DEPARTMENT OF CHEMISTRY

JHARGARM RAJ COLLEGE (UG AND PG)

(Affiliated to Vidyasagar University)

Programme Specific Outcome (PSO) & Course Outcome (CO)

Programme Name: B.Sc. Hons Major in Chemistry (Under CCFUP-NEP)
Year of Introduction: 2023-24
Duration: Eight Semesters (Total 4 Years)

Programme Specific Outcome (PSO) for UG

1. Students will be exposed to the all the main branches of chemistry such as physical, organic, inorganic & analytical chemistry.
2. Students will acquire the ability to analyse, explain chemical phenomena with the basic principles and fundamentals of chemistry. They will also be able to write concisely.
3. Students will enable to analyse organic and inorganic samples qualitatively as well as quantitatively.
4. Students will get expertise to synthesize cosmetics, perfumes, etc.
5. Students will be able to set up experimental methods and work up.
6. Students will be enriched with the knowledge and training to operate many physico-chemical instruments and to carry out experiments there in.
7. Students will be able to interpret IR and NMR spectra of organic compounds.
8. Students will attain the ability to work individually or in a group following a systematic plan.
9. Introduction of computer under at the UG level will upgrade the Quality of Education of the students.

Course Outcome For UG (NEP System)

SEMESTER	COURSE CODE	COURSE TITLE	COURSE OUTCOME
I	CEMHMJ01	T: Organic Chemistry-I P: Organic Chemistry Lab- I	(i) Recognizing basics of organic chemistry like hybridization, shapes of organic molecules, formal charge of an atom, double bond equivalent, orbital pictures etc. (ii) Understanding inductive effect, field effect, mesomeric effect, resonance effect along with reactive intermediate like carbocations, carbanions, carbon radicals, carbenes to know the reaction mechanism for organic reactions. (iii) Representing some three-dimensional organic molecules to two dimensional organic molecules. (iv) Getting idea to separate enantiomeric mixture of compounds which will be effective in biomedical industry. (v) Gaining knowledge to separate mixtures of organic compounds based upon solubility, by using common laboratory reagents.

	CEMMI01	T: Atomic Structure, Acids and Bases, Redox Reactions, & States of Matter; P: Practical	(i) Getting knowledge about atomic structure, chemical periodicity, acids and bases, redox reactions, general organic chemistry & aliphatic hydrocarbons. (ii) Getting practical ideas of estimation of oxalic acid by titrating it with $KMnO_4$,water of crystallization in Mohr's salt by titrating with $KMnO_4$,Fe (II) ions by titrating it with $K_2Cr_2O_7$ using internal indicator etc.
	CEMSEC01	P: Chemistry of Cosmetics & Perfumes	Getting knowledge of preparing cosmetics and perfumes
II	CEMHMJ02	T: Inorganic Chemistry-I P: Inorganic Lab-I	(i)Understanding different model theories of atomic structure including quantum mechanical approaches. (ii) Detail knowledge about periodic table. (iii) Gaining idea about different theories of acid-base, pH, buffer. (iv) Knowing about redox reactions and correlate theories with practical methods of redox, acid-base titrations.
	CEMMI02	T: General Organic Chemistry, Aliphatic Hydrocarbons & Chemical Kinetics; P: Practical	Same as of CEMMI01
	CEMSEC02	P: Medicinal & Pharmaceutical Chemistry	Pharmaceutical Chemistry Getting knowledge of preparing pharmaceuticals and medicine.

Programme Name: B.Sc. Hons CBCS System and
Year of Introduction: 2018
Duration: Six Semesters (Three Years)

Course Outcome For UG (CBCS System)

