K. L. E. Society's

SCIENCE AND COMMERCE COLLEGE

(Affiliated to University of Mumbai)

Plot No 29, Sector -01, Kalamboli, Navi Mumbai-410218.

Ph.:8828979594 Web: http//klessccmumbai.edu.in E-mail: klekalamboli@gmail.com

Department- B.Sc. (Chemistry)

Programme Outcomes (POs)

PO-1 Disciplinary Knowledge- Demonstrate, solve and an understanding of major concepts in all disciplines of Chemistry.

PO-2 Communication Skills- Solve the problem and also think methodically, independently and draw the logical conclusion.

PO-3 Critical Thinking- Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of Chemical reactions.

PO-4 Analytical Reasoning and Problem Solving- Create an awareness of the impact of Chemistry on the environment, society, and development outside the scientific community.

PO-5 Sense of Inquiry- Find out the green route for Chemical reaction for sustainable development.

PO-6 Use of Modern Tools- To inculcate the scientific temperament in the students and outside the scientific community.

PO-7 Research Skills- Use modern techniques, decent equipment and chemistry softwares.

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Programme Specific Outcomes (PSOs)

PSO-1	Chemistry graduates will be able to understand basic concepts related to chemistry covering various organic syntheses, Structural determination. Along with this students will be able to apply the chemistry concept in Applied Chemistry.
PSO-2	Develop critical thinking and use scientific knowledge to solve problems in Chemistry & be aware of handling the sophisticated instruments/equipment.
PSO-3	Chemistry graduates will be able to understand the basic concepts in Chemistry & apply this knowledge in material chemistry and Biosynthesis.
PSO-4	Gain knowledge of physical properties of various compounds through electrochemical study, Thermodynamics, Colligative properties as well as Quantum Mechanics.

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Course Outcomes (COs)

SEMESTER-I

COURSE CODE: M3-1

COURSE NAME: BASICS IN PHYSICAL, INORGANIC AND ORGANIC CHEMISTRY I

After successful completion of this course, students will be able to:	
CO-1	The learner will be able to learn concepts related to state of matter and different methods of concentration expressions and rate laws
CO-2	The learner will be able to classify the elements on the basis of theory learnt and will understand the historical perspective of atomic structure
CO-3	The learner will be able to identify the organic compounds on the basis of nomenclature and stereochemistry

COURSE CODE: VSCCH1

COURSE NAME: VOCATIONAL SKILL COURSE (VSC): Calibration of Glassware and Instruments

After successful completion of this course, students will be able to:	
CO-1	Calibrate glassware and instruments.
CO-2	Understand the concept of minimizing errors.
CO-3	Handle various chemicals with the necessary care.

COURSE CODE: SKILL ENHANCEMENT COURSE (SEC)

COURSE NAME: SAMPLING TECHNIQUES

After successful completion of this course, students will be able to:	
CO-1	Conducting sampling procedures in Chemistry, including selecting appropriate methods and equipment for different sample types
CO-2	Handling solid and liquid samples according to established protocols to ensure

	accurate analysis and reliable results
CO-3	Critically analyze case studies related to soil and water pollution, applying Chemical principles to identify causes, effects, and remedial measures, and proposing effective solutions and prevention strategies

SEMESTER-II

COURSE CODE: M3-2

COURSE NAME: CHEMISTRY PAPER I

After successful completion of this course, students will be able to:	
CO-1	The learner will be able to acquire the knowledge related to electrochemistry, thermodynamics and surface tension
CO-2	The learner will be able to identify different methods of qualitative analysis and various theories of chemical bonds.
CO-3	The learner will be able to exemplify different organic reaction mechanisms and hybridization involved in organic compounds

COURSE CODE: VSCCH2- VOCATIONAL SKILL COURSE (VSC)

COURSE NAME: COMMERCIAL ANALYSIS OF FOOD SAMPLES

After successful completion of this course, students will be able to:	
CO-1	Identify the various components present in food samples.
CO-2	Apply analytical techniques for the analysis of food samples.
CO-3	Acquire the necessary basic skills for the analysis of food samples.

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COURSE CODE: SKILL ENHANCEMENT COURSE (SEC)

COURSE NAME: SOFTWARES IN CHEMISTRY

After successful completion of this course, students will be able to:	
CO-1	Proficiently use of MS-Word and MS-Excel for accurately documenting chemical formulae, equations and experimental data, ensuring clarity and precision in scientific communication
CO-2	Utilization of online platforms to conduct comprehensive literature surveys, and stay updated with advancements in Chemistry
CO-3	Gain mastery of specialized Chemistry software tools such as Chem Draw/Chem Sketch etc.

COURSE CODE: OPEN ELECTIVE (OE)

COURSE NAME: FOOD SAFETY AND HYGIENE

After successful completion of this course, students will be able to:	
CO-1	Practice and promote good systems for food safety and hygiene
CO-2	Identify the sources of food contamination and will be able to take preventive measures to avoid contamination
CO-3	Recognize the signs and causes of foodborne diseases
CO-4	Give an overview of perishable supply chain management

SEMESTER-III

COURSE CODE: S3MJ3

COURSE NAME: Progressive Physical and Analytical Chemistry I

After successful completion of this course, students will be able to:	
CO-1	Explain and apply concept of Free energy, Chemical potential
CO-2	Understand the principle of electrolyte conductance, terms associated and experimental technique to determine transport no. of ions
CO-3	Explain the difference of ideal and non-ideal solution, partially and immiscible liquid pairs
CO-4	Understand the importance of Analytical Chemistry and apply statistical tests to the given data or the data generated in the laboratory to comment on error and minimize it.
CO-5	Explain the various terms involved in titrimetric analysis, choose a suitable indicator, standardization and Preparation of standard solutions
CO-6	Describe the function of the different components of a colorimeter and spectrophotometer.

