationship to viscosity.	Analyzing	PSO5
	CO3: Explain intermolecular forces, surface tension, viscosity, and perform related measurements.	Understanding	PSO5
	CO4: Comprehend the solid state, crystallography, defects in crystals, and electrical conductivity.	Understanding	PSO5
	CO5: Understand adsorption, types of solutions, colloidal properties, and coagulation of colloids.	Understanding	PSO5
	CO6: Develop practical skills in conducting experiments related to physical chemistry concepts.	Applying	PSO5
PHYSICAL CHEMISTRY II	CO1: Understand quantum mechanics and its application to classical mechanics, radiation, and atomic spectra.	Understanding	PSO5
	CO2: Apply quantum mechanics principles to simple systems and analyze wave functions.	Applying	PSO5

	CO3: Comprehend the Schrödinger equation for the hydrogen atom and quantum numbers.	Understanding	PSO5
	CO4: Acquire knowledge of various spectroscopic techniques and their interpretation.	Understanding	PSO5
	CO5: Analyze rotational, vibrational, electronic, Raman, NMR, and ESR spectroscopy.	Analyzing	PSO5
	CO6: Interpret spectroscopic data to understand molecular properties and behavior.	Analyzing	PSO5
CHEMISTRY IN EVERYDAY LIFE	CO1: Understand different types of food additives, their functions, and their impact on food quality, safety, and regulation.	Understanding	PSO4
	CO2: Learn about different types of soaps, their cleansing action, and the difference between soaps and detergents, including environmental aspects.	Understanding	PSO4
	CO3: Gain insight into the formulation, composition, and toxicology of cosmetics and their potential effects on human health.	Understanding	PSO4
	CO4: Learn about the types of plastics and their environmental impact.	Understanding	PSO4
	CO5: Understand different classes of drugs and their uses, along with issues surrounding drug addiction and abuse.	Understanding	PSO4
	CO6: Gain knowledge about fertilizers and their environmental impact.	Understanding	PSO4
	CO7: Understand the potential benefits and implications of using nanoparticles in different industries.	Understanding	PSO4

INORGANIC CHEMISTRY	CO1: Comprehensive understanding of coordination chemistry, including its principles, theories, applications in various fields, and relevance in biological systems and industrial processes.	Understanding	PSO2
	CO2: Gain an understanding of the spin-only formula, applications, and magnetic properties of transition metal complexes.	Understanding	PSO2
	CO3: Acquire a basic understanding of silicates, their classification, and structural details, as well as the structure and bonding of the inorganic polymer phosphazenes.	Understanding	PSO2
	CO4: Understand the specifics of bioinorganic chemistry, including metalloporphyrins with a focus on hemoglobin and myoglobin, as well as the biological functions of alkali and alkaline earth metal ions.	Understanding	PSO2
	CO5: Gain knowledge about inorganic rings, cages, and non-stoichiometric compounds.	Understanding	PSO2
	CO6: Gain knowledge about the classification, preparation, structures, and reactivity of interhalogen compounds.	Understanding	PSO2
QUALITATIVE INORGANIC ANALYSIS	CO1: Develop skills in qualitative analysis techniques.	Applying	PSO2
	CO2: Understand the reactions and properties of various radicals.	Understanding	PSO2
	CO3: Gain practical experience in identifying and confirming radicals in mixtures.	Applying	PSO2

ORGANIC CHEMISTRY IV	CO1: Acquire a comprehensive understanding of advanced topics in organic chemistry, including natural products, lipids, vitamins, steroids, hormones, amino acids, proteins, nucleic acids.	Understanding	PSO1
	CO2: Gain knowledge of natural rubber, its processing methods, vulcanization, compounding, mastication, and various applications.	Understanding	PSO1
	CO3: Understand waxes, phospholipids, and glycolipids and their biological functions.	Understanding	PSO1
	CO4: Learn about the determination of the primary structure of amino acids using various methods and the denaturation of proteins.	Understanding	PSO1
	CO5: Introduce the concept of supramolecular chemistry and the role of molecular recognition in biopolymer structure organization.	Understanding	PSO1
	CO6: Develop proficiency in organic spectroscopy for the identification of organic compounds.	Applying	PSO1
ORGANIC PREPARATIONS AND BASIC LABORATORY TECHNIQUES	CO1: Develop proficiency in basic laboratory techniques such as crystallization, distillation, and solvent extraction, ensuring accurate yield recovery.	Applying	PSO1
	CO2: Gain hands-on experience in performing organic synthesis of various organic compounds.	Applying	PSO1
	CO3: Understand the principles and techniques of chromatography for separation, identification, and purification of organic compounds and determination of R _f values.	Understanding	PSO1

