

Department Of Chemistry
Major Chemistry

Programme Outcomes

- To make the students thorough with fundamentals before going to advanced techniques.
- To make the students understand the importance of Chemistry in different fields of Science.
- Educate students about the role mainly played by Chemistry in development of society.
- Teaching students how to deal with different types of science issues in this world.
- Inculcate awareness among students how chemical science should be ecofriendly.

Course Out comes:

Semester 1:

Essentials In Chemical Sciences

1. To explain the basic principles and concepts underlying a broad range of fundamental areas of chemistry and to Connect their knowledge of chemistry to daily life.
2. Understand the interplay and connections between mathematics, physics, and chemistry in various applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.

Semester 1

Advances In Chemical Sciences

1. Understand the principles and techniques used in computer-aided drug design and drug delivery systems, to understand the fabrication techniques and working principles of nanosensors. Explore the effects of chemical pollutants on ecosystems and human health.
2. Understand the interplay and connections between mathematics, physics, and chemistry in various advanced applications. Recognize how

mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.

Semester 2

GENERAL AND INORGANIC CHEMISTRY

1. Understand the structure of atom and the arrangement of elements in the periodic table.
2. Identify the structure of a given inorganic compound.
3. Define acids and bases and predict the nature of salts.

Semester 2

INORGANIC CHEMISTRY

1. Understand the basic concepts of p-block elements.
2. Explain the concepts of d-block elements
3. Describe the importance of radioactivity.

Semester 3

FUNDAMENTALS IN ORGANIC CHEMISTRY

1. Understand and explain the differential behaviour of organic compounds based on fundamental concepts learnt.
2. Learn and identify many organic reaction mechanisms .
3. Correlate and describe the stereo-chemical properties of organic compounds and reaction

Semester 3

ORGANIC CHEMISTRY

1. Understand the concept of SN1 and SN2 mechanisms.
2. Describe the reactivity of alcohols and phenols.
3. Achieve the skills required to propose various mechanisms.

Semester 3

PHYSICAL CHEMISTRY

1. Understand the ideal and non ideal behaviour of solutions.
2. Discuss the basic concepts of Photochemistry.
3. Apply the principles of electrical conductivity.

Semester 3

INORGANIC AND PHYSICAL CHEMISTRY

1. Understand the various theories, structure and stereo chemistry of coordination compounds.
2. Explain the reaction mechanism in complexes.
3. Discuss the basic concepts of thermodynamics.

SEMESTER 4

PHYSICAL CHEMISTRY

1. Explain the difference between solids liquids and gases in terms of intermolecular interactions.
2. Discuss the basic concepts of two component systems
3. Understand the basic concepts of crystallography.

SEMESTER 4

General and Physical Chemistry

1. Correlate and describe the stereochemical properties of organic compounds
2. Explain the biological significance of various elements present in the human body.
3. Determine the order of a chemical reaction.

SEMESTER 4

Nitrogen containing Organic Compounds & Spectroscopy

1. Distinguish primary secondary and tertiary amines and their properties.
2. Describe the preparation and properties of amino acids.
3. Apply the concepts of UV and IR to ascertain the functional group in an organic compound.

Semester 5:

Analytical Methods In Chemistry

1. Acquire knowledge on the basic principles of volumetric analysis and gravimetric analysis.
2. Understand the theories of different types of titrations.
3. Gain knowledge on different types of errors and the minimization methods.

Semester 5

Environmental Chemistry

1. Understand the environment functions and how it is affected by human activities
2. Engage in simple and advanced analytical tools used to measure the different types of pollution.
3. Analyze key ethical challenges concerning biodiversity and understand themoral principles, goals.

Semester 5

Chromatography and Instrumental methods of Analysis

1. Identify the importance of chromatography in the separation and identification of compounds in a mixture
2. Acquire a critical knowledge on various chromatographic techniques.
3. Understand the principles of spectrochemistry in the determination of metal ions

Semester 5

Green Chemistry and Nanotechnology

1. Understand the importance of Green chemistry and Green synthesis.
2. Demonstrate skills using the alternative green solvents in synthesis.
3. Analyse alternative sources of energy and carry out green synthesis.

Semester 5

Synthetic Organic Chemistry

1. Identify the importance of reagents used in the synthesis of organic compounds.
2. Acquire knowledge on basic concepts in different types of pericyclic reactions.
3. Comprehend the applications of different reactions in synthetic organic chemistry.

