BANKURA ZILLA SARADAMANI MAHILA MAHAVIDYAPITH
DEPARTMENT OF CHEMISTRY
Programme Outcome, Programme Specific Outcome and Course Outcome
For B.Sc. in Chemistry (NEP-2020)
2024-2025

The undergraduate (UG) programme of chemistry is composed of major, minor and interdisciplinary subjects. The syllabus is based on the national education policy (NEP) which covers almost all the fields of chemistry. The students will be enriched with plenty of knowledge after the completion of the course. The complete syllabus is compatible with the competitive examination for higher studies and research. In this programme there are various multidisciplinary courses. The students will acquire multidisciplinary skills which will be of tremendous value to them.

Department of Chemistry		After successful completion of three year degree program in Chemistry a student should be able to;
PO	**Programme Outcomes**	**Description**
PO 1	**Sound domain knowledge**	Acquiring sound knowledge of chemical concepts and emerging issues in chemical science.
PO2	**Academic and Scientific Endeavour**	To help the students in developing academic and scientific endeavour by fostering and nurturing the young talent for proper scientific pursuit.
PO3	**Creative and Practical Ability to analyse and deal with data**	Analysis of experimental data and their representation in the form of graphs and plots. Use of statistics as a means to express complicated chemical data.
PO4	**Familiarity with Recent Developments in a Particular Field**	Should be able to apply modern theories and approaches to explain all spatial phenomena and relate nature with human inter relations
PO5	**Environmental Awareness**	Impact of environmental changes on human and how it can be explained at a global and regional perspective.
PO 6	**Laboratory Skill**	The students are exposed to modern equipments in the Laboratory where they get hands-on training which help them to succeed at any entry-level position in chemical industry.
PSO	**Programme Specific Outcomes**	**Description**
PSO 1	**Critical appreciation of the Subject.**	Acquiring sound knowledge on the fundamentals of Physico-chemical concepts and applying them in practical and professional situations.
PSO 2	**Academic and Scientific Endeavour.**	To help the students in developing, Cultivating and demonstrating the art of science learning and teaching by fostering and nurturing the young talent for proper

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		scientific pursuit.
PSO 3	**Scientific Attitude**	Developing the right scientific temper compatible with creative impulse.
PSO 4	**Technical Skill Development**	Creating updated knowledge on research methodology and developing skills in the application oriented Chemistry.
PSO 5	**Environmental Consciousness**	Impact of environmental changes on human and its reflection on society.
PSO 6	**Communication Skill**	Classroom discussions, student seminar ,written assignments, debates etc. help students to develop effective communication skill which will aid them to enhance employability.
PSO 7	**Personality Development**	Personality development skills are likely to help students in their professional and personal lives thus making them responsible and sincere citizens of the socie√ty.
PSO 8	**Spirit of Team Work**	Encouraging students to co-ordinate with one another in a team environment rather than trying to excel individually.
PSO 9	**Basic Human Values**	Study of various texts and mutual interaction among the students inside and outside the class room help the learners to understand human behavioural science.

Course Outcomes B. Sc Chemistry (Semester-I; MAJOR & MINOR)

Course: **Fundamentals of Chemistry I**	Outcomes After completion of these courses students should be able
Extra Nuclear Structure of Atom, Chemical Periodicity, Acid Base, Redox and Precipitation Reactions	CO-1. To learn the concept about extra-nuclear structures of atoms. CO-2. To acquire detailed knowledge about the periodic table and the trend of various periodic properties. CO-3. To study about acid base reactions in detail. CO-4. To gather in-depth knowledge about redox and precipitation reactions.
Bonding and Physical Properties of Organic Compounds, Stereochemistry-I	CO-5. To learn detailed knowledge about bonding and physical properties of organic compounds. CO-6. To gather preliminary and basic knowledge about stereochemistry.

