PROGRAMME OUTCOMES AND COURSE OUTCOMES

2023 – 2024

Name of the Programme: B.SC.CHEMISTRY **Programme Code: UACH**

Programme Outcomes:

PO1	Have firm foundations in the fundamentals and application of current chemical and scientific theories.
PO2	Are skilled in problem solving, critical thinking and analytical reasoning.
PO3	Are able to identify and solve chemical problems and explore new areas of research.
PO4	Are able to communicate the results of their work to chemists and non-chemists.
PO5	Students will be able to explain that chemistry is an integral part in addressing social, economic, and environmental problems.
PO6	Students turn out to be globally competent there by establishing themselves as attractive professionals.

Course Outcomes:

Course Code	Course Title	Course Outcomes
23C1CC1	GENERAL CHEMISTRY-I	CO1: Explain the atomic structure, wave-particle duality of matter, periodic properties, bonding, and properties of compounds. CO2: Classify the elements in the periodic table, types of bonds, reaction intermediates, electronic effects in inorganic compounds, types of reagents. CO3: Construct MO diagrams, predict trends in periodic properties, assess the properties of elements, and explain hybridization in molecules, nature of H-bonding and organic reaction mechanisms. CO4: Apply the theories of atomic structure, bonding, to calculate energy of a spectral transition, Δx, Δp, electronegativity, percentage ionic character, and bond order. CO5: Evaluate the relationship existing between electronic configuration, bonding, geometry of molecules and reactions; structure-activity and electronic effects.

23C1CC2	INORGANIC ESTIMATION AND PREPARATIONS	CO1: explain the basic principles involved in titrimetric analysis and inorganic preparations. CO2: compare the methodologies of different titrimetric analysis. CO3: calculate the concentrations of unknown solutions in different ways and develop the skill to estimate the amount of a substance present in a given solution. CO4: assess the yield of different inorganic preparations and identify the
23C1GEZ1	CHEMISTRY FOR BIOLOGICAL SCIENCES I (ZOOLOGY)	CO 1:Construct MO diagrams for homonuclear diatomic molecules CO 2:Explain the type of hybridization, electronic effect and mechanism involved in the organic reactions. CO 3:Evaluate the efficiencies and uses of various fuels and fertilizers. CO 4:Demonstrate the structure and uses of antibiotics, anaesthetics, antipyretics and artificial sugars. CO 5:Analyse various methods to identify an appropriate method for the separation of chemical components.
23C1GEN1	CHEMISTRY FOR BIOLOGICAL SCIENCES I (HOME SCIENCE)	CO 1:Construct MO diagrams for homonuclear diatomic molecules CO 2:Explain the type of hybridization, electronic effect and mechanism involved in the organic reactions. CO 3:Evaluate the efficiencies and uses of various fuels and fertilizers. CO 4:Demonstrate the structure and uses of antibiotics, anaesthetics, antipyretics and artificial sugars.

		CO 5:Analyse various methods to identify an appropriate method for the separation of chemical components.
23C1GEZ2	CHEMISTRY PRACTICALS FOR BIOLOGICAL SCIENCES I (ZOOLOGY)	CO 1: gain an understanding of the use of standard flask and volumetric pipettes, burette. CO 2: design, carry out, record and interpret the results of volumetric titration. CO 3: apply their skill in the analysis of water/hardness. CO4: analyze the chemical constituents in allied chemical products
23C1GEN2	CHEMISTRY PRACTICALS FOR BIOLOGICAL SCIENCES I (HOME SCIENCE)	CO 1: gain an understanding of the use of standard flask and volumetric pipettes, burette. CO 2: design, carry out, record and interpret the results of volumetric titration. CO 3: apply their skill in the analysis of water/hardness. CO4: analyze the chemical constituents in allied chemical products
23C1SE1	FOOD CHEMISTRY	CO1: learn about Food adulteration - contamination of Wheat, Rice, Milk, Butter CO2: get an awareness about food poisons like natural poisons (alkaloids - nephrotoxin) pesticides, DDT, BHC, Malathion CO3: get an exposure on food additives, artificial sweeteners, Saccharin,