Semester 5

Industrial Chemistry- Fertilisers and Surface coatings

1. Identify the importance of different surface coatings.
2. Understand various steps in the manufacture of cane sugar.
3. Explain the manufacture of pulp and paper.

Semester 5

Analysis of Organic Compounds

1. Identify the importance of mass spectrometry in the structural elucidation of organic compounds.
2. Understand various chromatography methods in the separation and identification of organic compounds.
3. Demonstrate the knowledge gained in solvent extraction for the separate the organic compounds.

Semester 5

Industrial Chemistry- Polymers and water analysis

1. Understand the basic concepts of polymers
2. Explain the sources of air pollution
3. Demonstrate the analysis of water quality parameters.

Semester 7

Advance Studies in Complexes and Group theory

1. The student will understand the VSPER theory, symmetric and unsymmetric Hydrogen bonds in inorganic molecules.
2. The Students will be able to understand the basics of molecular orbital theory and energetic of hybridization.
3. The Students are able to understand the Jobs method, hard and soft acids and bases.

Semester 7

Inorganic Materials of Industrial Importance

1. Explain the process of formulation of paints and the basic principle behind the protection offered by the surface coatings.
2. Explain the principle, working and applications of different batteries.
3. Explain the synthesis and properties of nano-dimensional materials, various semiconductor And superconductor oxides

Semester 7

Spectroscopy of Organic compounds

1. Gain insight into the basic fundamental principles of IR and UV-Vis spectroscopic techniques.
2. Use basic theoretical principles underlying UV-visible and IR spectroscopy as a tool for functional group identification in organic molecules
3. Interpret of IR, UV-visible spectra and their applications and Interpret of NMR, Mass spectra and their applications.

Semester 7

Organic Chemistry: Stereo Chemistry and Natural Products

1. Understand and apply the substitution and elimination reaction mechanisms at aliphatic and aromatic substrates for various reactions leading to research

2. Understand the conformations of acyclic, monocyclic and fused ring systems and applying it to organic compounds.
3. Explain formation of various heterocyclic compounds and their synthesis and importance.

Semester 7

Physical Chemistry – I : Thermodynamics, Electrochemistry and Chemical Kinetics

1. Understand the classical thermo dynamics, fugacity.
2. Derive the Butler - Volmer equation and Ilkovic equation
3. Demonstrate the Branching Chain Reactions, Enzyme catalysis and Photochemical equilibrium.

Semester 7

Instrumental Methods of Chemical Analysis

1. Handle analytical data and Understand basic components of IR, FTIR, UV-Visible and Mass spectrometer.
2. Learn elemental analysis, Electro analytical Methods, Radiochemical Methods, X-ray analysis and electron spectroscopy.

Semester 8

Inorganic Chemistry-II: Metal clusters, Electronic spectra of Complex compounds and Bio-inorganic chemistry

1. Understand the study of age compounds of oxygen, phosphorous and sulphur.
2. Describe the reactions of organo metallic compounds and its applications.
3. Discuss structure and functions of hemoglobin, myoglobin and vitamin B12, photochemical laws.

Semester 8

Organo Metallic Chemistry

1. Apply 18-electron rule to rationalize the stability of metal carbonyls and related species and Understand the nature of Zeise's salt and compare its synergic effect with that of carbonyls.
2. Zeigler- Natta catalyst and synthetic gasoline manufacture by Fischer-Tropsch process

3. Understand the importance of organometallic compounds in the synthesis of organic compounds

Semester 8

Organic Chemistry: Modern Organic synthesis and Natural products

1. Understand various types of reaction intermediates and the bonding present in various organic compounds.
2. Describe the mode of addition reactions by electrophile and nucleophiles.
3. Discuss mechanisms of named reactions and their applications in organic synthesis.

Semester 8

Chemistry of Natural Products

1. To know the classification of terpenoids, isoprene rule, structures and their natural sources.
2. Learn advanced methods of structural elucidation of compounds of natural origin
3. Learn advanced methods of structural elucidation of compounds of natural origin

Semester 8

Physical Chemistry: Quantum and Molecular Spectroscopy

1. Understand the time-dependent and time-independent Schrödinger equation.
2. Describe the principles and theories of rotational, vibrational and vibrational spectroscopy methods.
3. Interpret the molecular spectra and find molecular properties from molecular spectra.

Semester 8

Analytical Methods of Analysis

1. Develop methods of analysis for different samples independently and Test contaminated water samples.
2. Understand basic principle of instrument like Flame Photometer, UV-vis spectrophotometer.
3. Learn separation of analytes by chromatography.