

Department of Chemistry
Programme Specific and Course Outcomes
Chemistry Honours

Programme Specific Outcomes

Three years undergraduate course in Chemistry honours orients students for career as professionals or researchers in the field of Chemistry by developing knowledge base in theory as well as expertise in laboratory works. The programme helps in understanding of the theoretical principles of different branches of Chemistry - inorganic, organic, physical and analytical. It aims at enabling the students to handle apparatus and chemicals through hands on training during practical lessons. The students are familiarized with several industrial processes enabling them to utilize the expertise gained for further applications.

The main objective of this course is to:

- Increase the employability quotient of the students by preparing them with the technical and theoretical aspects of this continuously evolving subject
- The principles of physical chemistry and how to apply it in experimental procedures of general Chemistry will be understood after the end of the three years course
- Special emphasis to be given to thermodynamics, electrochemistry and chemical kinetics
- The cutting edge field of Quantum Chemistry will be understood by the students
- The chemistry of elements which make up all the material world will be understood from the perspective of the periodic table
- The students will be acquainted with all the instrumental procedures used to analyze both quantitatively and qualitatively the chemical components of an unknown material. This includes basic procedures like titration, salt analysis along with pHmetry, potentiometry, conductometry polarimetry and spectrophotometry
- The students will have an awareness of green chemistry and ecologically sustainable chemical procedures
- Students will have a strong foundation in the fundamental and application of current organic chemistry
- Students will have understanding of chemical and molecular processes that take place in organic chemical reactions
- Students will be able to design and carry out synthesis of different organic compounds in pure form in a well designed fashion, keeping the focus on principles for effective synthetic strategies
- Students become able to use spectroscopic methods in identification of complicated molecules
- Understanding of biomolecules like amino acid and carbohydrates

CO 1.

INORGANIC CHEMISTRY	To impart essential theoretical knowledge on atomic structure, nuclear chemistry. Basic concept of Acid-base and redox reactions
ORGANIC CHEMISTRY	Basics of Organic Chemistry.Stereochemistry
PHYSICAL CHEMISTRY	Kinetic theory, Chemical kinetics
PRACTICALS	Developing skills in Inorganic estimations Redox titrations utilising volumetric methods. Separation and purification of organic compounds.

CO 2.

ORGANIC CHEMISTRY	Clear understanding of Reaction Mechanisms in organic substrates
INORGANIC CHEMISTRY	Chemical Bonding
PRACTICALS	Learning methods of preparation of aromatic organic compounds and their purification. Titrations based on iodimetry and estimation of metal content in brass, steel and cement

CO 3.

PHYSICAL CHEMISTRY	Basic concepts of Chemical Thermodynamics
INORGANIC CHEMISTRY	General chemistry of s and p Block Elements
PRACTICALS	Experiments in physical chemistry –condometric, potentiometric titrations. Analytical methods involving Complexometric titrations. Skill orientation towards paper chromatographic separations of metal ions. Gravimetric estimations of copper, aluminium, nickel and chloride. Identification of pure organic compounds and sound knowledge of qualitative organic estimations.

CO 4.

ORGANIC CHEMISTRY	Organic Synthesis, Spectroscopy
PHYSICAL CHEMISTRY	Applications of Thermodynamics, Quantum Mechanics
PRACTICALS	Qualitative Analysis of single solid organic compounds. Kinetic studies using polarimeter and pH metric titrations. Inorganic preparations and handling of spectrophotometers.

CO 5.

PHYSICAL CHEMISTRY
ORGANIC CHEMISTRY

Quantum Chemistry, Statistical Thermodynamics
Cyclic Compounds, Biomolecules

PRACTICALS

Computer programme based on numerical methods.
Exposure to Analytical methods like Thin Layer, Column
and Paper chromatography of organic compounds.
Spectroscopic analysis of organic compounds: nmr and IR

CO 6.

INORGANIC CHEMISTRY

Bioinorganic and Organometallic Chemistry

PHYSICAL CHEMISTRY

Molecular Spectroscopy, Photochemistry

PRACTICALS

Qualitative inorganic analysis of radicals.
Determination of various physical parameters

B.Sc General Programme in Chemistry

Programme Specific Outcomes

Outcomes of the course: 3 years degree course in CHEMISTRY GENERAL

Students pursuing this stream of study are specially equipped with the know-how and training required to find jobs in industry and health care sections

- The basic principles of physical organic and inorganic chemistry are understood by the students
- Chemical equations representing both inorganic and organic reactions could be framed and understood by the students
- Chemical formulae of household chemical like naphthalene will be known. → The main working theory behind industrial process like petroleum industry, fermentation industry plastic and textile industry along with glass and ceramics will be understood
- The basic tenets of Environmental chemistry involving Carbon-cycle, Phosphorus cycle and Nitrogen cycle will be understood.

CO 1. Properties of gases and Liquids. Chemical kinetics. Atomic structure and chemical periodicity. Acids and bases. Fundamentals of organic chemistry. Stereochemistry of organic molecules. Reaction mechanisms.

Practicals : Inorganic estimations.

CO 2. Chemical Thermodynamics. Chemical Equilibrium. Solutions and Phase Equilibrium. Solid state. Aliphatic Hydrocarbons. Error analysis and computation. Redox reactions.

Practicals : Physical experiments related to kinetics.

CO 3. Chemical bonding. Comparative study of p-block elements. Transition elements and coordination chemistry. Electrochemistry. Aromatic hydrocarbons, organometallics and aryl halides.

Practicals :Qualitative semimicro analysis of mixtures containing two radicals.

CO 4. Alcohols, Phenols and Ethers.Carboxylic acids and their derivatives. Amines and diazonium salts. Amino acids and carbohydrates.Crystal Field Theory.Quantum Chemistry and spectroscopy.

Practicals :Qualitative Analysis of Single Solid Organic Compound(s). Identification of a pure organic compound.

CO 5.

Novel Inorganic Solids :

Synthesis and modification of inorganic solids.Inorganic solids of technological importance.Nanomaterials.Introduction to engineering materials for mechanical construction.Composite materials.Speciality polymers.

Practicals : Inorganic determinations and synthesis.

OR

Inorganic Materials of Industrial Importance :

Silicate Industries.Fertilisers.Surface Coatings, batteries and alloys.Catalysis.Chemical explosives.

Practicals : Determinations and Estimations in Fertilisers. Determination and synthesis in ores and alloys.Preparation of pigments.

CO 6.

Green Chemistry and Chemistry of Natural Products :

Green Chemistry: Principles and Future Trends. Alkaloids and Terpenes,

Practicals : Alternative green pathways to chemical methodologies for synthesis and preparation.

OR

Analytical Methods in Chemistry :

Optical methods of analysis.Thermal methods of analysis.Electroanalytical methods.Separation techniques.

Practicals : Separation Techniques by Chromatography and solvent extraction. Analysis of Soil.Ion exchange.Spectrophotometry.