

Programme Outcome: B. Sc. Chemistry

After successful completion of three year degree program in Chemistry a student should be able to;

1. Demonstrate, solve and an understanding of major concepts in all disciplines of chemistry.
2. Students gained the theoretical as well as practical knowledge of handling chemicals.
3. Provide the students a comprehensive understanding about the fundamentals of chemistry covering all the principles and perspectives.
4. Solve the problem and also think methodically, independently and draw a logical conclusion.
5. Understand the importance of the elements in the periodic table including their physical and chemical nature and role in the daily life
6. Create an awareness of the impact of chemistry on the environment, society, and development outside the scientific community.
7. To inculcate the scientific temperament in the students and outside the scientific community.
8. Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of chemical reactions.
9. The practical exercises done in the laboratories impart the students the knowledge about various chemical reagents and reactions.
10. Also they expand the knowledge available opportunities related to chemistry in the government services through public service commission particularly in the field of food safety, health inspector, pharmacist etc.
11. Afford a broad foundation of chemistry that stresses scientific reasoning and analytical problem solving with a molecular perspective.
12. Understand the concept of chemistry to inter relate and interact with the other subject like mathematics, physics, biological science etc.

Programme Specific Outcomes

1. Gain the knowledge of Chemistry through theory and practicals.
2. To explain nomenclature, stereochemistry, structures, reactivity, and mechanism of the chemical reactions.
3. Identify chemical formulae and solve numerical problems.
4. Students will learn to estimate inorganic salt mixtures and organic compounds both qualitatively and quantitatively using the classical methods of analysis in practical classes.
6. Students will grasp the mechanisms of different types of reactions both organic and inorganic and will try to predict the products of unknown reactions.
7. Students will learn to synthesize the chemical compounds.
8. Know structure-activity relationship.
9. Understand good laboratory practices and safety.

10. Make aware and handle the sophisticated instruments/equipments.

12. Will become familiar with the different branches of chemistry like analytical, organic, inorganic, physical, environmental, polymer

Courses	Outcome
BSc I year	Students will gain an understanding of:
CHEM 101-Atomic Structure and Bonding, General Organic Chemistry & Aliphatic Hydrocarbons	<ol style="list-style-type: none">1. The fundamental properties of atoms, molecules, and the various states of matter.2. The reactivity and stability of an organic molecule based on structure, including conformation and stereochemistry3. An understanding of nucleophiles, electrophiles, electronegativity, and resonance.4. Explain the nature of electromagnetic radiation and quantum theory.5. Understand the periodic law and significance of atomic no. and electronic configuration as the basic for periodic classification.6. Explain the classification of elements into a s,p,d and f blocks and learn their main characteristics.7. Understand the concept of organic reaction mechanism.8. Explain about various methods of preparation and applications of hydrocarbons.9. Explain & understand the difference between configuration and conformation10. Recognize the type of organic reactions11. Describe the term – paramagnetic, diamagnetic and ferromagnetic substances.
CHEM 102- States of Matter, Chemical kinetics & Functional Organic Chemistry	<ol style="list-style-type: none">1. Explain the gas laws in various real life situations.2. Explain the behaviour of real and ideal gas.3. Explain differentiate between gaseous state and vapour.4. Explain the kinetic theory of gases.5. Explain the properties of liquid, describe condition required for liquefaction of gases..6. Estimate no of hydroxyl groups and alkoxy group in alcohol and ether.7. Discuss electrophilic and nucleophilic reactions in aromatic compounds.8. Differentiate between activating and deactivating groups

	<ol style="list-style-type: none"> 9. Understand the term rectified spirit and methylated spirit. 10. Explain the mechanism of few selected reactions of alcohols, phenols, aldehyde and ketones.
BSc II year	Student will be able to
CHEM 201-Solutions, Phase Equilibrium, Conductance, Electrochemistry, & Organic Chemistry	<ol style="list-style-type: none"> 1. Understand the concept of solution and causes of deviation from the ideal behaviour 2. Effects of temperature and impurity on partial miscibility of liquids 3. Deal with analytical problems of solubility, extent of association and dissociation 4. Understand criteria of Phase Equilibrium 5. Draw and explain the Phase Diagram of one component system and two component system 6. Calculate Transport Number of electrolyte by using Hittorf and Moving Boundary Methods 7. Conducting conductometric titrations of acid-base 8. Calculate EMF of cell with the help of Nernst equation 9. Determine activity, activity coefficient, solubility product and PH of solution by different concentration cells 10. Write the preparation and chemical reactions of carboxylic acid and its derivatives 11. Write the preparation and chemical reactions of amines and diazonium salt and its derivatives
CHEM 202- Chemistry of Main Group Elements, Chemical Energetics and Equilibria	<ol style="list-style-type: none"> 1. Understand the chemistry of Hydrogen 2. Explain the chemistry of S-block Elements in term of electronic configuration, atomic size, ionization enthalpy, electron gain enthalpy and electronegativity 3. Explain the chemistry of P-block Elements in term of hydrides, halides, oxides and oxoacids 4. Explain the chemistry of Noble Gases in term of fluorides, oxides, oxyfluorides 5. Explain the principles of thermochemistry 6. Deal with the analytical problems of bond energy, resonance energy from thermochemical data. 7. Understand the concept of Free energy in a chemical reaction 8. Explain the chemistry of ionization of weak acids and bases.
CHEM 203- Basic Analytical Chemistry	<ol style="list-style-type: none"> 1. Explain the theoretical principles and important applications of classical analytical methods within titration (acid/base titration, complexometric titration, redox titration), and various techniques within gravimetric and coulometric methods. 2. Explain the theoretical principles of selected instrumental methods within electroanalytical and