Course	SEMESTER	Course code	Course Name	Course Outcome
B. Sc General	B. Sc General	CEMG	B. Sc General (Chemistry)	It covers the basic concept of chemistry
	B. Sc Honours (Chemistry)	CEMH	B. Sc Honours (Chemistry)	It gives the detailed idea about stereo chemistry, basic organic and physical chemistry
	I	DSC-1AT (CC-1)	Atomic Structure, Bonding, general organic chemistry & aliphatic hydrocarbons.	It covers electronic configuration, molecular structures and basic concepts of chemistry
		DSC1AP (CC-1)	Atomic structure, Bonding, general organic chemistry & aliphatic hydrocarbons (Practical)	It gives practical idea about the molecular structures in space
	II	DSC-1BT (CC-1)	Chemical Energetics, Equilibria &Functional Organic Chemistry.	students should learn about the reactivity of the organic molecules and feasibility of the reaction and uses of the compounds
		DSC-1BP (CC-1)	Chemical Energetics, Equilibria & Functional Organic Chemistry (Practical)	It trains the reactivity of the organic molecules and feasibility of the reaction and uses of the compounds in reality
	III	DSC-1CT (CC-1)	Solutions, Phase equilibrium, Conductance, Electrochemistry & Functional Organic Chemistry.	It consists of strength of the solution, conductivity of the compounds and reactivity of organic molecules
		DSC-1CP (CC-1)	Solutions, Phase Equilibrium, Conductance, Electrochemistry & Functional Organic Chemistry (Practical)	It helps the student to prepare the solution which is the basic step of further chemical observation
B. Sc General	**IV**	DSC-1DT (CC-1)	Coordination Chemistry, States of matter Chemical Kinetics.	It gives the idea about activation energy of any reaction and uses of inorganic compounds in our real life
		DSC-1DP (CC-1)	Coordination Chemistry, States of matter & Chemical Kinetics (Practical)	It gives the practical idea about activation energy of any reaction and uses of inorganic compounds in our real life
		DSE-1T	Analytical Methods in Chemistry	It highlights the accurate measurement of the solution and helps how to separate the mixtures

B. Sc General	**V**	DSE-1T	Polymer Chemistry	It's about various chemical compounds and their components
		DSE-1T	Instrumental Methods of Chemical Analysis	It explores various instrumental methods regarding various chemical analysis
		DSE-1T	Organometallics, Bioinorganic Chemistry, Polynuclear hydrocarbons and **UV,** IR Spectroscopy	It explores various metal carbon interaction, uses of different metal and enzymatic action on human health, and identification of compounds
		DSE-1P	Analytical methods in Chemistry (Lab)	Students shouldn learn acurate measurement of the solution and helps how to separate the mixtures
		DSE-1P	Polymer Chemistry (Lab)	It helps the students for preparation of various chemical compunds in labroatory
		DSE-1P	Instrumental Methods of Chemical Analysis (Lab)	It expertize the instrument handeling
		DSE-1P	**Section A**: Inorganic Chemistry: 1. Separation of mixtures by chromatography	It explore the isolation and purification of the compounds and basic idea of the atom and molecular structure
		DSE-1P	2. Preparation of any two of the following complexes and measurement of their conductivity	It helps to give idea the conductivity of the complexes
		DSE-1P	**Section B:** Organic Chemistry: Systematic Qualitative Organic Analysis of Organic Compounds	It explore the identifying the special elements and functional groups present in organic compounds and the particular organic compounds
		DSE-2T	Applications of Computers in Chemistry.	It helps to draw the different chemical structures, curves and tables
		DSE-2T	Green Chemistry	It helps to reduce the economy, energy and toxicity
		DSE-2T	Industrial Chemicals and Environment	It helps the use of chemicals in daily life
		DSE-2T	Quantum Chemistry, Spectroscopy & Photochemistry	Understanding of chemical phenomenon from microscopic stand point
		DSE-2T	Molecular Modelling & Drug design	Understanding the modification of drug with time
		DSE-2P	Applications of computers in chemistry (Lab)	Practical sense about molecular structure

