

DEPARTMENT OF CHEMISTRY
DAV AUTONOMOUS COLLEGE TITILAGARH
B. Sc Chemistry

	After successful completion of three year degree program in Chemistry a student should be able to;
Programme Outcomes	<p>PO-1. Demonstrate, solve and an understanding of major concepts in all disciplines of chemistry.</p> <p>PO-2. Solve the problem and also think methodically, independently and draw a logical conclusion.</p> <p>PO-3. Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of chemical reactions.</p> <p>PO-4. Create an awareness of the impact of chemistry on the environment, society, and development outside the scientific community.</p> <p>PO-5. Find out the green route for chemical reaction for sustainable development.</p> <p>PO-6. To inculcate the scientific temperament in the students and outside the scientific community.</p> <p>PO-7. Use modern techniques, decent equipments and Chemistry software's</p>

Programme Specific Outcomes	<p>PSO-1. Gain the knowledge of Chemistry through theory and practical's.</p> <p>PSO-2. To explain nomenclature, stereochemistry, structures, reactivity, and mechanism of the chemical reactions.</p> <p>PSO-3. Identify chemical formulae and solve numerical problems.</p> <p>PSO-4. Use modern chemical tools, Models, Chem-draw, Charts and Equipments.</p> <p>PSO-5. Know structure-activity relationship.</p> <p>PSO-6. Understand good laboratory practices and safety.</p> <p>PSO-7. Develop research oriented skills.</p> <p>PSO-8. make aware and handle the sophisticated instruments/equipments.</p>
Course Outcomes B. Sc Chemistry	
	After completion of these courses students should be able to; Semester-I
CORE-I Inorganic chemistry-I	<p>CO-1. Understand the concept of structure of atoms, periodicity of elements, types of chemical bonding and redox reactions.</p> <p>CO-2. Solve the numerical problems based on redox reactions.</p> <p>CO-3. Understand the term specific volume, molar volume.</p> <p>CO-4. To know Calibration and use of apparatus.</p> <p>CO-5. Preparation of solutions of different normality/molarity of titrants.</p>
CORE-II Physical Chemistry-I	<p>CO-1. Know the concepts of different states of matter.</p> <p>CO-2. To understand equilibria and ionic equilibria and related numerical.</p> <p>CO-3. Know the different structures of solids.</p> <p>CO-4. Experimental determination of surface tension and viscosity.</p> <p>CO-5. Experimental determination of pH of different solutions</p>

Semester-II	
CORE-III Organic Chemistry-I	<p>CO-1. Define organic acids and bases.</p> <p>CO-2. Distinguish between geometrical and optical isomerism.</p> <p>CO-3. Discuss kinetics, mechanism and stereochemistry of SN¹ and SN²</p> <p>CO-4. Compare between E₁ and E₂ reactions.</p> <p>CO-5. Understand the evidences, reactivity and mechanism of various elimination and substitution reactions.</p> <p>CO-6. To determine the melting point and effect of impurities on melting point.</p>
CORE-IV Physical Chemistry-II	<p>CO-1. Know the principles and concept of Thermodynamics.</p> <p>CO-2. To understand laws of thermodynamics and concept of entropy.</p> <p>CO-3. Understand the criteria of spontaneity of a process.</p> <p>CO-4. To know the systems of variable compositions.</p> <p>CO-5. Measure the heat capacity of a calorimeter and calculation of enthalpies of ionization of different acids and bases.</p>
Semester-III	
CORE-V Inorganic Chemistry-II	<p>CO-1. Know the concept of metallurgy.</p> <p>CO-2. Understand the concept of acids and bases</p> <p>CO-3. Study of chemistry of s and p block elements and noble gases.</p> <p>CO-4. Understand the characteristics of some food starches.</p> <p>CO-5. Synthesis and applications of polymers.</p> <p>CO-6. Standardization of solutions and estimation of different elements.</p>
CORE-VI Organic Chemistry-II	<p>CO-1. To know the chemistry of halogenated hydrocarbon.</p> <p>CO-2. Preparation and properties of alcohols, phenols, Aldehydes, ketones, carboxylic acids, esters, ethers and thio ethers.</p> <p>CO-3. Synthetic applications of active methylene compounds.</p> <p>CO-4. Acylation of aliphatic and aromatic amines experimentally.</p> <p>CO-5. Bromination and nitration of different organic compounds.</p>
CORE-VII Physical Chemistry-III	<p>CO-1. To know the concept of phases, components and degrees of freedom.</p> <p>CO-2. To understand rates, order and molecularity of a reaction.</p> <p>CO-3. To know the concept of catalyst and catalysis.</p> <p>CO-4. Determination of partition coefficient.</p> <p>CO-5. To determine rate constants.</p>



