

Course outcomes for B.Sc. Chemistry

B.Sc. Chemistry students are exposed to fundamentals of theory as well as practical skills in their core subjects, broadly under the following major subjects:

1. Organic Chemistry
2. Inorganic Chemistry
3. Physical Chemistry
4. Applied (Industrial) Chemistry
5. Medicinal Chemistry
6. Nanotechnology
7. Chemistry Laboratory techniques

These inculcate B.Sc. Chemistry students to acquire not only employment oriented technical skills, but also aid to pursue higher education as well as research.

Organic chemistry

Basic to advanced molecular structures such as natural products, pharmaceutical compounds, petrochemical compounds, compounds in various industrial as well as consumer products. Naming and identifying organic compounds as per IUPAC norms is elaborately covered. More focus is given to reaction mechanism behind the synthesis of molecules to elevate the theoretical aspects of compound formation. In-depth coverage on structural elucidation of carbohydrates, proteins, DNA etc. Geometry of molecules related to stability is included in this course. Despite this, synthesis and qualitative as well as quantitative analysis of simple to complex biological bio-organic compounds, dyes and medicinal compounds are also covered. Principles of various instrumentation techniques such as IR, NMR, UV-Vis are focused related to spectral analysis of organic compounds. Laboratory exposure is given to analyze qualitatively and to estimate basic organic compounds for real-time industrial / employment needs.

Inorganic chemistry

Basic atomic structure of molecules, fundamental atomic and ionic properties, theories on bonding, electronegativity, periodicity, electronic orbitals, extraction of elements / metals from the ores, physical and chemical properties of compounds, fundamentals and geometries of various coordination compounds, organometallics, bioinorganic compounds such as Vitamin B-12, Chlorophyll, basics of catalysts, acids, bases, chelates etc. Besides C-programming on estimation of different fundamental physical-chemical parameters. Principles of specific instrumentation techniques such as colorimetry, chromatography, magnetic moment measurements, X-ray

diffraction analysis are included. Fundamentals of error analysis, statistical tools to analyze experimental results is covered. Practical course consists of qualitative analysis for mixture of inorganic compounds and quantitative volumetric estimation of basic inorganic compounds as well as gravimetric analysis.

Physical Chemistry

It is focused on understanding the physical properties of organic and inorganic atoms, molecules and ions. This broadly covers atomic/ molecular physical parameters for organic as well as inorganic compounds in gaseous, liquid and solid states. Principles of various forces acting in these states, mathematical derivation to estimate different physical and chemical parameters. Despite this estimation of energy required for chemical reactions, in all the three states as well as in solutions. Mathematical derivation of various thermodynamic, kinetic, magnetic and electrical parameters. Photochemical and electrochemical properties of molecules are covered elaborately. Despite that quantum mechanical concepts of atomic and molecular structures are also covered. Principles of various spectroscopic techniques, X-ray diffraction analysis are covered to possess real-time technical knowledge for industrial and research needs. Estimation of various physical, kinetics and thermodynamic parameters, UV-spectrophotometry, polarimetry, electrochemical analysis – conductometry, potentiometry are included in the Physical Chemistry practical course.

Applied Chemistry

Industrial manufacturing principles of various products such as cement, detergents, petrochemical products etc.

Water purification related to effluent / sewage treatment processes.

Refining of crude oil and separation of useful byproducts such as gasoline, diesel, naphtha, toluene etc.

Manufacturing and molding of various polymers such as PVC, TEFLON, Nylon, Rubber etc.

Manufacture of sugar, alcohol, paper, textile finishing, dyes, soaps & detergents etc.

Students are taken for industrial field visits to get real-time knowledge.

Medicinal Chemistry

It includes classification and naming of pharma compounds based on diseases and disorders. Structure and synthesis of different types of drugs such as analgesics, antipyretics, antibiotics, antivirals, antidepressants, anti-inflammatory compounds etc.

Extraction of medicinal compounds from natural products are included.

Structure of pharmaceutical compounds present in allopathy, homeopathy, siddha drugs are extensively covered.

Medicinal significance of natural products such as vembu, tulsi, keezhanelli etc., are included.

Other elective courses

1. Fundamentals of green chemistry for eco–friendly synthesis of chemical compounds, principles on environmental pollution control, recycling the chemical wastes are also covered.
2. Various synthetic methods of nanomaterials, characterization of nanomaterials, instrumental analysis of nano compounds etc.
3. Laboratory safety, how to handle hazardous chemicals, antidote for chemical poisoning, types of fires, fire protection etc.
4. Principles of semimicro qualitative, volumetric and gravimetric analyses.