B. Sc General	**VI**	DSE-2P	Green Chemistry (Lab)	It helps practically how to reduce the economy,energy and toxicity
		DSE-2P	Industrial Chemicals & Environment (Lab)	Training for preparation of daily uses materials
		DSE-2P	UV/Visible spectroscopy and Colourimetry	Understanding of fluorescence and photo-physical property of the compounds
		DSE-2P	Molecular Modelling & Drug design (Lab)	Training to give how modify the drug with changing their functional groups
		SEC-1T	Basic Analytical Chemistry	Understanding the error and accuracy
		SEC-1T	Chemo informatics	Theory of Physical chemistry with computer
		SEC-1P	Basic Analytical Chemistry (Practical)	Lab Training to measure the exact amount of the compounds
		SEC-2T	Analytical Clinical Biochemistry	Use of chemicals for pathological detection
		SEC-2T	Intellectual Property Rights (IPR)	Assignment of property rights through patent, copyright and trademarks.
		SEC-2P	Analytical Clinical Biochemistry (Practical)	Practical training the use of chemicals for pathological detection
		SEC-3T	Pharmaceutical Chemistry	Understanding the structur and property of the compounds
		SEC-3T	Chemistry of Cosmetics & Perfumes	Understanding the use of chemicals and solvents in Cosmetics and Perfumes
		SEC-3P	Pharmaceutical Chemistry (Practical)	Training about the preparation of simple drug and its starting materials
		SEC-3P	Chemistry of Cosmetics & Perfumes (Practical)	Lab Training to prepare the Cosmetics & Perfumes
		SEC-4T	Pesticide Chemistry	Explore the use and preparation of chemicals to control the Pest
		SEC-4T	Fuel Chemistry	Explore the use of different hydrocarbon as fuel and their limitation
		SEC-4P	Pesticide Chemistry (Practical)	Training the preparation Pesticide
		C1T	Organic Chemistry-I	Understanding the basic idea and mechanism of organic reaction

B. Sc Honours Chemistry	**I**	C1P	Organic Chemistry-I Lab	Model study of organic molecules
		C2T	Physical Chemistry-I	Understanding the principles of physical and chemical process
		C2P	Physical Chemistry-I Lab	Understanding the principles of physical and chemical process in laboratory
		GE-1T	Section A: Inorganic Chemistry-I Section B: Organic Chemistry-I	Understanding about the atom, molecular structure, mechanism and reactivity of the reaction
		GE-1P	Section A: Inorganic Chemistry –Lab Section B: Organic Chemistry-I Lab	Understanding about the atom, molecular structure, mechanism and reactivity of the reaction in laboratory
	II	C3T	Inorganic Chemistry-I	Understanding about the atom, molecular structure
		C3P	Inorganic Chemistry-I Lab	Understanding about the atom, molecular structure in laboratory with model
		C4T	Organic Chemistry-II	Explore the preparation with mechanism of organic molecules
		C4P	Organic Chemistry-II Lab	Explore the preparation with mechanism of organic molecules in laboratory
		GE-2T	Section A: Physical Chemistry-I Section B: Inorganic Chemistry-II	Understanding the principles of physical and chemical process and comparative study of Periodic elements
		GE-2P	Section A: Physical Chemistry-I Lab Section B: Inorganic Chemistry-II Lab	Understanding the principles of physical and chemical process and comparative study of Periodic elements in Laboratory
B. Sc Honours Chemistry		C5T	Physical Chemistry-II	Understanding the feasibility, reaction kinetics of the reaction,
		C5P	Physical Chemistry-II Lab	Development the practical training of feasibility, reaction kinetics of the reaction,
		C6T	Inorganic Chemistry-II	Understanding the comparative study of Periodic elements
		C6P	Inorganic Chemistry-II Lab	Understanding the comparative study of Periodic elements in Laboratory
		C7T	Organic Chemistry-III	It explores the reactivity, comparative study and preparation of aliphatic and aromatic organic molecules

B. Sc Honours Chemistry	**III**	C7P	Organic Chemistry-III Lab	Development of practical sense to prepare organic molecules in Laboratory
		SEC-1T	Analytical Clinical Biochemistry	Understanding the basic structure, properties and functions of carbohydrates, lipids and proteins
		SEC-1T	Pharmaceutical Chemistry	It helps to understand the preparation, use of chemicals in medicine and their side effect
		SEC-1P	Analytical Clinical Biochemistry (Practical)	Understanding the use of chemicals and solvents in quantitatively in pathological detection in Laboratory
		SEC-1P	Pharmaceutical Chemistry (Practical)	Development of practical sense to prepare the drug compounds and their starting materials
		GE-3	Section A: Physical Chemistry-II Section B: Organic Chemistry-II	Understanding the feasibility, reaction kinetics of the reaction, reactivity and mechanistic study and preparation of organic compounds
		GE-3P	Section A: Physical Chemistry-II Lab Section B: Organic Chemistry-II Lab	Understanding the feasibility, reaction kinetics of the reaction, reactivity and mechanistic study and preparation of organic compounds
	IV	C8T	Physical Chemistry-III	Understanding the application of thermodynamics, electrical property and quantum chemistry
		C8P	Physical Chemistry-III Lab	It helps to measure the solubility of sparingly soluble salt, standardisation of solution by potentiometric method and pH metric titration
		C9T	Inorganic Chemistry - III	Understanding the method for preparation of metals from its ore, preparation, use of inorganic polymer and comparative study of periodic elements,
		C9P	Inorganic Chemistry – III Lab	Practical training for complex metric titration and inorganic preparation
		C10T	Organic Chemistry -IV	It explores the reactivity, comparative study and