Semester-IV	
CORE-VIII Inorganic Chemistry-III	CO-1. Understand about coordination compounds. CO-2. Know isomerism in coordination compounds. CO-3 Study the Crystal Field Theory. CO-4. Determination of CFSE CO-5. Basic idea on inorganic polymers. CO-6. Chemistry of Lanthanoids and Actinoids. CO-7. Preparation of complexes. CO-8. Estimation of Ca and Mg.
CORE-IX Organic Chemistry-III	CO-1 Study of nitrogen containing organic compounds. CO-2. Get knowledge on polynuclear compounds and diazonium salts. CO-3. Understanding of heterocyclic compounds, alkaloids and Terpenes. CO-4. Study of detection of elements in organic compounds. CO-5. Qualitative analysis of organic compounds.
CORE-X Physical Chemistry-IV	CO-1. To study conductance of electrolytes. CO-2. Discuss different types galvanic cells. CO-3. Determination of cell potential and pH by EMF measurements. CO-4. Carry out conductometric titrations.. CO-5. To calculate transport number.
Semester-V	
CORE-XI Organic Chemistry-IV	CO-1. Know the principles of spectroscopy. CO-2. To understand different types of spectroscopy. CO-3. To understand UV, IR and NMR spectroscopy CO-4. To give an extended knowledge about Carbohydrates. CO-5. Qualitative analysis of carbohydrates
CORE-XII Physical Chemistry-V	CO-1. To understand quantum chemistry. CO-2. To know application of quantum mechanics in different systems. CO-3. To understand molecular spectroscopy CO-4. To give an extended knowledge on photochemistry. CO-5. Knowledge on spectrophotometric titrations. CO-6. To understand photometric titrations.

DSE-I Polymer Chemistry	<p>CO-1. Know the introduction and history of polymeric materials.</p> <p>CO-2. To study the functionality and degree of polymerisation.</p> <p>CO-3. To understand mechanism of polymerization.</p> <p>CO-4. To study the glass transition temperature.</p> <p>CO-5. Synthesis and application of different polymers.</p> <p>CO-6. Determination of molecular weight of polymer by viscometry</p>
DSE-II Green Chemistry	<p>CO-1. Know the principle of green chemistry and designing a chemical synthesis..</p> <p>CO-2. To study energy efficient processes for synthesis.</p> <p>CO-3. To understand micro wave and ultrasound assisted reactions</p> <p>CO-4. To know future trends of green chemistry.</p> <p>CO-5. Preparation and characterization of nanoparticles.</p> <p>CO-6. Detection of elements in organic compounds by green methods..</p>
Semester-VI	
CORE-XIII Inorganic Chemistry-IV	<p>CO-1. Know organometallic compounds.</p> <p>CO-2. Preparation and properties of different organometallics.</p> <p>CO-3. Study of catalysis by organometallic compounds.</p> <p>CO-4. Thermodynamics and kinetic aspect of metal complexes.</p> <p>CO-5. Qualitative analysis of inorganic mixture.</p>
CORE-XIV Organic Chemistry-V	<p>CO-1. Chemistry of amines, peptides and proteins.</p> <p>CO-2. Knowledge on enzymes and nucleic acids.</p> <p>CO-3. Study of concept of energy in Biosystem.</p> <p>CO-4. Study of structure and importance of Pharmaceutical compounds.</p> <p>CO-5. Determination of saponification value of esters and oils.</p>
DSE-III Industrial chemicals and Environment	<p>CO-1. Study of industrial gases and inorganic chemicals.</p> <p>CO-2. Knowledge on industrial metallurgy.</p> <p>CO-3. To know the environment and its segments.</p> <p>CO-4. To understand the concept of energy and environment.</p> <p>CO-5. Introduction of Biocatalysis</p> <p>CO-6. Determination of COD and BOD</p>
DSE-IV Project	<p>CO-1. Concept of research methodology.</p> <p>CO-2. How to write a research paper.</p>

