

DEPARTMENT OF CHEMISTRY

M.Sc. Chemistry

Course Outcomes

On the successful completion of the course, students will be able to

Course Code	Course Name	Course outcomes
20PCHC1	Inorganic Chemistry-I	CO1: Summarize the basic concepts of nuclear chemistry and determination of radioactivity
		CO2: Acknowledge in depth study of natural radioactivity and application of radioactive isotopes
		CO3: Comprehend and compare the structure of boranes, carboranes and polyacids
		CO4: Gain the knowledge about the inorganic polymers
		CO5: Gain the knowledge about the Photochemical reactions
20PCHC2	Organic Chemistry-I	CO1: Determine and interpret absolute stereochemical assignments in organic molecules identify prochirality, chirality centres and the topical relationship in organic molecules
		CO2: Predict the stability of various conformers of cyclic systems using steric and electronic effect and correlate them to reactivity
		CO3: Describe and formulate the mechanism of various nucleophilic substitution reactions and predict the role of substrate structure and reaction medium on the rate
		CO4: Compare and appreciate the reactivity of aliphatic and aromatic compounds with respect to nucleophilic substitution reactions
		CO5: Predict major and minor products of elimination reactions with appropriate stereochemistry and regiochemistry.
20PCHC3	Physical Chemistry-I	CO1: Understand the concepts of classical thermodynamics; construct and analyse phase diagram for three components systems
		CO2: Profound understanding of the fundamental concepts of quantum mechanics.

		CO3: Set up and Solve the Schrodinger equation for various systems
		CO4: Give an overview of approximation methods such as variation and perturbation methods; spin orbit interactions and ground state term symbols
		CO5: Gain insights on various approximations-BO, LCAO-MO, HF; HMO theory for conjugated systems
20PCHEC1	Advanced Chemistry	CO1: Explain the principle and instrumentations of GLC & HPLC and illustrate with corresponding applications
		CO2: Summarize the principle, instrumentation of DTA, DSC and polarography and determine Cd, Pb and Cu ions
		CO3: Discuss the principles, instrumentation of amperometry, AAS and estimate lead & sulphate using amperometric titrations
		CO4: Generalize polymers and detail bio & conducting polymers and illustrate the kinetics of polymerisation
		CO5: Elaborate the classification of nanomaterials and comprehend various nanotechnologies, characterization techniques
20PCHEC1	Water Chemistry	CO1: Explain the characteristics of water and measurement techniques
		CO2: Summarize the potable water standards and disinfectant methods
		CO3: Discuss waste water treatment methods
		CO4: Generalize industrial waste water treatment methods
		CO5: Elaborate treatment plants
20PCHC4	Inorganic Chemistry-II	CO1: Acquire sound knowledge on coordination compounds; stereochemical aspects and stability of complexes
		CO2: Understand the theories of coordination compounds; CFT, MO
		CO3: Acquire the knowledge of structure and defects in solids; superconductivity and magnetic property of solids

		CO4: Learn and apply HSAB principle; Have deep knowledge on the band structure of solids and role of band gap in determining the electrical properties (conductors, semiconductors and insulators) of materials
		CO5: Understand and appreciate the role of metals in biological systems
20PCHC5	Organic Chemistry-II	CO1: Understand the effect of structure on reactivity understand and apply various methods of determining reaction mechanisms
		CO2: Design the synthetic route for unknown molecule by applying the accepted mechanism of addition reaction of alkenes and carbonyl compounds
		CO3: Compare and appreciate the reactivity of aliphatic and aromatic compounds with respect to electrophilic substitution reactions
		CO4: Devise reasonable high yield synthesis of a target molecule from the given starting materials applying molecular rearrangements
		CO5: Predict the product, mechanism and uses of reactions involving selected oxidising and reducing agents
20PCHEC2	Chemical kinetics and Thermodynamics	CO1: Explicate the kinetics of simultaneous reactions and comprehend the significance of ARRT
		CO2: Examine the influence of physical parameters on reaction in solutions
		CO3: Assess the importance of determining fugacity, activity and activity co-efficient
		CO4: Summarize the objectives, distribution law and applications of statistical thermodynamics
		CO5: Calculate different partition function and know about theories of heat capacity
20PCHEC2	Green Chemistry	CO1: Explicate the need for green chemistry
		CO2: Examine the green reagents and catalysts
		CO3: Assess the importance of microwave induced synthesis

