Rayat Shikshan Sanstha's

Karmaveer Bhaurao Patil College Vashi, Navi Mumbai

Name of the Faculty: Science and Technology

Name of the Program: Bachelor in Science (B.Sc.)

Program Outcomes (POs) 2022-23

PO-1	**Disciplinary Knowledge:** Understand the basic concepts, fundamental principles, theoretical formulations and experimental findings and the scientific theories related to Physics, Chemistry, Mathematics, Microbiology, Computer Science, Biotechnology, Information Technology, and other fields related to the program.
PO-2	**Communication Skills:** Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.
PO-3	**Critical Thinking:** Propose novel ideas in explaining the scientific data, facts and figures related to science and technology.
PO-4	**Analytical Reasoning and Problem-Solving:** Hypothesize, analyze, formulate, and interpret the data systematically and solve theoretical and numerical problems in the diverse areas of science and technology.
PO-5	**Sense of Inquiry:** Curiously ask relevant questions for a better understanding of fundamental concepts and principles, scientific theories and applications related to the study.
PO-6	**Use of Modern Tools:** Operate modern tools, equipments, instruments and laboratory techniques to perform the experiments and write the programs in different languages (software).
PO-7	**Research Skills:** Understand to design, collect, analyze, interpret and evaluate information/data that is relevant to science and technology.
PO-8	**Application of Knowledge:** Develop scientific outlook and apply the knowledge with respect to subject.
PO-9	**Ethical Awareness:** Imbibe ethical, moral and social values and exercise it in day to day life.
PO-10	**Teamwork:** Work collectively and participate to take initiative for various field-based situations related to science, technology and society at large.
PO-11	**Environment and Sustainability:** Create social awareness about environment and develop sustainability for betterment of future.
PO-12	**Lifelong Learning:** Ability of self-driven to explore, learn and gain knowledge and new skills to improve the quality of life and sense of self-worth by paying attention to the ideas and goals throughout the life.

Program Coordinator

BOS Chairman

Principal

I/C PRINCIPAL
KARMAVEER BHAURAO PATIL COLLEGE
VASHI, NAVI MUMBAI 400 703.

KARMAVEER BHAURAO PATIL COLLEGE VASHI NAVI MUMBAI

Name of the Specific Program: BSc Chemistry
Program Specific Outcomes (PSO)

PSO-1	Enable students to develop scientific skills by applying the principles of organic, inorganic, physical chemistry and analytical chemistry.
PSO-2	To develop ability and to acquire the knowledge of terms, facts, concepts and processes techniques of Chemistry.
PSO-3	To inculcate the ethical, Human, environmental, Social Values and responsibilities in the context of learning Chemistry.
PSO-4	To expose the students to a breadth of experimental techniques, skills required in chemistry, proper handling of apparatus and chemicals using modern instrumentation.

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Department of Chemistry List of COs

Title of Specific Program: B.Sc. Chemistry		
Course Code	**Title of Course**	**Course Outcomes**
		After successful completion of each course in Chemistry a learner should be able;
UGCH101	Chemistry Paper-I	CO-1 To employ the basic concepts of thermodynamics & its laws, IUPAC nomenclature of organic compounds. (3) CO-2 To explain periodicity & periodic properties, fundamentals of organic reactions. (2) CO-3 To describe mole concept, importance of analytical chemistry & laws of crystallography. (2) CO-4-To evaluate the graphical representations of equations, hybridization (5)
UGCH102	Chemistry Paper-II	CO-1 To describe rate equations, stereoisomers, types of catalysis & various terms in statistical analysis. (2) CO-2 To deduce the hybridization of simple inorganic compounds & measurements in statistical analysis (4) CO-3 To explain different properties of main group elements. (2) CO-4 To estimate properties of the liquid state. (2 & 5)
Semester-II		
UGCH201	Chemistry Paper-I	CO-1 To express Ideal gas laws, kinetic theory of gases, HSAB principle, alkene & alkyne chemistry. (2) CO-2 To classify acids & bases according to various theories, environmental pollution. (2) CO-3 To evaluate numerical based on chemical equilibria & thermodynamic parameters. (5) CO-4 To understand classical methods of analysis. (2)
UGCH202	Chemistry Paper-II	CO-1To summarize the basic concept of aromaticity, ionic equilibria, and fundamentals of chemical bonding. (2) CO-2 To apply redox chemistry in different chemical reactions. (3) CO-3 To develop an evacuation plan in case of a laboratory accident. (6) CO-4-To explain different terminologies involved in molecular spectroscopy. (2)
UGCHP1	Chemistry Practical-I	CO -1To estimate a reaction's rate constant, enthalpy by a given method. (2, 5) CO-2-To examine Commercial samples, using a double indicator. (1,3) CO-3 To determine the purity of any two organic compounds. (3) CO-4 To classify mixture of o-and p-nitro phenols by thin layer chromatography (TLC). (2,4)
UGCHP2	Chemistry Practical-II	CO-1 To determine the rate constant for the saponification reaction, the dissociation constant of a weak acid. (3) CO-2 To analyse inorganic samples qualitatively. (4) CO-3To predict organic compounds containing C, H, (O), N, S, X elements. (3,5)