	CO4: Develop skills in accurately recording experimental observations, data analysis, and interpretation of results.	Applying	PSO1
PHYSICAL CHEMISTRY III	CO1: Understand the fundamental concepts of thermodynamics, including systems, surroundings, and types of systems.	Understanding	PSO5
	CO2: Differentiate between extensive and intensive properties and identify various macroscopic properties.	Understanding	PSO5
	CO3: Recognize state functions and path functions and apply them in thermodynamic calculations.	Applying	PSO5
	CO4: Explain the Joule-Thomson effect and the process of gas liquefaction.	Understanding	PSO5
	CO5: Apply thermochemistry principles to calculate enthalpies of formation, combustion, and neutralization.	Applying	PSO5
	CO6: Analyze the thermodynamics of ionic equilibria and understand the factors affecting the degree of ionization and pH.	Analyzing	PSO5
	CO7: Explain the concept of buffer solutions and their mechanisms.	Understanding	PSO5
	CO8: Analyze phase equilibria using the phase rule and apply it to one-component and two-component systems.	Analyzing	PSO5
	CO9: Understand chemical kinetics and calculate rate equations and reaction orders.	Understanding	PSO5
PHYSICAL CHEMISTRY PRACTICALS	CO1: Provide hands-on experience and practical understanding of various concepts in physical chemistry.	Applying	PSO5

	CO2: Gain knowledge over a wide range of topics, including viscosity, heat of solution, conductance of electrolytes, conductometric titrations, transition temperature of salt hydrates, surface tension determination, critical solution temperature, molecular weight determination, and kinetics of simple reactions.	Understanding	PSO5
PHYSICAL CHEMISTRY IV	CO1: Understand vapor pressure-composition and temperature-composition curves for both ideal and non-ideal solutions.	Understanding	PSO5
	CO2: Gain knowledge of solubility and colligative properties.	Understanding	PSO5
	CO3: Understand Faraday's laws of electrolysis, Kohlrausch's law, Debye-Hückel theory, and conductance measurements.	Understanding	PSO5
	CO4: Develop knowledge of EMF, different electrochemical cells, reversible electrodes, different types of concentration cells, and fuel cells.	Understanding	PSO5
	CO5: Gain insights into the laws of photochemistry, Jablonsky diagram fluorescence, phosphorescence, and various photochemical reactions.	Understanding	PSO5
	CO6: Understand the elements of symmetry and point groups.	Understanding	PSO5
	CO7: Gain proficiency in determining the point groups of simple molecules.	Applying	PSO5
GRAVIMETRIC ANALYSIS	CO1: Gain hands-on experience in conducting gravimetric analysis experiments, including proper handling of precipitates, filtration, washing, drying, and weighing techniques.	Applying	PSO5

	CO2: Learn how to interpret experimental data, perform gravimetric calculations, and draw conclusions from the obtained results.	Analyzing	PSO5
	CO3: Familiarize with potential sources of errors in gravimetric analysis and learn how to take necessary precautions to obtain accurate and reliable results.	Understanding	PSO5
POLYMER CHEMISTRY	CO1: Understand polymer history, classification, and nomenclature.	Understanding	PSO6
	CO2: Comprehend polymerization mechanisms and copolymerization.	Understanding	PSO6
	CO3: Gain knowledge of various polymerization techniques.	Understanding	PSO6
	CO4: Learn about physical properties of polymers, including crystallinity, molecular weight, and glass transition temperature.	Understanding	PSO6
	CO5: Familiarize with polymer reactions, degradation types, and processing techniques.	Understanding	PSO6
	CO6: Acquaintance with commercial polymers and their properties.	Understanding	PSO6
	CO7: Learn about specialty polymers, including biomedical applications and conducting polymers.	Understanding	PSO6
Seminar/Assignment	CO1: Enhance understanding and knowledge of the subject matter covered in the courses.	Applying	PSO7
	CO2: Encourage the development of critical thinking skills.	Analyzing	PSO7

	CO3: Develop problem-solving skills, including the ability to identify problems, generate alternative solutions, and select the most appropriate approach to solve them.	Applying	PSO7
	CO4: Develop effective communication skills, both written and verbal.	Applying	PSO7
	CO5: Learn how to prioritize tasks, meet deadlines, and manage your workload effectively.	Applying	PSO7
Group Activity	CO1: Enhance your ability to work effectively in a team.	Applying	PSO7
	CO2: Practice leadership skills, such as delegating tasks, facilitating discussions, guiding the group towards consensus, and making effective decisions.	Applying	PSO7
	CO3: Foster the development of advanced communication skills.	Applying	PSO7
	CO4: Adapt to new situations, adjust plans when needed, and collaborate effectively in dynamic environments.	Applying	PSO7
	CO5: Practice ethical and professional behavior.	Applying	PSO7
Field Visit/Institute Visit	CO1: Gain practical experience and apply theoretical knowledge in a real-world setting.	Applying	PSO7
	CO2: Develop observational and analytical skills by studying and documenting natural phenomena, cultural practices, or specific environments.	Analyzing	PSO7
	CO3: Understand the interconnections between different components of an ecosystem, community, or industry.	Understanding	PSO7

	CO4: Learn about local challenges, issues, and solutions related to the field of study.	Understanding	PSO7
Project	CO1: Develop your ability to design rigorous research studies.	Creating	PSO7
	CO2: Critically evaluate existing research, identify gaps or limitations in the literature, and situate your research within the broader scholarly discourse.	Analyzing	PSO7
	CO3: Apply statistical or qualitative analysis techniques, interpret findings, and draw conclusions based on empirical evidence.	Applying	PSO7
	CO4: Apply critical thinking skills to analyze data, interpret results, and propose innovative solutions.	Analyzing	PSO7
	CO5: Develop research timelines, set realistic goals, allocate resources, and meet project milestones.	Applying	PSO7