



Programme outcomes (POs) of B.Sc.

(As per UGC Guidelines)

- P01. Disciplinary knowledge:** Students will possess a breadth and depth of disciplinary knowledge in the field of Science.
- P02. Scientific Judgment, Critical Thinking & Research:** Students will be able to analyze information objectively and make a reasoned judgment by observation, understanding and evaluation of sources, such as data, facts and link research findings to innovation and entrepreneurship.
- P03. Problem solving & Analytical Skills:** Students will be able to think logically, analyze situations and solve problems skillfully.
- P04. Environment and sustainability:** Ability to understand the issues related to environmental contexts and sustainable development
- P05. Effective Communication:** Students will be able to present ideas clearly and confidently with skills to convey with others. They will be able to evaluate primary literature, in oral and written form during seminar delivery and subsequently articulate the information.
- P06. Digital Literacy:** Acquire ability to use ICT, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.
- P07. Leadership & Team work:** Ability to work as a leader as well as in a team for group projects, field work and group activities and participate actively, in a healthy spirit
- P08. Ethical & Moral values:** Students will bear the core characters of honesty, integrity and commitment and imbibe qualities of empathy for fellow human beings.
- P09. Effective Citizenship and Social Interaction:** Students will develop tolerance and harmony towards cultural, regional, linguistic, communal, socioeconomic and other diversities and respect for national symbols of pride

Programme Specific Outcomes (PSOs)

Programme Specific Outcomes for Programmes in Life Sciences

Programmes in Life Sciences:

1. B. Sc. with Chemistry, Botany, Zoology (CBZ)
2. B. Sc. with Chemistry, Botany, Microbiology (CBMb)
3. B. Sc. with Chemistry, Zoology, Geology (CZG)
4. B. Sc. with Chemistry, Geology, Physics (CGP)

Programme Specific outcomes (PSOs)

PSO1. RECOLLECTION: Students will be able to identify the major groups flora and fauna and be able to classify them within a phylogenetic framework. Students will be able to compare and contrast the characteristics, micromolecular structures of biomolecules at cellular and molecular level.

PSO2. UNDERSTANDING: Students will be able to associate the theoretical concepts with the practical observations and draw inferences for better comprehension

PSO3. APPLICATION: Students will be able to apply the domain knowledge and present their ideas in order to extrapolate science to everyday life. Students will be able to integrate classroom knowledge with field work to develop entrepreneurial skills like Apiculture, Diagnostics etc.

PSO4. ANALYSIS: Students will gain analytical skills and research ability. This will be facilitated by making observations, collecting data in laboratory and in the field. They will be trained to analyze these results, derive conclusions and report their findings.

PSO5. EVALUATION: Students will be equipped to judge, support or critique the scientific information like global warming, forest fires, vaccine drives, oil spills etc.

PSO6. CREATION: Students will be able to design, author and present scientific ideas as presentations, popular science articles, scientific write ups and graduate research projects.

PSO7. Students will be able to use instruments independently pertaining to their domain knowledge and understand the principles of instrumentation and their application

Course Outcomes (COs) of Subject Chemistry

SEMESTER-I

Course Outcome

After successful completion of three year degree program in Chemistry student should be

Course	Code	Outcomes
Chemistry Paper-I (Inorganic Chemistry)	USCChT01	CO-1: To know the fundamental and shape s, p and d atomic orbital and their electronic configuration CO-2: To study periodic table through periodic trends and their properties. CO-3: Explore the concept of VBT and MOT using bonding and antibonding molecular orbital. CO-4: Known the effect of hydrogen bonding, viscosity, solubility, melting and boiling point.

<p>Chemistry Paper–II (Organic Chemistry)</p>	<p>USCChT01</p>	<p>CO-1: To understand the structure and bonding in organic Molecules, reactive intermediates, mechanism of organic reactions.</p> <p>CO-2: To understand the stereochemistry of organic compounds and know the basic concept of isomerism and concept of chirality.</p> <p>CO-3: To understand the nomenclature, methods of preparation, physical and chemical properties of Alkane, Cycloalkane, Alkene and Diene.</p> <p>CO-4: To discuss the preparation of benzene with their chemical properties.</p> <p>CO-5: Explain the aromaticity and Huckel's rule of aromatic compounds.</p> <p>CO-6: To understand the Mechanism of Electrophilic Aromatic Substitution.</p> <p>CO-7: To understand the Orientation Effect of substituent groups. Activating and deactivating groups.</p>
--	------------------------	--