		Cyclomate and Aspartate in the food industries. CO4: acquire knowledge on beverages, soft drinks, soda, fruit juices and alcoholic beverages examples. CO5: study about fats and oils - Sources of oils - production of refined vegetable oils - preservation. Saturated and unsaturated fats –MUFA and PUFA
23C1FC	FOUNDATION COURSE IN CHEMISTRY	CO1Gain a basic knowledge about the basic concepts of chemistry CO2Knowledge about the determination of boiling point and molecular weight determination CO3Understanding the concept of detection of elements carbon & nitrogen- estimation of elements carbon &nitrogen. CO4Know about the Gravimetric analysis and selective precipitant, use of sequestering agents CO5Gain a knowledge in major compounds of living beings-biochemical techniques
23C2CC3	GENERAL CHEMISTRY II	CO1: explain the concept of acids, bases and ionic equilibria; periodic properties of s and p block elements, preparation and properties of aliphatic and aromatic hydrocarbons CO2: discuss the periodic properties of sand p- block elements, reactions of aliphatic and aromatic hydrocarbons and strength of acids CO3: classify hydrocarbons, types of reactions, acids and bases,

		examine the properties s and p-block elements, reaction mechanisms of aliphatic and aromatic hydrocarbons CO4: explain theories of acids, bases and indicators, buffer action and important compounds of s-block elements CO5: assess the application of hard and soft acids indicators, buffers, compounds of s and p- block elements and hydrocarbons
23C2CC4	QUALITATIVE ORGANIC ANALYSIS AND PREPARATION	CO1: identify the presence of special elements and functional group in an unknown organic compound performing a systematic analysis. CO2: compare mono and dicarboxylic acids, primary, secondary and tertiary amines, mono and diamides, mono and polyhydric phenols, aldehyde and ketone, reducing and non- reducing sugars and explain the reactions behind it. CO3: exhibit a solid derivative with respect to the identified functional group. CO4 :: Prepare an Organic Compound with Practical Experience
23C2GEZ3 / 23C2GEN3	CHEMISTRY FOR BIOLOGICAL SCIENCES II (FOR ZOOLOGY AND HOME	CO 1:Estimate the hardness of water samples CO 2:Distinguish the monosaccharides and disaccharides CO 3:Explain the role of amino acids in biological systems

	SCIENCE STUDENTS)	CO 4:Gain knowledge in electrochemical reactions and corrossion CO 5:Differentiate thermal and photochemical reactions
23C2GEZ4 / 23C2GEN4	CHEMISTRY PRACTICALS FOR BIOLOGICAL SCIENCES II (FOR ZOOLOGY AND HOME SCIENCE STUDENTS)	CO 1: gain an understanding of the use of standard flask and volumetric pipettes, burette. CO 2: design, carry out, record and interpret the results of volumetric titration. CO 3: apply their skill in the analysis of water/hardness. CO4: analyze the chemical constituents in allied chemical products
23C2SE2	DAIRY CHEMISTRY (SKILL ENHANCEMENT)	CO1:understandaboutgeneralcompositionofmilk–constituentsanditsphysicalproperties CO2:acquire knowledge about pasteurization of Milk and various types of pasteurization – Bottle, Batch and HTST Ultra High Temperature Pasteurization. CO3:learn about Cream and Butter their composition and how to estimate fat in cream and Ghee CO4:explain about Homogenized milk, flavoured milk,vitaminised milk and tone dmilk. CO5:haveanideaabouthowtomakemilkpowderanditsdryingprocess-

		typesofdryingprocess
23C2SE3	COSMETICS AND PERSONAL CARE PRODUCTS	CO1: Toknow about the composition of various cosmetic products CO2: To understand chemical aspects and applications of hair care and dental care and skin care products. CO3: To understand chemical aspects and applications of perfumes and skincare products. CO4:To understand the methods of beauty treatments, their advantages, and disadvantages. CO5:understand the hazards of cosmetic products.
19C3CC7	ORGANIC AND INORGANIC CHEMISTRY	CO 1. To interpret the concept of aromaticity and the main properties of aromatic compounds. CO 2. To explore reactivity patterns of conjugated, aromatic molecules and to evaluate the kinetics and thermodynamics controlled reactions. CO 3. Explain types of oxides and oxyacids, their structure and reactivity in halogens CO 4. Discuss the properties d block elements & triads of transition elements. CO 5. Recognize the role of oxidizing agents, reducing agents, group reagents and complexing agents, and inferences with theory behind practicals.