				preparation of nitro compounds and identification of organic molecules by spectroscopy
		C10P	Organic Chemistry -IV Lab	Practical training of estimation of different compounds mainly daily usable compounds
		SEC-2T	Basic Analytical Chemistry	It explores analysis of different substances mainly water, soil, cosmetics etc.
		SEC-2T	Chemistry of Cosmetics & Perfumes	Understanding the preparation, use of cosmetics and perfumes
		SEC-2T	Fuel Chemistry	It explores the use of different hydrocarbons use as fuel and their limitation
		SEC-2T	Basic Analytical Chemistry (Practical)	Practical training to estimate the pH of soil, amount of calcium, magnesium in calcium carbonate by complex metric titration and separation by chromatography
		SEC-2P	Chemistry of Cosmetics & Perfumes (Practical)	Practical training to prepare different types of daily usable chemicals
		GE4T	Section A: Physical Chemistry-III Section B: Analytical and Environmental Chemistry	It helps to understand the basic concept of ideal, non-ideal solution, conductivity of the solution and EMF of a cell
		GE4P	Section A: Physical Chemistry-III Lab Section B: Analytical and Environmental Chemistry Lab	Practical training to measure the conductance and titration by potentiometrically
		C11T	Inorganic Chemistry - IV	Understanding the concept about structure and stability of inorganic complex molecules by VBT, CFT and comparative study of d and f block elements
		C11P	Inorganic Chemistry – IV Lab	Practical training to separate mixtures by chromatographic technique, estimation of metal ions by gravimetric and spectroscopic analysis of complex molecule
B. Sc Honours Chemistry		C12T	Organic Chemistry - V	It explores the property, reactivity and synthesis of carbocyclic and heterocyclic, biomolecules and

				carbohydrates; concept about cyclic stereochemistry
		C12P	Organic Chemistry – V Lab	Practical training to separate of the mixtures of dyes, amino acids, leaf pigments by different types chromatography technique
	V	DSE-1T	Advanced Physical Chemistry	To understand the structure and stability of Crystal Structure, origin of random process and classification of several polymeric compounds with its property and synthesis
		DSE-2T	Analytical Methods in Chemistry	It helps to determination of structure by spectroscopy and theoretical concept of several separation technique
		DSE-2T	Instrumental Methods of Chemical Analysis	It gives the preliminary idea molecular spectroscopy and several separation techniques.
		DSE-2P	Analytical Methods in Chemistry Lab	Practical training of the chromatography separation technique, solvent extraction and analysis of soil, BOD, COD.
		DSE-2P	Instrumental Methods of Chemical Analysis Lab	Practical training of the determination of isoelectric pH of a protein, titration of amino acid and determination by atomic adsorption.
B. Sc Honours Chemistry	**VI**	C13T	Inorganic Chemistry-V	It explores the utility of different metal ion and their enzymatic activity on human health; metal-carbon interaction and their uses as a catalyst in organic synthesis.
		C13P	Inorganic Chemistry-V Lab	Practical training in qualitative analysis of in organic compounds.
		C14T	Physical Chemistry-V	It explores the theoretical idea about the different molecular spectroscopy; photochemistry and surface phenomena of solid.
		C14P	Physical Chemistry-V Lab	Practical training of the determination of surface tension CMC, verification of Lambert's Beer's Law.
		DSE-3T	Green Chemistry	It gives the idea about the synthesis of several organic molecules by greens approach.