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Chemical Analysis Lab: Acid-Base Titrations, Oxidation-Reduction Titrimetry, Estimation of Organic Compounds.	CO-1. To become skilled at carrying out acid-base titrations as well as oxidation-reduction analysis after getting hands-on training in laboratory. CO-2. To become experienced to estimate glucose, glycine, formaldehyde and acetic acid in organic samples.
Course Outcomes B. Sc Chemistry (Semester-I; Multidisciplinary)	
Course	Outcomes After completion of these courses students should be able
Basic Chemistry	CO-1. Structure of atom - discovery of sub-atomic particles; atomic models; Bohr's model for hydrogen atom. CO-2. Classification of element and periodicity in properties - why we need to classify elements? genesis of periodic classification; modern periodic law and the present form of periodic table; periodic trends in properties of elements. CO-3. Chemistry of carbon compounds: Hybridization of carbon, σ and π bonds, functional group approach for the following (preparations & reactions) to be studied in context to their structures: aliphatic hydrocarbons (alkanes, alkenes, alkynes, alcohols, ethers, carbonyls, carboxylic acids, esters, amines and amide) and aromatic hydrocarbons. CO-4. Methods of purification of organic compound - filtration, crystallization, sublimation, distillation and chromatography. CO-5. Acids and bases - different concept of acids and bases - Arrhenius, Lowry-Bronsted, Lewis and salt; ionization of acids and bases, Ostwald dilution law, buffer solution; indicators. CO-6. Gaseous state, gas laws, ideal gas equation and real gas equation. CO-7. Thermodynamics - concept of heat and work, state and path function, reversible process, isothermal and adiabatic processes, internal energy, enthalpy, reaction enthalpy.
Course Outcomes B. Sc Chemistry (Skill Enhancement Course)	
Course	Outcomes After completion of these courses students should be able
Basic Analytical Chemistry: Analysis of Soil, Water, Food and Cosmetics.	CO-1. To learn about introduction to analytical chemistry and its interdisciplinary nature. CO-2. To learn about analysis of soil. CO-3. To study analysis of water.

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	CO-4. To gain knowledge of analysis of food products. CO-5. To come to know about analysis of cosmetics.
Course Outcomes B. Sc Chemistry (Semester-II; MAJOR & MINOR)	
Course: **Fundamentals of Chemistry II**	Outcomes After completion of these courses students should be able
Gaseous state I, Liquid State, Thermodynamics I,	CO-1. To gather detail knowledge about kinetic theory of gases and speed distribution of gas molecules. CO-2. To acquire in-depth knowledge about viscosity and surface tension of liquid state. CO-3. To learn detail about thermodynamical parameters and thermochemistry.
General treatment of Organic Reaction Mechanism I, Stereochemistry II	CO-4. To learn basic and important points about general organic reaction mechanism. CO-5. To gather in-depth knowledge about stereochemical configuration and isomerisms.
Physico-Chemical Analysis Lab: Physical Chemistry Practicals, Identification of Pure Organic Compounds.	CO-1. To become skilled in order to determine viscosity, surface tension and pH of unknown samples/solutions. CO-2. To become skilled to identify different kinds of pure organic compounds.
Course Outcomes B. Sc Chemistry (Semester-II; Multidisciplinary)	
Course	Outcomes After completion of these courses students should be able
Chemistry in Daily Life	CO-1. To learn about daily usable hydrocarbons, agrochemicals, glass and ceramics. CO-2. To gather basic knowledge about food chemistry, drugs and pharmaceuticals and surface chemistry.
Course Outcomes B. Sc Chemistry (Semester-II; Skill Enhancement Course)	
Course	Outcomes After completion of these courses students should be able
Pharmaceuticals Chemistry: Drugs & Pharmaceuticals, Fermentation	CO-1. To learn about drugs and pharmaceuticals in detail. CO-2. To gather basic knowledge about fermentation process. CO-3. To know the hands on preparation procedure of Aspirin and magnesium bi-silicate.

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Course Outcomes B. Sc Chemistry (Semester-III; Major)	
Course: Organic Chemistry I, Physical Chemistry I.	Outcomes After completion of these courses students should be able
MO Theory, General Treatment of Reaction Mechanism I, Stereochemistry III	CO-1. To learn the concept about MO theory on cyclic p orbital system and the concept about aromaticity. CO-2. To acquire detailed knowledge about the organic reaction mechanism and types of organic reactions. CO-3. To gather stereochemistry of organic molecules, which include chirality arising out of stereo-axis and concept of pro stereoisomerism and conformation. CO-4.
Gaseous State II, Thermodynamics II, Chemical Equilibrium, Chemical Kinetics I.	CO- 1. To learn about the basic properties of real gases and weak intermolecular forces. CO-2. To acquire knowledge about 2nd law of thermodynamics and important thermodynamic relations. CO-3. To gather in-depth knowledge about chemical equilibrium. CO-4. To gather preliminary and basic knowledge about reaction kinetics.
Physico-Chemical Analysis Lab: Physical Chemistry Practicals, Organic chemistry practicals.	CO-1. To gather knowledge and skills to understand the laboratory methods related to organic preparation. CO-2. To develop practical knowledge about separation of the binary organic mixture. CO- 3. To determine the boiling points of different organic liquid compounds. CO-4. To become skilled at carrying out acid catalyzed hydrolysis of ester. CO-5. To become experienced to monitor the kinetics of any chemical reaction.
Course Outcomes B. Sc Chemistry (Semester-III; Minor)	
Course-Inorganic Chemistry I	Outcomes After completion of these courses students should be able
Chemical Bonding and Molecular Structure, Comparative Study of p-block Elements.	CO-1. To acquire detailed knowledge about ionic and covalent bonding among atoms. CO-2. To learn the basic concept of chemical bonding with the help of MO theory. CO-3. To learn the comparative study of p-block elements.
Inorganic Chemistry I Laboratory	CO-1. To become skilled at carrying out qualitative semi-micro analysis of mixtures of three radicals.