M. Sc Chemistry

	After successful completion of two year degree program in chemistry a student should be able to;
Programme Outcomes	<p>.</p> <p>PO-1. Determine molecular structure by using UV, IR and NMR.</p> <p>PO-2. Study of medicinal chemistry for lead compound.</p> <p>PO-3. Improve the Skill of student in organic research area.</p> <p>PO-4. Synthesis of Natural products and drugs by using proper mechanisms.</p> <p>PO-5. Study of Asymmetric synthesis.</p> <p>PO-6. Determine the aromaticity of different compounds.</p> <p>PO-7. Solve the reaction mechanisms and assign the final product.</p>
Programme Specific Outcomes	<p>PSO-1. Know the structure and bonding in molecules/ ions and predict the Structure of molecule/ions.</p> <p>PSO-2. Understand the various type of aliphatic, aromatic, nucleophilic substitution reaction.</p> <p>PSO-3. Understand and apply principles of Organic Chemistry for understanding the scientific phenomenon in Reaction mechanisms.</p> <p>PSO-4. Learn the Familiar name reactions and their reaction mechanisms.</p> <p>PSO-5. Understand good laboratory practices and safety.</p> <p>PSO-6. Study of organometallic reactions.</p> <p>PSO-7. Study of free radical, bicyclic compound, conjugate addition of Enolates and pericyclic reactions.</p> <p>PSO-8. Study of biological mechanisms using amino acids.</p>

Course Outcomes M. Sc Chemistry	
Semester-I	
Course	Outcomes
	After completion of these courses students should be able to;
CH-101 Group Theory, Solid state Chemistry and Transition Metal Chemistry	CO-1. To know symmetry and group theory. CO-2. Know the concept of symmetry and spectroscopy. CO-3. General idea on structure of solids. CO-4. Understand the theories of metal-ligand bonding. CO-5. Knowledge of complex equilibria and term diagram. CO-6. Electronic spectra and magnetic properties.
CH-102 Structure, Reactivity and stereochemistry	CO-1 Nature and bonding in organic molecules. CO-2. Study of reaction mechanism. CO-3. Knowledge of reagents in organic synthesis. CO-5. Stereochemistry of organic compounds. CO-6. Study of molecular dissymmetry and chiroptical properties.
CH-103 Thermodynamics and Dynamics	CO-1. Learn the thermodynamic description of exact differential and state function CO-2. Know the concept of classical thermodynamics. CO-3. Understanding thermodynamics of living system. CO-4. Concept of non equilibrium thermodynamics. CO-5. Study of chemical kinetics, Catalytic and fast reaction.
CH-104 Inorganic and Organic Practical	CO-1. Analysis of an inorganic mixture containing more than six radicals.. CO-2. Analysis of insoluble mixture. CO-3. Analysis of interfering radicals. CO-4. Isolation and identification of multi functional compound in a mixture of two organic compounds.