		DSE-3T	Inorganic Materials of Industrial Importance	It explores use and preparation of daily needs, fertilizers, chemical explosive and surface coating agent; theoretical concept of properties and reactivity of catalyst.
		DSE-3P	Green Chemistry Lab	Practical training of the preparation and characterisation of Au-nanoparticle by tea leaf and other chemical reaction by greases approaches.
		DSE-3P	Inorganic Materials of Industrial Importance Lab	Practical training for the preparation of different fertilizer, pigment; analysis of cement and metal in allow.
		DSE-4T	Polymer Chemistry	It explores the determination of molecular weight, function, properties, important and kinetic study of polymer.
		DSE-4P	Polymer Chemistry Lab	Practical training for the synthesis and characterisation of polymer.

Programme Name: M. Sc in Chemistry
Year of Introduction: 2018
Duration: Four Semesters (Two Years)

Course outcome (C.O) for PG:

The purpose of the postgraduate chemistry at Jhargram Raj College is to provide the key knowledge base and laboratory resources to prepare students for careers as professional in the field of Chemistry. After completion of the program students will be ready for:

I. Global level research opportunities to pursue Ph.D. program in Chemistry, Biochemistry and allied fields.
II. Job opportunities in chemical, pharmaceuticals, food products, life oriented material industries, etc.
III. Discipline specific competitive examinations conducted by different central and state agencies.
IV. Acquired knowledge for the solution of natural and individual problems.
V. Attend profound knowledge to identify, formulate, review of research literature, and to analyze complex problems to reach substantiated conclusions.
VI. Attain the ability to design solutions for the public health and safety including the cultural, societal, and environmental considerations.

COURSE	SEMESTER	Course code	Course Name	Course Outcome
M. Sc in Chemistry	I	CEM-101	Mathematical preliminaries & Quantum Mechanics-I, statistical thermodynamics and mechanics, electrochemistry-I, principles of molecular spectroscopy-I.	Understanding of the microscopic and classical aspect of physical chemistry by bridging the gap between the two.
		CEM-102	Pericyclic reaction-1, Organic transformations/synthesis/reagents chemistry-1, natural products-terpenoids, Natural products-alkaloids, Retrosynthesis I.	Explain the use of reagents in organic synthesis, electro cyclic ring closing and ring opening reaction; Use and synthesis of natural products
		CEM-103	Inorganic Chemistry: Symmetry and Group theory-I, Crystallography, Bioinorganic chemistry-I, Chemical toxicology.	Explain the of symmetry present in molecules; crystal structure; use of different metals ion and their enzymatic activity, toxicity on human health.
		CEM-104	Food processing and preservation-I and Computer basics	It consists constituents of food, its processing and preservation; basic knowledge of computer.
		CEM-105	Food processing preservation and packaging Practical And Inorganic Chemistry Practical.	Preparation of jams, jellies and estimation of food values and their packaging in laboratory.

	II	CEM-201	Physical Chemistry: Quantum Mechanics-II, Chemical kinetics, electrochemistry-II, molecular spectroscopy-II	Understanding of the microscopic and classical aspect of physical chemistry by bridging the gap between the two elaborately; theoretical concept of molecular spectroscopy; kinetics study and electrolytic solution.
		CEM-202	Pericyclic reaction-2, Organic transformations/synthesis/reagents chemistry2, Retrosynthesis II, Stereochemistry-1, Stereochemistry-2.	Explain the use of reagents in organic synthesis, electro cyclic ring closing and ring opening reaction; reactivity using stereo chemical approach.
		CEM-203	Inorganic Chemistry: Organometallic chemistry –I, Allotropes of carbon and boron compounds, Chemistry of d-block elements.	Understanding the M-C interaction; several allotropes boron and carbon; molecular symmetry of inorganic molecules elaborately and comparative study of d-block elements.
		CEM-204	Nanotechnology: Principles and Practices. Introduction, synthesis of nanomaterials, analysis techniques, application of nanotechlogy.	Basic concept, analysis and application of nanotechnology.
		CEM-205	Organic Chemistry Practical and Physical Chemistry Practical	Practical training of the separation of the mixture of organic liquid sample; quantitative analysis of different compounds.
M. Sc in Chemistry (Physical Special)		CEM-301	Approximate method in QM-I, Approximate method in QM-II, Group theory-I & Group theory-I I.	Understanding of the microscopic aspect of physical chemistry elaborately and theoretical concept about molecular symmetry.
		CEM-302	Statistical mechanics, Chemical kinetics-I, Chemical Kinetics-II, Advanced Electrochemistry.	Understanding the equilibrium, kinetics of chemical reaction and conductance and EMF study of different solution.