Semester-III		
UGCH301	Chemistry Paper-I	CO-1 To deduce the relationship between different thermodynamic parameters. (4) CO-2 To explain the theories of Nondirectional & directional bonding, different types of organic reagents. (2) CO-3 To discuss the nucleophilic substitution reactions, and Fundamentals of molecular orbitals theory. (2)
UGCH302	Chemistry Paper-II	CO-1 To illustrate types of complex chemical reactions and theories of chemical reaction rates, synthesis of ammonia by economical method. (2, 3) CO-2 To explain Boron, Carbon, Nitrogen families with respect to their physicochemical properties. (2) CO-3 To predict the mechanism of reactions involving Carbonyl Compounds. (3,5)
UGCH303	Chemistry Paper-III	CO-1 To understand and interpret the treatment of analytical data and sampling. (2) CO-2 To compare various classical methods. (2,4,5) CO-3 To apply modern methods of separation techniques in analysis.(3)
Semester-IV		
UGCH401	Chemistry Paper-I	CO-1 To justify phase rule, various thermodynamic properties from electrochemical data, properties of transition metals. (5) CO-2 To propose mechanisms of various name-reactions in organic chemistry, the Nature of the Metal-Ligand Bond in coordination chemistry. (6) CO-3 To illustrate the properties & types of biomolecules, pH determination, and theories of coordination compounds. (2)
UGCH402	Chemistry Paper-II	CO-1 To illustrate the characteristics of different crystals, properties of amines & properties of ions in aqueous medium. (2) CO-2 To plan the synthesis of heterocyclic compounds. (4) CO -3 To describe the environmental aspects of oxides, oxo-acids, oxo-anions (2) CO-4 To explain the reactivity of heterocyclic compounds (2)
UGCH403	Basics in Analytical Chemistry - II	CO-1 To understand the basic concepts of various instrumental methods of analysis, thermal methods of analysis (2) CO-2 To describe physico – chemical properties of soil & water. (2) CO-3 To articulate different distillation techniques and uses of petrochemical and eco-friendly fuels (3)
UGCHP 301	Chemistry Practical-III	CO-1 To evaluate the different electro-analytical parameters by different instrumental techniques. (5) CO-2 To test the given sample for its qualitative & quantitative properties. (4, 6) CO_3 To analyse bi-functional organic compounds qualitatively. (4)
UGCHP 401	Chemistry Practical-IV	CO-1 To evaluate the different electro-analytical parameters by different instrumental techniques. (5) CO-2 To test the given sample for its qualitative & quantitative properties. (4, 6) CO-3 To analyse bi-functional organic compounds qualitatively. (4)
Semester-V		

UGCH501	Physical Chemistry	CO-1 To understand the basic concepts of Molecular spectroscopy (2) CO-2 To correlate the colligative properties, elevation and depression of boiling point (4) CO-3 To classify types of chemical reaction (fast, slow, moderate), nuclear reactions (4) CO-4 To generalize the concept of nuclear reactions (2)
UGCH502	Inorganic Chemistry	CO-1 To deduce packing density and the point group of given molecules (4) CO-2 To construct the Molecular Orbital diagram for diatomic and polyatomic molecule (4,6) CO-3 To understand the defects in solids, the concept of superconductivity and chemistry of inner transition elements (2) CO-4 To discuss the chemistry of non-aqueous solvents and group 16 and 17 elements. (2)
UGCH503	Organic Chemistry	CO-1 To plan organic synthesis by using green technology with proper mechanisms. (6) CO-2 To illustrate different reactions involving carbanion intermediate. (4) CO-3 To explain the IUPAC nomenclature of spiro compounds. (2) CO-4 To elucidate the structure of samples using spectroscopic techniques. (5)
UGCH504	Analytical Chemistry	CO-1 To understand the electrophoresis, Spectrophotometry and Quality concepts in Analytical Chemistry. (2) CO-2 To discuss & estimate classical methods of analysis. (2,4) CO-3 To describe the various types of optical methods (2) CO-4 To apply various methods of separation techniques. (5)
UGCHDD501	Applied Component (Drugs and Dyes)	CO-1 To describe routes of drug administration & different pharmacodynamic agents. (2) CO-2 To classify & discuss different Analgesics, Antipyretics and Anti-inflammatory, Antihistaminic, Cardiovascular, Antidiabetic, and Anti parkinsonism Drugs. (2,4) CO-3 To classify dyes based on applications and dyeing methods. (4) CO-4 To explain the unit process and Dye Intermediates (2)
UGCHP501	Physical Chemistry Practical	CO-1To evaluate the velocity constant of alkaline hydrolysis of ethyl acetate by the conductometric method. (5) CO-2 To investigate the molecular weight of compound by Rast Method. (6) CO-3 To estimate the different physical parameters using instrumental methods of analysis. (4,5)
UGCHP502	Inorganic Chemistry Practical	CO-1 To synthesize different inorganic complex preparations involving basic inorganic skills. (6) CO-2 To determine the of percentage purity of the given water soluble salt and its quantitative & qualitative detection (3)
UGCHP503	Organic Chemistry Practical	CO-1To apply separation technique for binary solid-solid mixture (5) CO-2 To analyse separated organic components. (4)
UGCHP504	Analytical Chemistry Practical	CO-1 To understand the Spectrophotometric estimation of fluoride. (2) CO-2 To Estimate magnesium content in Talcum powder. (5) CO-3 To Determination of COD, sulphate of the water sample. (3) CO-4 To determine the amount of persulphate in the given sample solution by back titration. (3)

