



Name of the Programme: B.Sc. Chemistry (CBCS)

Programme Outcomes (PO)

After completing the Three Year Undergraduate Programme in Chemistry, Students are expected to achieve the following Programme Outcomes:

PO1: Knowledge/Academic expertise

PO2: Critical Thinking

PO3: Effective Communication

PO4: Social Interaction

PO5: Effective Citizenship

PO6: Ethics

PO7: Environmental and Sustainability

PO8: Self-directed and Life-long Learning

PO9: Community engagement

PO10: Individuality and Teamwork

PO11: Competencies for employment

PO12: Competencies for Research

Programme Specific Outcomes (PSO)

The programme specific outcomes of the Undergraduate Programme in Chemistry are listed below. After completing the programme, the students will be able to-

PSO1: Understand the basics of Chemistry.

- Gain knowledge in fundamental aspects of various branches of Chemistry.

PSO2: Applications of Chemistry in day to day Life.

- Apply the key concepts and standard methodologies to solve problems related to Chemistry.

PSO3: Development of Analytical and experimental skills.

- Gain analytical and experimental skills which will equip them to contribute to academic and industrial environments.
- Prepare themselves for higher education and a career in Chemistry.

Course Outcomes (CO)**B.Sc. 1st Semester****Course Title: Inorganic Chemistry**

Course Code: C-101

On completion of this course, a student will be able to:

- CO1:** Learn the concept of sign of wave function, counter boundary and probability diagrams.
- CO2:** Understand variations of orbital energy with atomic number.
- CO3:** Learn properties of elements, atomic radii, ionic radii, size effect of ionic bond
- CO4:** Grab the Concept of solvation energy, covalent character of ionic bond, redox equations.
- CO5:** Understand the principle involved in volumetric analysis.

Course Title: Physical Chemistry

Course Code: C-102

At the end of this course, the student should be able to:

- CO1:** Matriculate the Kinetic molecular model of a gas, behaviour of real gases etc.
- CO2:** Know the effect of addition of various solute on surface tension and viscosity and also the cleansing action of detergents.
- CO3:** Understand the nature of solid state, elementary idea of symmetry.
- CO4:** Gain an idea of solubility and solubility product of sparingly soluble salts.
- CO5:** Carry out Surface tension and viscosity measurement experiments.

B.Sc. 2nd Semester**Course Title: Organic Chemistry**

Course Code: C-201

At the end of this course, the student should be able to:

- CO1:** Gain knowledge of basic organic chemistry and definitions.
- CO2:** Learn the classification of stereoisomerism, optical activity, absolute and relative configuration etc.
- CO3:** Gain knowledge of elimination reaction, electrophilic and nucleophilic addition.
- CO4:** Understand the relative stability of cyclic hydrocarbon, Bayer's strain theory etc.
- CO5:** Carry out experiments on Purification of organic compounds by crystallization, melting points, chromatography.

Course Title: Physical Chemistry

Course Code: C-202

At the end of this course, the student should be able to:

- CO1:** Learn the application of mathematical tools to calculate thermodynamic properties.
- CO2:** Gain the concept of free energy change and spontaneity.
- CO3:** Understand thermodynamics derivation of relation between Gibbs free energy of reaction and reaction quotient.
- CO4:** Connect the relation between the four colligative properties using chemical potential.
- CO5:** Perform experiments related to Thermochemistry.

B.Sc. 3rd Semester**Course Title: Inorganic Chemistry**

Course Code: C-301

At the end of this course, the student should be able to:

- CO1:** Predict the purification of metal.
- CO2:** Emphasize the structure, bonding, preparation and properties of compounds.
- CO3:** Understand real world applications, shapes etc of noble gas.
- CO4:** Know various types of acids and bases, concept of hard acid and bases and their application.
- CO5:** Gain knowledge on the structural aspects and applications of inorganic polymer.

Course Title: Organic Chemistry

Course Code: C-302

At the end of this course, the student should be able to:

- CO1:** Predict the mechanism for organic reactions.
- CO2 :** Know how to design synthesis of organic molecule.
- CO3:** Build knowledge on the reactivity and stability of organic molecule based on structure.
- CO4:** Gain an idea of alcohols, phenols, carbonyl compounds, acids and their derivatives etc.
- CO5:** Carry out experiments on Organic preparations.

Course Title: Physical Chemistry

Course Code: C-303

At the end of this course the student should be able to:

- CO1:** Know the types of catalysis, Michaelis – Menten mechanism, mechanism of catalysed reaction at solid state.
- CO2:** Matriculate steady - state approximation in reaction mechanism.
- CO3:** Gain the concept of phases, phase diagrams for systems of solid- liquid.
- CO4:** Grab the concept of phases, phase diagrams for systems of solid- liquid.
- CO5:** Carry out the experiments of CST, Saponification, and Freundlich and Langmuir isotherms.