Chemistry Practical's, Semester-I

<p>PRACTICAL (Inorganic and Organic)</p>	<p>USCChP01</p>	<p>CO-1: Semimicro qualitative analysis of inorganic salt mixture containing two acidic Radicals of different group and two basic radicals of same groups.</p> <p>CO-2: Purification of an impure organic compound by crystallization/Sublimation method and determination of melting point of purified sample.</p> <p>CO-3: Organic Preparations 1. Preparation of acetanilide (Acetylation of Anil</p>
---	------------------------	---

		ine) 2. Preparation of Benzanilide (Benzoylation of Aniline) 3. Preparation of Iodoform from Methanol or Acetone. 4. Preparation of m-di-Nitrobenzene (Nitration) 5. Preparation of tri-Bromoaniline from Aniline (Bromination) 6. Preparation of Benzoic acid from Benzamide (Hydrolysis) 7. Preparation of Benzoic acid from Benzaldehyde (oxidation) Preparation of Semicarbazone from Acetone
--	--	--

Semester II

Course Outcome- B.Sc. Chemistry

After successful completion of three year degree program in Chemistry student should be

Course	Code	Outcomes
Chemistry Paper-I (Organic Chemistry)	USCChT03	CO-1: To study the mechanism of nucleophilic substitution reaction (SN^1 , SN^2 and SN^i) CO-2: Learn chemical properties and different approaches to obtain alcohols, Phenol ether and their uses. CO-3: To know the nomenclature, structure and reactivity of the carbonyl group through organic named reaction.
Chemistry Paper-I (Physical Chemistry)	USCChT04	CO-1: To understand some basic mathematical concepts CO-2: To understand the concept of nucleus, nuclear reaction and applications of radioisotopes. CO-3: To understand the kinetic gas theory, its equation, various molecular velocities and its interrelationship equation. CO-4: To understand the ideal and real gases. Vander Waal's equation and its isotherm. CO-5: To know the structure of liquids, its classification and properties.

Chemistry Practical's, Semester-II

		<p>CO-1: Determination of boiling point of given mixture of organic compounds.</p> <p>CO-2: Qualitative Analysis of simple Organic Compound 1. Detection of extra elements (N.S. and halogen) Functional group detection</p> <p>CO-3: Expt. 2. To determine percentage composition (v/v) of the given mixture of ethyl alcohol and water by viscosity measurement. Expt. 3 To determine surface tension of liquid by Stalagmometer. Expt. 4 To determine Parachor value of –CH₂ group by Stalagmometer. Expt. 5. To compare cleaning power of detergents by Stalagmometer. Expt. 6. To determine refractive index of the given liquid by Abbe's refractometer.</p>
--	--	--

Course Outcome- B.Sc. Chemistry Semester III

After successful completion of three year degree program in Chemistry student should be

Chemistry Paper-I (Inorganic Chemistry)	USCChT05	<p>CO-1: Redox and acid base titration CO-2: To learn the Chemistry of transition series of lanthanides and actinides. CO-3: To know the basic properties and understanding of iodine and interhalogen compound. CO-4: Explain Error in Chemical analysis</p>
--	-----------------	---

<p>Chemistry Paper – II (Physical Chemistry)</p>	<p>USCChT06</p>	<p>CO-1: To understand the Recapitulation of thermodynamic terms.</p> <p>CO-2: To understand the Statements of first law of thermodynamics, Carnot's cycle & its efficiency, thermodynamics scale of temperature.</p> <p>CO-3: To understand the concept of Thermochemistry and its applications.</p> <p>CO-4: To understand Free energy functions</p>
--	------------------------	--

Chemistry Practical's, Semester-III

<p>Practical chemistry (Inorganic Chemistry and Physical chemistry)</p>	<p>CO-1: Volumetric analysis (Preparation of standard solution by weighing)</p> <p>CO-2- To determine heat of solution KNO_3</p> <p>CO-3- To determine heat of ionization of weak acid (acetic acid)</p> <p>CO-4- To determine the solubility of benzoic acid at different temperature</p>
---	--

Course Outcome- B.Sc. Chemistry Semester IV

After successful completion of three year degree program in Chemistry student should be

<p>Chemistry Paper – I (Inorganic Chemistry)</p>	<p>USCChT07</p>	<p>CO-1: To study the effective atomic number, magnetic properties and the colour of splitting of d- orbital in octahedral, tetrahedral and square planar complexes.</p> <p>CO-2: To understand the Stability metal of complexes by formation constant and calculate thermodynamics parameter.</p> <p>CO-3: Learn to explain Parson's SHAB concept and familiar with its application.</p> <p>CO-4: To study in depth about principle, instrumentation of colorimetry and spectrophotometer.</p>
--	------------------------	---