	<p>spectrometric/spectrophotometric methods, and main components in such analytical instruments.</p> <ol style="list-style-type: none"> 3. Explain the theoretical principles of various separation techniques in chromatography, and typical applications of chromatographic techniques. 4. Assess and suggest a suitable analytical method for a specific purpose, and evaluate sensitivity, important sources of interferences and errors, and also suggest alternative analytical methods for quality assurance. 5. Perform classical analytical experiments, and make observations and assessments of important factors that could affect the analytical result. 6. Be familiar with calculations in analytical chemistry, be able to calculate titration errors for method evaluation, and perform statistical evaluation of results from classical and instrumental chemical experiments and analysis.
CHEM 204- Fuel Chemistry & Chemistry of Cosmetics and Perfumes	<ol style="list-style-type: none"> 1. Explain different sources of energy, their classification, composition and uses 2. Become familiar with Petrochemical Industry and Refining different types of petroleum product 3. Become familiar with fractional distillation, cracking and reforming petroleum and non- petroleum fuels 4. Explain Lubricant, their classification, properties and their determination 5. Become familiar with preparation and uses of cosmetics. 6. Understand the essential oils and their importance in cosmetic industries
BSc III year	Students will gain an understanding of
CHEM 301- Polynuclear Hydrocarbons, Dyes, Heterocyclic Compounds, and Spectroscopy (UV, IR, NMR)	<ol style="list-style-type: none"> 1. Synthesis and reactions of polynuclear hydrocarbons 2. Study of heterocyclic chemistry: Five and six member heterocyclic with one or two hetero atoms. 3. To understand the function of dyes, paints and pigments. 4. To study UV, IR and NMR spectroscopy. 5. Determine structure of compound by spectroscopic methods.
CHEM 305- Polymer Chemistry	<ol style="list-style-type: none"> 1. To study the different types of polymers and classification of polymers. 2. Identify the repeat units of particular polymers and specify the isomeric structures which can exist for those repeat units. 3. Estimate the number- and weight-average molecular masses of polymer samples given the degree of polymerisation and mass fraction of chains present. 4. Explain polymerization methods

	<ol style="list-style-type: none"> 5. Understand polymerization kinetics and Glass Transition temperature (T_g). 6. Structure, properties and application of some polymers including conducting polymers. 7. A good knowledge about the Industrial Applications of Polymers
CHEM 307- Chemical Technology & Society and Business Skills for Chemistry	<ol style="list-style-type: none"> 1. Study the purification & separation technique 2. Study the different type of equipments needed in chemical technology- reactors, distillation columns, extruders, pumps, mills, emulgators. 3. Understanding of clean technology. 4. Exploration of societal and technology issues. 5. Understand business concept, writing and presentation of business plan. 6. Know project management. 7. Understanding the role of chemistry in industry, global economy and world economy. 8. Know Intellectual Property Right, Copyright, Trademark, Patents
CHEM 308- Pesticide Chemistry & Pharmaceutical Chemistry	<ol style="list-style-type: none"> 1. Study the pesticides, its pros and cons. 2. Acquire theoretical knowledge of synthesis and use of different pesticides. 3. Know the various pharmaceutical drugs, their application and synthesis.
Practicals	<ol style="list-style-type: none"> 1. how to engage in safe laboratory practices by handling laboratory glassware, equipment, and chemical reagents appropriately. 2. how to work effectively as a member of a team. Communicate productively with lab mates, teaching assistant and instructor 3. how to critically evaluate data collected to determine the identity, purity, and percent yield of products and to summarize findings in writing in a clear and concise manner 4. how to predict the outcome of organic reactions using a basic understanding of the general reactivity of functional groups and mechanism.