	III	CEM-303	NMR, ESR, LASER, PES, NQR, Photophysical Processes.	Understanding the photo-physical process and explain the concept and application of LASER, EPR, PES, NQR.
		CEM-304	Introduction of Pharmaceutical Chemistry, Classification and nomenclature of drugs, Theory of drog action and factors affecting the drugs, Types of drugs, Antimalarial drugs.	Understanding the properties , preparation, classification of different drugs and their side effect.
		CEM-305	Project work: Physical Chemistry special.	Training of pre-research work on physical chemistry.
M. Sc in Chemistry (Inorganic Special)	**III**	CEM-301	Organometallic chemistry – II, Application of organometallic compounds and catalysis, Chemical application of group theory – I, Chemistry of f-block elements.	Understanding the application of organometallic compound in different organic synthesis; comparative study of f-block elements and application of group theory.
		CEM-302	Bioinorganic chemistry – II, Nuclear chemistry, Inorganic photochemistry Solid state chemistry.	It understanding the different enzymatic function in human body; mechanism of photo-synthesis, nuclear energy; inorganic photochemistry and solid state chemistry.
		CEM-303	NMR, ESR, LASER, PES, NQR, Photophysical Processes.	Understanding the photo-physical process and explain the concept and application of LASER, EPR, PES, NQR.
		CEM-304	Introduction of Pharmaceutical Chemistry, Classification and nomenclature of drugs, Theory of drog action and factors affecting the drugs, Types of drugs, Antimalarial drug.	Understanding the properties, preparation, classification of different drugs and their side effect.
		CEM-305	Project work: Inorganic Chemistry special.	Training of pre-research work on inorganic chemistry.

M. Sc in Chemistry (Organic Special)	III	CEM-301	Pericyclic reaction-III, Linear free energy relationship I and II, Organometallic chemistry.	Thermal and photochemical organic reaction, concept about free energy diagram of organic reaction and application of organometallics compound in organic synthesis.
		CEM-302	Bioorganic and supramolecular Chemistry-1,2, and 3, Peptides and nucleic acids, Green chemistry.	Preliminary idea about the different type of interaction of bio-organic molecules and organic synthesis by greens approach.
		CEM-303	NMR, ESR, LASER, PES, NQR, Photophysical Processes.	Understanding the photo-physical process and explain the concept and application of LASER, EPR, PES, NQR.
		CEM-304	Introduction of Pharmaceutical Chemistry, Classification and nomenclature of drugs, Theory of drog action and factors affecting the drugs, Types of drugs, Antimalarial drugs.	Understanding the properties, preparation, classification of different drugs and their side effect.
		CEM-305	Project work: Organic Chemistry special.	Training of pre-research work on organic chemistry.
M. Sc in Chemistry (Physical Special)	**IV**	CEM-401	Quantum mechanics of many electron atoms, Atomic Spectroscopy, QM of diatomic molecules, QM of polyatomic molecules.	Understanding of the microscopic aspect of many electron systems.
		CEM-402	Non-equilibrium thermodynamics, Macromolecules & Bioploymers, Solid state-I, Solid state-II.	Understanding the non-equilibrium nature of natural processes under deterministic and stochastic domains.
		CEM-403	Detailed 1H NMR, 13C NMR, CW and FT techniques, Principles of relaxation, NOE, Mass spectroscopy, Combined applications of spectroscopic techniques for structure elucidation, CD ORD, Moss-Bauer.	Theoretical concept of the determination of structure by the different spectroscopic method.