UGCHDDP5	Practical Applied Component (Drugs and Dyes)	CO-1 To Estimate Ibuprofen by titration method and acid neutralizing capacity of a drug. (5) CO-2 To Prepare Aspirin from salicylic acid. (6) CO-3 To Separate components of natural pigments by paper chromatography (6)
Semester – VI		
UGCH601	Physical Chemistry	CO-1 To recall activity, activity coefficient, basic terms of polymer, principle, and instrumentation of NMR & ESR spectroscopy (1). CO-2 To explain the outline of different electrochemical cells, the molar masses of polymers, the properties of the wave function, and the concept of the operator (4). CO-3 To relate Chemical cells with and without transference, Solar cells and Hydrogen as a fuel for the future (4) CO-4 To appraise NMR & ESR spectrometer, linear operator, Hamiltonian operator, Eigen function and Eigen value (5).
UGCH602	Inorganic Chemistry	CO-1 To appraise the theories of the metal-ligand bond (5). CO2 To construct the molecular orbital diagrams of co-ordination compounds (4,6). CO-3 To explain theory, reactivity, stability of metal complexes, organometallic compounds, the chemistry of group 18 elements (2) CO-4 To describe the concept of metallurgy and the basics of bioinorganic chemistry (2).
UGCH603	Organic Chemistry	CO-1 To discuss stereochemical aspects of reaction, catalysts and reagents, structure and reactions of carbohydrates. (2) CO-2 To classify amino acids, proteins, carbohydrates, nucleic acids, and polymers. (2,4) CO-3 To deduce the structure by spectral data, the product, and the mechanism of molecular rearrangements. (4) CO-4 To predict the reactions with the mechanism. (5)
UGCH604	Analytical Chemistry	CO-1 To understand the principle, Instrumentation and applications of various electro analytical techniques. (2) CO-2 To express the modern methods of separation, analysis of food and cosmetics. (2) CO-3 To articulate thermal methods and validation of analytical method (4) CO-4 To compare various instrumental methods used in analytical techniques (5).
UGCHDD601	Applied Component (Drugs and Dyes)	CO-1 To describe drug discovery, design, and development, and structure-activity relationship (1,2) CO-2 Classification, synthesis, and uses of some selected drugs and dyes (2,4) CO-3 To know concepts of drug intermediate synthesis, nanoparticles, and environmental aspects. (1) CO-4 To discuss Non-textile uses of dyes, Pigments, Dyestuff Industry (2,4)
UGCHP 601	Physical Chemistry	CO-1 To interpret the order of reaction graphically. (4) CO-2 To detect the molecular weight of high polymer polyvinyl

	Practical	alcohol (PVA) by viscosity measurement and the number of halides in the mixture by potentiometric titration. (5) CO-3 To apply the instrumental methods for the estimation of the amount of acid and Fe(III) ions. (4)
UGCHP 602	Inorganic Chemistry Practical	CO-1 To synthesize different inorganic complex preparations involving basic inorganic skills. (6) CO-2 To determine the of percentage purity of the given water soluble salt and its quantitative & qualitative detection (3)
UGCHP 603	Organic Chemistry Practical	CO-1 To apply separation techniques for binary liquid-liquid and liquid-solid mixtures by using the microscale technique. (5)
UGCHP 604	Analytical Chemistry Practical	CO-1 To estimate Chromium in water sample spectrophotometrically and reduce sugar in honey by the Willstatter method. (5) CO-2 To evaluate of Mg^{+2} & Zn^{+2} by using ion exchange chromatography. (5) CO-3 To measure acetic acid in the Vinegar sample potentiometrically and phosphoric acid in the cola sample pH metrically. (5)
UGCHDDP601	Applied Component (Drugs and Dyes)	CO-1 To plan the synthesis of β-naphthyl methyl ether, Paracetamol and Fluorescein. CO-2To Carry out TLC of Chlorophyll pigment.

Note:

Numbers in bracket ( ) indicate cognitive levels of the revised Blooms Taxonomy as follows:
(1): Remembering, (2): Understanding, (3): Applying, (4): Analysing, (5): Evaluating, (6): Creating

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