Semester-II	
CH-201 Metal π complex and clusters and Bioinorganic Chemistry	<p>CO-1. Study of carbon monoxide complexes.</p> <p>CO-2. Know the complex of carbon monoxide complex analogue.</p> <p>CO-3. Study of metal clusters and polyacids.</p> <p>CO-4. Study of biomolecules and their role in metal ion storage.</p> <p>CO-5. Learn the role of protein as oxygen and electron carrier.</p> <p>CO-6. Study of Biomolecular catalysis</p>
CH-202 Organic reaction mechanism	<p>CO-1. Learn SN1, SN2 and SNi Mechanism and stereochemistry.</p> <p>CO-2. Learn classical and non-classical carbocation, NGP by pi and sigma bonds.</p> <p>CO-3. Solve the elimination problems.</p> <p>CO-4. Distinguish between type of addition, elimination and substitution Reactions.</p> <p>CO-5. Study of Aromatic electrophilic and nucleophilic substitution reactions</p>
CH-203 Statistical Thermodynamics, HMO theory and Surface chemistry	<p>CO-1. Study of classical and quantum statistical mechanics.</p> <p>CO-2. Significance of partition functions.</p> <p>CO-3. Study of HMO theory.</p> <p>CO-4. Application of phase rule in one and two components systems.</p> <p>CO-5. Knowledge on adsorption and adsorption isotherms.</p> <p>CO-6. Study on macromolecules</p>
CH-204 Inorganic and Organic practical	<p>CO-1. Estimation of major constituents in Brass and cement .</p> <p>CO-2. Determination of MnO₂ in Pyrolusite.</p> <p>CO-3. Preparation of different organic compounds.</p> <p>CO-4. Preparation of inorganic complexes.</p>

Semester-III

CH-301 Instrumental methods and Nuclear Chemistry	CO-1. Study on Spectroscopic methods. CO-2. Principle and techniques of electro analytical method. CO-3. Study of thermo analytical method. CO-4. Study of nuclear reactions.
CH-302 Organic redox reactions, Pericyclic reactions and Photochemistry	CO-1. Study of organic redox reaction. CO-2. Study of photochemistry: Carbonyl compounds, alkenes, dienes, polyenes and aromatic compounds. CO-3. Study photo rearrangement Barton reaction, application of photochemical reaction. CO-4. Learn Pericyclic reaction: Electro cyclic, Cycloaddition, and Ene Reaction, analysis by correlation diagram, FMO approach and ATS concept.
CH-303 Quantum Chemistry, atomic and Molecular spectroscopy	CO-1. Postulates of quantum mechanics and Schrodinger equation. CO-2. Study of approximate methods and angular momentum. CO-3. Study on rotational and vibrational spectroscopy. CO-4. Basic concept of Raman spectroscopy.
CH-304 Physical Chemistry practical	CO-1. Determination of ionization constant of weak acids. CO-2. Verification of Onsager's law. CO-3. Conductometric titrations. CO-4. Determination of solubility product of BaSO ₄ . CO-5. To determine rate constant of base hydrolysis of esters.
CH-305 Project	CO-1. Study on research methodology.. CO-2. How to write a research paper

Semester-IV	
CH-401 Advance Organometallic Chemistry	CO-1. Study of sigma and pi bonded organometallic compounds. CO-2. Learn organometallic compounds and unique reactions. CO-3. Study of organometallic compounds in catalysis. CO-4. Applications of organometallics in organic synthesis.
CH-402 Advanced spectroscopy	CO-1 Study of ESR spectroscopy. CO-2. Study on photoelectron spectroscopy. CO-3. Study of Mossbauer spectroscopy. CO-4. Applications of spectroscopy
CH-403 Chemistry of Nanomaterials	CO-1. Study on semiconductors and devices. CO-2. Study of Nanomaterials and their applications . CO-3. Organic/Inorganic hybrid materials and their applications. CO-4. Structure properties of polymers and their applications.
CH-404 Industrial Processes	CO-1. Study on Petroleum and petroleum based chemicals. CO-2. Study of oil based industries. CO-3. Study of pesticides and pharmaceutical based industries. CO-4. Study of Glass and Cement.
CH-405 Analytical Chemistry Practical	CO-1. Determine the pK value of an acid-base indicator. CO-2. To estimate metal ions by spectrophotometric titration. CO-3. To determine the pH of a given solution by spectrophotometrically. CO-4. Adsorption of CH ₃ COOH on activated charcoal and verification of Freundlich & Langmuir's adsorption isotherm.