		CEM-404	Milk products, Cereals, Legunes and nuts, Fats and oils, food safety, fruits and vegetables	Understanding of the processing and preservation of different milk product, cereals legumes, nuts fat, oil, fruit and vegetable.
		CEM-405	Project work: Physical Chemistry special.	Training of pre-research work on physical chemistry.
M. Sc in Chemistry (Inorganic Special)	IV	CEM-401	Molecular magnetism-I, Molecular magnetism-II, Metal carbonyls, clusters and metal-metal bonded compounds Supramolecular chemistry and designing of molecular materials	It understanding the magnetic properties of inorganic molecules, interaction of M-C cluster and different types of interaction on its.
		CEM-402	Reaction mechanism of transition metal complexes, Electron transfer reactions and twist mechanism. Analytical chemistry-I Analytical chemistry-II	It gives an idea about the structure, stability, reactivity and mechanistic study of different type of inorganic complexes; theoretical concept of different inorganic analytical instruments.
		CEM-403	Detailed 1H NMR, 13C NMR, CW and FT techniques, Principles of relaxation, NOE, Mass spectroscopy, Combined applications of spectroscopic techniques for structure elucidation, CD ORD, Moss-Bauer.	Theoretical concept of the determination of structure by the different spectroscopic method.
		CEM-404	Milk products, Cereals, Legunes and nuts, Fats and oils, food safety, fruits and vegetables.	Understanding of the processing and preservation of different milk product, cereals legumes, nuts fat, oil, fruit and vegetable.
		CEM-405	Project work: Inorganic Chemistry spl.	Training of pre-research work on inorganic chemistry.
M. Sc in Chemistry (Organic Special)		CEM-401	Organic photochemistry-1 & 2, Biological active molecules, Vitamins & co-enzymes, Heterocycles-2.	It gives detail idea about photo-chemical organic reaction and idea about biological active-molecules; synthesis and reaction of

				heterocyclic compounds.
		CEM-402	Stereochemistry-3, Stereochemistry-4, Stereochemistry-5, Stereochemistry-6, Stereochemistry-7.	Mechanism study of organic reaction by stereo-chemistry elaborately.
	IV	CEM-403	Detailed 1H NMR, 13C NMR, CW and FT techniques, Principles of relaxation, NOE, Mass spectroscopy, Combined applications of spectroscopic techniques for structure elucidation, CD ORD, Moss-Bauer.	Theoretical concept of the determination of structure by the different spectroscopic method.
		CEM-404	Milk products, Cereals, Legunes and nuts, Fats and oils, food safety, fruits and vegetable.	Understanding of the processing and preservation of different milk product, cereals legumes, nuts fat, oil, fruit and vegetable.
		CEM-405	Project work: Organic Chemistry special.	Training of pre-research work on organic chemistry.
M. Sc in Chemistry	I	CEM-101	PHYSICAL CHEMISTRY - I	Understanding of the microscopic and classical aspect of physical chemistry by bridging the gap between the two.
		CEM-102	ORGANIC CHEMISTRY- I	Explain the use of reagents in organic synthesis, electro cyclic ring closing and ring opening reaction; Use and synthesis of natural products
		CEM-103	INORGANIC CHEMISTRY-I	Explain the symmetry present in molecules; crystal structure; use of different metals ion and their enzymatic activity, toxicity on human health.
		CEM-104	FOOD PROCESSING AND PRESERVATION AND COMPUTER BASICS	It consists constituents of food, its processing and preservation; basic knowledge of computer.
		CEM-195	INORGANIC CHEMISTRY (practical)	Practical training about quantitative analysis by gravimetric and

				volumetric method; analysis of metals, alloy, minerals and ores; synthesis and characterisation of complex molecules
		CEM-196	FOOD PROCESSING AND PRESERVATION (practical)	Preparation of jams, jellies and estimation of food values and their packaging in laboratory.
M. Sc in Chemistry	**II**	CEM-201	PHYSICAL CHEMISTRY - II	Understanding of the microscopic and classical aspect of physical chemistry by bridging the gap between the two elaborately; theoretical concept of molecular spectroscopy; kinetics study and electrolytic solution.
		CEM-202	ORGANIC CHEMISTRY- II	Explain the use of reagents in organic synthesis, electro cyclic ring closing and ring opening reaction; reactivity using stereo chemical approach.
		CEM-203	INORGANIC CHEMISTRY-II	Understanding the M-C interaction; several allotropes boron and carbon; molecular symmetry of inorganic molecules elaborately and comparative study of d-block elements.
		CEM-204	NANOTECHNOLOGY:PRINCIPLES AND PRACTICES(CBCS)	Basic concept, analysis and application of nanotechnology.
		CEM-295	ORGANIC CHEMISTRY (practical)	Practical training of the separation of the mixture of organic liquid sample; quantitative analysis of different compounds.
		CEM-296	PHYSICAL CHEMISTRY (practical)	Practical training of quantitative analysis of different compounds
		CEM-301	ADVANCED SPECTROSCOPY-I (Common Paper)	Understanding the application of organometallic compound in different organic synthesis;