19C3CC8	PHYSICAL CHEMISTRY-I (Gaseous state, Solutions, dilute solutions, radio activity & Nuclear transformations and nuclear chemistry)	CO 1. Gain a basic knowledge about the kinetic theory of gases, gaseous laws, types of velocities and properties of gases CO 2. Distinguish between ideal and non-ideal solutions CO 3. Derive the relationship between molar mass of a non-volatile solute and colligative properties CO 4. Calculate the mass defect, packing fraction and binding energy for any nuclei CO 5. Predict the growing rate, mechanism and age of plants using radioactive elements
19C3SB1	AGRICULTURAL CHEMISTRY	CO 1. Define the term soil CO 2. Describe the various types of fertilizers and their uses CO 3. Realise the requirements of manures and fertilizers for better production of various types of crops CO 4. Examine the adverse effect of pesticides CO 5. Calculate the amount of calcium and magnesium present in various types of soils
19C3SB1(A)	DIARY CHEMISTRY	CO1. To understand The Composition, physical and chemical properties of milk.· CO2. To Know the minerals and vitamins present in the milk. ·

		CO3.To Gain the skills to develop milk powder processing CO4.To Gain knowledge about the chemistry of milk and milk products
19P3ACC1	ALLIED CHEMISTRY-I (Theory behind chemical bonding, quantitative and qualitative analysis, kinetics of chemical reactions and thermodynamics)	CO 1. To comprehend the fundamental theories of Valence Bond, types of overlapping and VSEPR. CO 2. To categorize the reactions involved in volumetric analysis CO 3. To analyze the various organic compounds qualitatively CO 4. To recognize the theories of chemical kinetics. CO 5. To highlight the importance of thermodynamics and its related functions.
19C3CC9	INORGANIC QUALITATIVE ANALYSIS	CO 1. Gain the knowledge of appearance, colour, physical state, and odour of inorganic substances CO 2. Distinguish whether the given compound is interfering or non-interfering radicals. CO 3. Perform the confirmatory test for various acid and basic radicals present in the given inorganic compound. CO 4. Recognize the usage of apparatus and laboratory reagents. CO 5. Avoiding hazardous experiments by doing microlevel eco friendly experiments.

19P3ACC2	Allied chemistry practicals-I	CO 1. Describe the principles and procedures of various titrimetric methods CO 2. Identify suitable indicators for a particular reaction CO 3. Know the various terms such as standard solution, normality, molality, molarity, equivalent weight and molecular weight. CO 4. Select the specific titric method to estimate the amount of analyte present in the given solution. CO 5. Apply the expressions and equations to calculate the strength of solutions.
19C4CC10	INORGANIC CHEMISTRY-III (Coordination Chemistry)	CO 1. Know the structure and bonding of important coordination compounds CO 2. Apply the rules to calculate the magnetic properties of complexes and how magnetic moments can be employed for the interpretation of their structure CO 3. Get an overview about the reaction mechanism of metal complexes CO 4. Import the skills to elucidate the structure and mode of bonding in organometallic compounds CO 5. Gain knowledge about the chemistry of Lanthanides and

		Actinides
19C4CC11	PHYSICAL CHEMISTRY-II (Chemical Kinetics, Solid State and distribution Law)	CO 1. To determine integrated rate expression for zero order, first order, second order reactions and their respective half-life period expressions with examples CO 2. To study the various factors which affect the rate of a chemical reaction such as concentration, temperature, and solvent CO 3. To learn the crystal diffraction and experimental techniques used to characterize the solid crystals CO 4. To recognize and give the lattice parameter relationships for the seven crystal systems CO 5. To value the Nernst distribution law - its thermodynamic derivation, modification of law when solute undergoes association, dissociation and chemical combination with one of the solvents
19C4SB2	DYES AND PIGMENTS	CO 1. Know and comprehend the principle and theories of dyes CO 2. Identify the chromophoric groups and auxochromes present in the dyes CO 3. Classify the of dyes whether natural or synthetic CO 4. Predict the structure of dyes CO 5. Recognise the applications of dyes in various industries

19C4SB2(A)	HEALTH CHEMISTRY	CO1.To Acquire the basic knowledge about the significances of food and hygiene CO2.To Classify the given drugs whether they belong to antipyretics,analgesics, depressants etc CO 3. To Interpret the structure and mechanism of enzyme action CO4.ToCatagorize and identify the function of the different types of hormones CO 5. To Analyse the reason for common diseases affecting the human body
19C4CC12	ORGANIC QUALITATIVE ANALYSIS	CO 1. Gain the knowledge of appearance, colour, physical state, and odour of organic substances CO 2. Distinguish whether the given compound is Aliphatic or Aromatic and Saturated or Unsaturated. CO 3. Perform the confirmatory test for various functional groups present in the given organic compound. CO 4. Recognize the usage of apparatus and laboratory reagents. CO 5. Avoiding hazardous experiments by doing micro level eco friendly experiments.