B.Sc. 4th Semester**Course Title: Inorganic Chemistry**

Course Code: C-401

At the end of this course the student should be able to:

- CO1:** Predict metal ion present in biological systems
- CO2:** Know the use of chelating agents in medicine.
- CO3:** Understand the quantitative aspect of ligand field and MO theory
- CO4:** Gain knowledge on the stability of various oxidation states and emf of transition elements
- CO5:** Know the property, application and separation of inner transition elements

Course Title: Organic Chemistry

Course Code: C-402

At the end of this course the student should be able to:

- CO1:** Learn the reaction for preparation of Heterocyclic compounds
- CO2:** Learn reaction for preparation of Heterocyclic compounds, polynuclear hydrocarbons
- CO3:** Understand methods of structure elucidation of terpenoids
- CO4:** Learn reaction for preparation of polynuclear hydrocarbons
- CO5:** Carry out Experiments on Detection of elements (N, S and Halogens), Functional group test for nitro, amine and amide groups and Qualitative analysis of unknown organic compounds

Course Title: Physical Chemistry

Course Code: C-403

At the end of this course the student should be able to:

- CO1:** Understand quantitative aspects of Faraday's laws of electrolysis
- CO2:** Learn application of conductance measurement
- CO3:** Know the concept of electrical and magnetic properties of atoms and molecules
- CO4:** Understand Electrochemistry, various laws governing electro chemical process and their application.
- CO5:** Perform experiments on Conductometry and Potentiometry

B.Sc. 5th Semester**Course Title: Organic Chemistry**

Course Code: C-501

At the end of this course the student should be able to:

- CO1 Know the chemical basis for biological phenomena and cellular structure.
- CO2 Learn the chemical basis for biological phenomena and cellular structure.
- CO3 Understand enzyme kinetics, chemical logic of metabolism
- CO4 Know health, disease and modern medicine are all rooted in biological chemistry
- CO5 Perform estimation of glycine, Saponification value of an oil or a fat etc

Course Title: Physical Chemistry

Course Code: C-502

At the end of this course the student should be able to:

- CO1 Know the difference between classical and quantum mechanics
- CO2 Know qualitative treatment of hydrogen atom and hydrogen like ions
- CO3 Know interpretation of spectra
- CO4 Understand the role of photochemical reaction in biochemical processes
- CO5 Carry out experiments related to UV/Visible spectroscopy and Colorimetry

Course Title: Analytical Methods in Chemistry

Course Code: DSE-501

At the end of this course the student should be able to:

- CO1 Understand the principles and applications of modern chemical instrumentation, experimental design and data analysis
- CO2 Know the composition of written laboratory reports that summarize experimental procedures and the accurately present and interpret data
- CO3 Learn qualitative and quantitative aspect of solvent extraction, chromatographic method of analysis -TLC & HPLC
- CO4 Learn chromatographic separation technique
- CO5 Carry out analysis of of different samples

Course Title: Green Chemistry

Course Code: DSE-502

At the end of this course the student should be able to:

- CO1 Know the concept of green chemistry
- CO2 Know the use of safer chemicals iii. Concept of atom economy
- CO3 Learn the use of green solvent
- CO4 Learn the use of safer chemicals
- CO5 Understand the concept of atom economy

B.Sc. 6th Semester**Course Title: Inorganic Chemistry**

Course Code: C-601

At the end of this course the student should be able to:

- CO1** Understand basic principles involved in analysis of anions, cations solubility product, common ion effect etc
- CO2** Know inorganic reaction mechanism
- CO3** Know the use of Wilkinson's catalyst in industrial process of hydrogenation of alkene, gas synthesis by metal carbonyl
- CO4** Learn hcapacity of organic ligands, 18 electron rule, Zeise's salt etc
- CO5** Learn preparation, structure, bonding, synergic effect of metal carbonyl complexes, use of IR data to explain back bonding

Course Title: Organic Chemistry

Course Code: C-602

At the end of this course the student should be able to:

- CO1** Learn application of UV, IR, NMR spectroscopy
- CO2** Learn application of mass spectra in organic molecule
- CO3** Know biological importance of carbohydrates
- CO4** Gain Knowledge on biodegradable polymer, colour and constitution of dyes and applications of different dyes
- CO5** Carry out qualitative analysis of unknown organic compounds containing monofunctional groups, Extraction of caffeine from tea leaves and Identification of simple organic compounds by IR spectroscopy and NMR Spectroscopy

Course Title: Inorganic Materials of Industrial Importance

Course Code: DSE-601

At the end of this course the student should be able to:

- CO1** Understand the properties and the types of different glasses, ceramics and cements.
- CO2** Learn different types and manufacture of fertilizers, composition of paint pigments
- CO3** Know working principle of different batteries, elements present in alloys, different types of steel etc
- CO4** Determine the free acidity of fertilizer
- CO5** Determine the pH of different soil samples

Course Title: Dissertation

Course Code: DSE-603

At the end of this course the student should be able to:

- CO1** Communicate effectively, verbally and written for the purpose of conveying chemical information to both professional scientists and to the public.
- CO2** Know availability of instrument for conducting specific, scientific research.
- CO3** Know how to do research work and write a review article on a particular field/topic as assigned by the teacher
- CO4** Know how to handle the technical devices for presenting research works.
- CO5** Develop research-oriented skills.