M. Sc in Chemistry	III			comparative study of f-block elements and application of group theory.
		CEM-302	ADVANCED PHYSICAL CHEMISTRY-I	Understanding of the microscopic aspect of physical chemistry elaborately and theoretical concept about molecular symmetry; radiation-matter interaction
		CEM-303	ADVANCED PHYSICAL CHEMISTRY-II	Understanding the non-equilibrium nature of natural processes under deterministic and stochastic domains; electrical conductivity and defect in solid
		CEM-302	ADVANCED INORGANIC CHEMISTRY-I	Understanding the application of organometallic compound in different organic synthesis; application of group theory
		CEM-303	ADVANCED INORGANIC CHEMISTRY SPECIALISATION	It understanding the different enzymatic function in human body; mechanism of photosynthesis; photochemistry
		CEM-302	ADVANCED ORGANIC CHEMISTRY-I	Thermal and photochemical organic reaction, concept about free energy diagram of organic reaction and application of organometallics compound in organic synthesis.
		CEM-303	ADVANCED ORGANIC CHEMISTRY-II	Preliminary idea about the different type of interaction of bio-organic molecules and organic synthesis by greens approach.
		CEM-304	INTRODUCTION TO PHARMACEUTICAL CHEMISTRY(CBCS) (Common paper)	Understanding the properties , preparation, classification of different drugs and their side effect.

M. Sc in Chemistry		CEM-395	CHEMISTRY PROJECT-I (PHYSICAL SPL/ORGANIC SPL/INORGANIC SPL)	Training of pre-research work.
	IV	CEM-401	ADVANCED SPECTROSCOPY-II (Common paper)	Theoretical concept of the determination of structure by the different spectroscopic method.
		CEM-402	ADVANCED PHYSICAL CHEMISTRY-III	Understanding of the microscopic aspect of many electron systems.
		CEM-403	ADVANCED PHYSICAL CHEMISTRY-IV	Understanding the non-equilibrium nature of natural processes under deterministic and stochastic domains.
		CEM-404	CHEMISTRY IN TECHNOLOGY	Theoretical concept of analytical analytical instrument.
		CEM-402	ADVANCED INORGANIC CHEMISTRY-III	It gives an idea about the magnetic property of different type of in organic complexes; theoretical concept of different inorganic analytical instruments.
		CEM-403	ADVANCED INORGANIC CHEMISTRY-IV	Theoretical concept of the determination of reaction mechanism of different reaction.
		CEM-404	CHEMISTRY IN TECHNOLOGY	Theoretical concept of analytical analytical instrument.
		CEM-402	ADVANCED ORGANIC CHEMISTRY-III	It gives detail idea about photo chemical organic reaction and idea about biological active-molecules; synthesis and reaction of heterocyclic compounds.
		CEM-403	ADVANCED ORGANIC CHEMISTRY-IV	Mechanism study of organic reaction by stereo chemistry elaborately.
		CEM-404	CHEMICAL PRINCIPLES IN FOOD SCIENCE AND TECHNOLOGY	Concept about dairy processing, food safety, fat and oil processing
		CEM-495	CHEMISTRY PROJECT-II (PHYSICAL SPL/ORGANIC SPL/ INORGANIC SPL)	Training of pre-research work.

Programme Specific Outcomes (PSOs) for PG:

1. Upon completing their M.Sc. in Chemistry, students will develop a strong sense of human and social values within the framework of their chemical education.
2. Graduates will cultivate a proactive stance on environmental and ecological issues through the lens of chemistry.
3. Equipped with comprehensive knowledge in advanced chemistry, students will sharpen their critical thinking and analytical abilities.
4. Graduates will leverage their chemistry expertise to address and resolve pertinent social challenges.
5. The program will foster entrepreneurial skills, enabling students to establish their ventures in key areas of chemistry-related industries and businesses.