19P4ACC3	ALLIED CHEMISTRY-II (Periodic table and atomic properties, electro chemistry–I, II, Catalysis and photochemistry)	CO 1. Understand the periodicity in periodic table CO 2. Understand the different types of condutances and their relations and the effect of dilution. CO 3. Use Nernst equation to calculate the electrode potential and emf of electrochemical cells. Study the applications of electrochemical measurements CO 4. Understand the basics of photochemistry using laws of photochemistry and Jablonsky diagram CO 5. Derive the rate constants o certain photochemical reactions.
19P4ACC4	ALLIED CHEMISTRY PRACTICALS	CO 1. Gain the knowledge of appearance, colour, physical state and odour of organic substances. CO 2. Distinguish whether the given compound is Aliphatic or Aromatic and Saturated or Unsaturated. CO 3. Perform the confirmatory test for various functional groups present in the given organic compound. CO 4. Recognize the usage of apparatus and laboratory reagents. CO 5. Relate the experimental observations with theory behind practicals.
19C5CC13	Organic chemistry –III (Aldehydes And	CO 1.Toanalyze the synthetic importance of reactive methylene

	Ketones, Carboxylic Acids And Their Derivatives, steroisomerism, Amines And Diazo Compounds And Carbohydrates)	compounds CO 2.To generalize the characteristic features of optical isomers and geometrical isomers
19C5CC14	PHYSICAL CHEMISTRY –III (Thermodynamics, Phase Rule & Group Theory)	CO 1. To predict the feasibility of chemical reactions applying II law of thermodynamics CO 2. To explain the absolute entropy of substances and to calculate it
19C5CC15	INORGANIC PRACTICALS (Gravimetric Analysis)	CO 1. Acquire the knowledge of concept of gravimetric estimations. CO 2. Recognise the role of reagents in chemistry.
22C5CC16	CONVENTIONAL AND GREEN SYNTHESIS	CO 1. Recognize the usage of apparatus and laboratory reagents. CO 2. Relate the experimental observations with theory behind practicals.
19C5ME1	SPECTROSCOPY	CO 1. To identify various functional groups present in organic molecules using IR frequency. CO 2.To predict the number and nature of protons/ carbons in organic

		molecules in 1H-NMR/ 13C-NMR spectroscopy
19C5ME2	BIO CHEMISTRY	CO 1.To identify the various metabolic reactions CO 2. To understand the importance of nucleic acids
19C5SB3	MEDICINAL CHEMISTRY	CO 1.To study the mechanism of drug action CO 2.To determine the designing and binding of drugs with receptors
19C5SB4	NANO CHEMISTRY	CO 1. Learn about the background on Nanoscience . CO 2. Understand the synthesis of nanomaterials and their application and the impact of nanomaterials on environment
19C6CC17	Organic chemistry –IV (Polynuclear Hydrocarbons, Heterocyclic Compounds, Amino Acids And Proteins)	CO 1. To explicate the structures of Citral, Dipentene and Camphor. CO 2. To distinguish the properties of quinolin and isoquinoline.
19C6CC18	PHYSICAL CHEMISTRY-IV (Electrolytic Conductance And Electrochemistry)	CO 1. Calculate the cell potential for a nonstandard cell. CO 2. Know the chemical reactions used in a lead-acid battery
19C6ME3	ADVANCED ORGANIC	CO 1. To sketch Frontier molecular orbitals in photochemistry.

	CHEMISTRY	CO 2. To differentitate the molecular rearrangements and to solve the simple problems
19C6ME4	POLYMER CHEMISTRY	CO 1. To understand the theories and mechanism of different types of polymerisation processes. CO 2. To study the applications of the above techniques to synthesize different natural and synthetic polymers.
19C6ME5	ADVANCED PHYSICAL CHEMISTRY	CO 1. To understand the theories behind the spectral techniques like MW.IR,NMR and ESR CO 2. To study the applications of the above techniques to elucidate the structures of molecules
19C6ME6	ADVANCED INORGANIC CHEMISTRY	CO 1. To understand the theories behind inorganic photochemistry and electroanalytical techniques. CO 2. To study the applications of the above techniques to elucidate the structures of Bio-inorganic molecules
19C6SB5	COMPUTERS IN CHEMISTRY	CO 1. To write programs to determine lattice energy, half-life, normality, molarity, molality CO 2. To present structure based drug designing in both 2D and 3D
19C6SB6	GREEN CHEMISTRY	CO 1. To differentiate between yield and atom economy CO 2. To interpret the concept of Stereo selectivity, Chemo selectivity and Regio selectivity

19C6CC19	PHYSICAL PRACTICALS	CO 1.Experience in some scientific methods employed in basic and applied physical chemistry CO 2. Developed skills in procedures and instrumental methods applied in analytical and practical tasks of physical chemistry