<p>Chemistry Paper – II (Organic Chemistry)</p>	<p>USCChT08</p>	<p>CO-1:To learn the preparation and properties of nitro and amino compound.</p> <p>CO-2: To introduced the concept of preparation and classification of amino acid , organometallic and heterocyclic compound.</p> <p>CO-3:To known classification and chemical properties of carbohydrates and learn the preparation of synthetic dye.</p> <p>CO-4:Make them aware with some functional classes of synthetic drugs.</p>
<p>PRACTICAL'S</p>		
<p>Practical chemistry (Inorganic Chemistry and Organic Chemistry)</p>	<p>CO-1:Semimicro qualitative analysis of inorganic salt mixture containing two acidic Radicals of different group and two basic radicals of same groups.</p>	
<p>Course Outcome- B.Sc. Chemistry Semester V</p> <p>After successful completion of three year degree program in Chemistry student should be</p>		
<p>Chemistry Paper – I (Organic Chemistry)</p>	<p>USCChT09</p>	<p>CO-1:To known about spectroscopic technique nuclear magnetic resonance (NMR)</p> <p>CO-2:Learn the claisen condensation reaction and study synthesis of ketone, diketone, 4- methyl uracil from acetoacetic ester.</p> <p>CO-3:Understand introduction classification and reaction of polymers and fabrics.</p> <p>CO-4:understand twelve principles of green chemistry</p>
<p>Chemistry Paper – II (Physical Chemistry)</p>	<p>USCChT10</p>	<p>CO-1: To Study the types of cells, types of reversible electrodes and applications of emf.</p> <p>CO-2:To study the failure of classical mechanism with hexa example of different theories.</p> <p>CO-3:To study the wave mechanics, Schrodinger wave equation, Derivation of</p>

		<p>box, Graphical representation of Ψ and its square Ψ^2. Applications of particle in a Schrodinger wave equation from postulates of quantum mechanics. Particle in a one dimensional box. Numerical problems.</p> <p>CO-4: To understand the Solutions and Colligative Properties.</p> <p>CO-5: To study the Magnetic Properties and its applications.</p>
Chemistry Practical's, Semester-V		
<p>Practical chemistry (Organic Chemistry and Physical Chemistry) (USCChPT05)</p>	<p>CO-1: Separation and identification of organic compounds from the given binary mixture.</p> <p>CO-2: Estimation of</p> <ol style="list-style-type: none"> 1. Estimation of glucose. 2. Estimation of amide. 3. Saponification value of oil. <p>CO-3: Preparation of</p> <ol style="list-style-type: none"> 1. Preparation of aspirin. 2. Preparation of paracetamol <p>CO-4:</p> <ol style="list-style-type: none"> 1) To determine the strength of strong acid and a weak acid in a given mixture conductometrically by titrating it with standard alkali solution. 2) To determine the solubility and solubility product of sparingly soluble salt conductometrically. 3) To titrate potentiometrically ferrous ammonium sulphate solution using potassium dichromate solution as titrate and calculate the redox potential of Fe^{2+}/Fe^{3+} system on hydrogen scale. 4) To determine the dissociation constant of weak acid potentiometrically by titrating it against alkali. 	
<p>Course Outcome- B.Sc. Chemistry Semester VI</p> <p>After successful completion of three year degree program in Chemistry student should be</p>		

<p>Chemistry Paper – I (Inorganic Chemistry)</p>	<p>USCChT11</p>	<p>CO-1:To know modern instruments Flame photometry and study basic principles, instrumentation and application of it. CO-2:To develop basic skill required for chromatography, ion exchange, crystallization, TLC and Column. CO-3:To understand the basic principles of soil chemistry through collection of samples.</p>
<p>Chemistry Paper – II (Physical Chemistry)</p>	<p>USCChT12</p>	<p>CO-1: To study the dipole moment and its applications. CO-2:To study the Rotational Spectroscopy and its applications. CO-3: To study the Vibrational Spectroscopy and its applications. CO-4:To understand the Adsorption, Chemisorption's, Application of adsorption, adsorption of gases by solid, Freundlich adsorption isotherm, Langmuir's theory of adsorption, Adsorption from solution, Adsorption chromatography.</p>
<p align="center">Chemistry Practical's, Semester-VI</p>		
<p>Practical chemistry (Inorganic Chemistry and Physical Chemistry) (USCChPT06)</p>	<p>CO-1: Preparation of Metal complexes. i) Potassium trioxalato ferrate (III) $K_3[Fe(C_2O_4)_3] \cdot H_2O$ ii) Copper tetramine complex $[Cu(NH_3)_4] \cdot 2H_2O$ CO-2: Colorimetry i) Job's method of determination of composition of Fe-SSA complex ii) Mole Ratio Method of determination of composition of Fe-SSA complex. CO-3: i) Ion exchange method, separation and estimation of Mg(II) and Zn (II). Chromatographic separation of binary mixtures (at least two) containing Cu(II), Co(II) and Ni(II) ions by paper chromatography and determination of R_f values.</p>	

CO-4:

1) To verify Beer-Lambert law for $\text{KMnO}_4/\text{K}_2\text{Cr}_2\text{O}_7$ and determine the concentration of the given solution of $\text{KMnO}_4/\text{K}_2\text{Cr}_2\text{O}_7$.

2) To verify law of refraction for mixture (glycerol-water) using Abbe's refractometer.

3) To determine the specific rotation of a given optically active compound by polarimetry. (D-glucose, D/Lactic acid).

To determine molecular mass of a non-volatile solute by Rast method.