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Course Outcomes B. Sc Chemistry (Semester-III ;Multidisciplinary)	
Course-Analytical Clinical Biochemistry	Outcomes After completion of these courses students should be able
Review of Concepts, Biochemistry of Disease	CO-1. To learn the basic concept of carbohydrates, protein, enzymes, lipids etc. CO-2. To acquire knowledge about the diagnostic approach of blood and urine analysis.
Hands on Practical	CO-1. To gather hands on laboratory experience about estimation of carbohydrates, lipids and proteins.
Course Outcomes B. Sc Chemistry (Semester-III ;Skill Enhancement Course)	
Course-Analytical Clinical Biochemistry	Outcomes After completion of these courses students should be able
Review of Concepts, Biochemistry of Disease	CO-1. To learn the basic concept of carbohydrates, protein, enzymes, lipids etc. CO-2. To acquire knowledge about the diagnostic approach of blood and urine analysis.
Hands on Practical	CO-1. To gather hands on laboratory experience about estimation of carbohydrates, lipids and proteins.
Course Outcomes B. Sc Chemistry (Semester-IV; Major)	
Course: Inorganic Chemistry I, Inorganic Chemistry II, Organic Chemistry II, Physical Chemistry II.	Outcomes After completion of these courses students should be able
Chemical Bonding, Theoretical Principles of Inorganic Qualitative Analysis, Radioactivity	CO-1. To acquire detailed knowledge about ionic and covalent bonding among atoms. CO-2. To learn the detail of molecular orbital concept of chemical bonding. CO- 3. To learn about properties of metallic bond and weak chemical forces. General Principles of Metallurgy. CO- 4. To gather knowledge about theoretical principles of inorganic qualitative analysis.

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General Principles of Metallurgy, Chemistry of s and p Block Elements, Noble Gases, Inorganic Polymers, Coordination Chemistry-I	CO-1. To acquire detailed knowledge about the chemistry of s and p block elements. CO-2. To study about the basic characteristics of noble gas. CO-3. To gather knowledge about inorganic polymers. CO-4. To learn preliminary knowledge about co-ordination chemistry.
Chemistry of Alkenes and Alkynes, Carbonyl and related Compounds.	CO-1. To understand the chemistry of alkenes and alkynes: reactions, mechanisms and structure. CO-2. To understand the chemistry of carbonyl and related Compounds; reactions, mechanisms and structure.
Application of Thermodynamics, Conductance, Ionic Equilibria	CO-1. To learn the concept about chemical potential, partial properties etc. CO-2. To acquire detailed knowledge about the Henry's law and the Nernst's distribution law. CO-3. To study about four colligative properties and phase equilibrium. CO-4. To gather in-depth knowledge about conductance properties of ions. CO-5. To learn detailed knowledge about reaction equilibrium of ions.
Inorganic Chemistry I Lab, Inorganic Chemistry II Laboratory, Organic Chemistry II Laboratory, Physical Chemistry II Laboratory	CO-1. To become skilled at carrying out qualitative semi-micro analysis of mixtures of three radicals. CO-2. To become experienced to estimate vitamin C, chlorine, copper etc. in a given sample. CO-3. To become skilled to evaluate the metal content in brass and cement. CO-4. To gather knowledge and skills to understand the laboratory methods and tests related to detection of elements and functional groups in different organic samples. CO-5. To gather knowledge and skills to understand the laboratory methods for further functionalization of exiting functional groups in different organic samples. CO-6. To become skilled at carrying out acid-base titrations monitoring conductance of ions. CO-7. To become experienced to evaluate the partition coefficient and equilibrium constant of any chemical reaction.

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Course Outcomes B. Sc Chemistry (Semester-IV; Minor)	
Course- Organic Chemistry I	Outcomes After completion of these courses students should be able
Stereochemistry III, General Treatment of Reaction Mechanism II, Functional Group Chemistry I	CO-1. To build an understanding about stereochemistry of organic compounds. CO-2. To comprehend and compare various types of organic reactions, mechanisms and intermediates. CO-3. To impart in-depth knowledge about the functional group chemistry, which include aliphatic and aromatic hydrocarbons, organometallic compounds, alcohols and ethers.
Organic Chemistry I Laboratory	CO-1. To gather knowledge and skills to understand the laboratory methods and tests related to detection of special elements and functional groups in different organic samples.