		CO4: Explain the aqueous phase reactions
		CO5: Illustrate about the organic synthesis in solid state
20PCHQC1	Inorganic Chemistry Practical	CO1: Understand the principle of qualitative inorganic analysis
		CO2: Identify various ions present in mixture of salts
		CO3: Learn to detect the rare earth qualitatively
		CO4: Estimate the amount ions by complexometric and cerimetric methods
		CO5: Acquire skills to estimate Fe, Ni, Mn, Ti and Co(II) by photolorimetry
20PCHQC2	Organic Chemistry Practical-I	CO1: Identify limiting reagents, calculate the theoretical yield and percentage yield
		CO2: Perform experiments safely by handling chemicals, glass wares and equipment's appropriately
		CO3: Develop skills in the synthesis of organic compounds and perform common laboratory techniques including refluxing, distillation, recrystallization and vacuum filtration
		CO4: Explain the theory behind the operations performed and give a detailed mechanism for all laboratory reactions
		CO5: Independently perform two or more step organic synthesis and extract compounds from natural products
20PCHQC3	Physical Chemistry Practical-I	CO1: Construct and analyse the phase diagram to determine the eutectic point
		CO2: Understand Nernst distribution law and its applications
		CO3: Develop skills in the estimation of acid-base, precipitation and redox titrations
		CO4: Determine the solubility of sparingly soluble salts
		CO5: Apply and analyze the principles of potentiometric Titrations
19PCHC6	Organic Chemistry-III	CO1: Sketch the synthesis and compare the properties of Oxygen, Nitrogen, Sulphur

		heterocycles and Flavonoids
		CO2: Analyse the structure, configuration and conformation of carbohydrate, protein, nucleic acids and their biological functions
		CO3: Elucidate the structure of terpenoids, alkaloids and outline their synthesis
		CO4: Discuss and elucidate the structure of steroids and outline their synthesis; apply ORD and CD to analyse the stereochemistry of steroids
		CO5: Apply the utility of organic reagents in organic synthesis and functional group transformation for analysis and research
19PCHC7	Physical Chemistry-II	CO1: Comprehend the kinetics of chain and fast reactions
		CO2: Analyse the concepts of adsorption isotherm and enzyme catalysis
		CO3: Evaluate the behaviour of strong and weak electrolyte
		CO4: Assess different double layer model and their applications
		CO5: Categorize different electrochemical energy systems and their impact on society
19PCHC8	Coordination Chemistry	CO1: Acquire sound knowledge on concepts of electronic spectra of transition metals; derive G.S and excited state terms symbols ; gain the skills to identify the spectral transition for the d^n configuration.
		CO2: Have elaborate understanding of electron transfer, square planar substitution reaction mechanism and interpreting the rates of electron transfer
		CO3: Acquire insights on substitution in octahedral complexes and rearrangement in 4 & 6 coordinate systems
		CO4: Obtain an overall idea on structure and bonding involved in organometallic compounds
		CO5: Appreciate the role of organometallic catalysts in the synthesis of selective organic compounds

19PCHEC3	Group theory and Spectroscopy	CO1: Understand and implement details of molecular symmetry including symmetry elements, operations and symmetry point groups to different chemical compound structures and the necessary mathematical basics needed for group theory
		CO2: Familiarise the basic concept in matrices, irreducible and reducible representations, construction of character table, and prediction of hybridisation, IR - Raman activity of molecular vibrations.
		CO3: Conceive the theory behind NMR and techniques used in simplification of spectra hence appreciate its utility in structure solving
		CO4: Have deeper insights on the principles of microwave spectroscopy; hence solve the problems relating to structure determination. Also have basic idea on NQR spectroscopy and its selective applications
		CO5: Gain a thorough overview on the physical concepts underlying the IR, Raman and electronic spectroscopy
19PCHEC3	Biomolecules	CO1: Understand about the chemistry of carbohydrates
		CO2: Familiarise about the proteins and lipids
		CO3: Conceive the knowledge about the nucleic acid and bioenergetics
		CO4: Have deeper insights on the chemistry of enzymes
		CO5: Gain a thorough overview on the techniques of analytical biochemistry
19PCHEDC	Therapeutical Chemistry	CO1: Conversant with the important terminologies used in medicinal chemistry and routes of drug administration
		CO2: Have profound knowledge on the healing power of herbs and indigenous healing systems
		CO3: Familiarize with various diseases, symptoms and their cure
		CO4: Acquire elementary idea on various drugs and certain life style diseases
		CO5: Gain brief insights on various issues blood

		and its analysis, vitamins and hormones, accidents and first aids.
19PCHC9	Physical Methods In Chemistry	CO1: Have a firm foundation in the fundamentals and applications of photoelectron spectroscopy and flame emission spectroscopy
		CO2: Apply the IR and Raman spectroscopy in the structural determination of Inorganic compounds
		CO3: Structural elucidation of inorganic compounds using NMR spectroscopy
		CO4: Understand in depth the concepts and utilities of EPR and Mossbauer spectroscopy.
		CO5: Have an overview of computational Chemistry, the methods involved and scope of the subject
19PCHEC4	Advanced Organic Chemistry	CO1: Understand the concepts of aromaticity, anti aromaticity, non aromaticity and apply them to classify and compare the stability of organic compounds
		CO2: Know the generation and analyse configuration, general reactions and name reactions of free radicals
		CO3: Apply the principles of photochemistry in organic reactions and research
		CO4: Comprehend and apply the concepts of pericyclic reactions to classify and identify them in general and research
		CO5: Employ retrosynthesis to design synthetic routes of organic compounds and natural products
19PCHEC4	Material science chemistry	CO1: Understand the concepts of ionic conductivity, crystal defects and electronic properties
		CO2: Know the types of magnetic, electric and insulating materials
		CO3: Gain knowledge about biomaterials
		CO4: Comprehend the synthetic techniques and applications of nanomaterials
		CO5: Able to explain nano imaging techniques

19PCHEC5	Photochemistry and Organic Spectroscopy	CO1: Explain the theory of radiative and non-radiative processes
		CO2: Comprehend the kinetics of photochemical reactions and discuss about photovoltaic and photo electrochemical cells
		CO3: Discuss the principle of UV and IR spectroscopy; calculate λ_{\max} and interpret IR spectra of organic compounds
		CO4: Elaborate the principle and applications of NMR spectroscopy; interpret ^1H and ^{13}C NMR spectra of organic compounds
		CO5: Propose and illustrate different fragmentation pattern for various compounds, elucidate the structure of organic compounds using UV, IR, NMR & mass spectral techniques
19PCHEC5	Medicinal Chemistry	CO1: Explain the basic concepts about drug actions
		CO2: Comprehend about anticonvulsant and stimulants
		CO3: Discuss about various analgesics
		CO4: Elaborate about anti-histamines and anti-inflammatory drugs
		CO5: Explain about expectorants and antitussives
19PCHQC4	Organic Chemistry Practical-II	CO1: Separate organic mixture by solvent extraction
		CO2: Qualitative analysis of the organic compounds
		CO3: Synthesis of suitable derivatives of the organic compounds
		CO4: Determination of boiling point/melting point of the derivatives
		CO5: Analyse UV-Visible, IR, NMR and Mass spectra and identify organic compounds
19PCHQC5	Physical Chemistry Practical-II	CO1: Evaluate the relative strength of acids and energy of activation by kinetics
		CO2: Examine the behaviour of strong and weak electrolytes
		CO3: To determine the order of reaction

		CO4: Develop skills in the estimation of acid-base and halides by conductometric methods
		CO5: Get an insight on using softwares for molecular modelling