COURSE CODE: S3MJ4

COURSE NAME: Progressive Inorganic and Organic Chemistry I

After successful completion of this course, students will be able to:	
CO-1	Elucidate the types of bonding and enable them to write the VBT and MOT with respect to examples
CO-2	Explain compounds of boron and silicon
CO-3	Differentiate between SN1, SN2, SNi, and aromatic substitution mechanisms with stereochemical implications.
CO -4	Predict the reactivity of haloalkanes and haloarenes in various nucleophilic substitution contexts.

CO -5	Identify and describe methods of preparing aldehydes and ketones different precursors.
CO -6	Explain mechanisms and outcomes of reactions involving carbonyl compounds.
CO -7	Describe and illustrate the mechanisms of selected name reactions

SEMESTER-IV

COURSE CODE: S3MJ5

COURSE NAME: Progressive Physical and Analytical Chemistry II

After successful completion of this course, students will be able to:	
CO-1	Demonstrate an understanding about chemical kinetics, reaction mechanism and complex chemical reaction.
CO-2	Learn chemical cells, distinguish between reversible/ irreversible cells, types of electrode, use of emf data to calculate equilibrium constant and pH of solution.
CO-3	Develop a clear understanding of the criteria for phase equilibrium and apply Gibbs Phase Rule to different systems
CO-4	Develop a clear understanding of the principle, technique and application of PC and TLC , Solvent extraction.
CO-5	Understand the details of working and application of potentiometer, Conductometer and pH-meter.

COURSE CODE: S3MJ6

COURSE NAME: Progressive Inorganic and Organic Chemistry II

After successful completion of this course, students will be able to:	
CO-1	Discuss the position of transition elements, properties and qualitative analysis
CO-2	Determine the rules , theories of coordination compounds and their application
CO-3	Expound the types of oxides of nitrogen, Sulphur and their impact on environment
CO-4	Classify and name five- and six-membered heterocyclic compounds containing one heteroatom.
CO-5	Describe and compare synthesis methods and electrophilic substitution reactivity of furan, pyrrole, thiophene, and pyridine.
CO-6	Predict conformational preferences and stereochemical behavior of mono- and disubstituted cyclohexanes
CO-7	Identify symmetry elements in organic molecules and relate them to optical activity.
CO-8	Explain mechanisms and applications of selected named reactions

SEMESTER-V

COURSE CODE: USCH501

COURSE NAME: PHYSICAL CHEMISTRY

After successful completion of this course, students will be able to:	
CO-1	To introduce to the learner molecular spectroscopy
CO-2	To teach learners concepts of colligative properties in chemical thermodynamics
CO-3	To orient learners about collision theory of chemical kinetics and classification of reactions
CO-4	To make learners aware of Nuclear Chemistry
CO-5	To acquaint learners to Surface Chemistry
CO-6	To facilitate the learning of electrochemistry and Polymers
CO-7	To facilitate the learning of electrochemistry and Polymers
CO-8	To facilitate the learning of electrochemistry and Polymers
CO-9	To introduce the learner to be competent at all basic laboratory skills and will be able to complement and develop these with more advanced techniques

COURSE CODE: USCH502

COURSE NAME: INORGANIC CHEMISTRY

After successful completion of this course, students will be able to:	
CO-1	To introduce the concepts of molecular symmetry and chemical bonding

CO-2	To expose the learner to the concept of solid state chemistry and super conductivity
CO-3	To equip learner with a sound knowledge Chemistry of inner Transition elements,
CO-4	Chemistry of non-aqueous solvents and chemistry of Group 16 and 17

COURSE CODE: USCH503

COURSE NAME: ORGANIC CHEMISTRY

After successful completion of this course, students will be able to:	
CO-1	Understand the basic concepts in Organic Reaction mechanism to be used to the reaction like carbonyl compound
CO-2	Understand the basic concept of pericyclic reactions and Photochemistry, application of it to the carbonyl compounds
CO-3	Adopt the term used in the stereochemistry for details stereochemistry study
CO-4	Able to Relate Agrochemicals with chemistry
CO-5	Understand chemistry of Heterocyclic compounds.
CO-6	Predict the structure and Name of the Organic compounds
CO-7	Role of chemistry in environment pollution and develop sustainable practices to

	remove the negative aspects of conventional chemistry.
CO-8	Understand the concept of stoichiometric calculations and relate them to green chemistry metrics, atom economy and their difference from percentage yield
CO-9	Understand the basic principles of UV-Visible and IR.
CO-10	Learn about the chemistry of natural Products
CO-11	Separate solid mixture of Organic compounds, its purification and Identification

COURSE CODE: USCH504

COURSE NAME: ANALYTICAL CHEMISTRY

After successful completion of this course, students will be able to:	
CO-1	To introduce the concept of quality in analytical chemistry
CO-2	To make the learner understand the calculations for interconversion in chemical calculations and sampling techniques.
CO-3	To introduce the instrumentation of spectroscopic techniques in analytical chemistry
CO-4	Interpret the schematic diagram of Gas chromatography,label its critical components, understand applications of technique and apply knowledge for analysis of compounds.

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COURSE CODE: UACDD501

COURSE NAME: DRUGS AND DYES

After successful completion of this course, students will be able to:	
CO-1	To get comprehensive information about classification, nomenclature and various routes of durg administration and to study the synthesis of different durg intermediates and drugs.
CO-2	To familiarize with the mode of actions of drugs. and to be exposed to the applications of analgesics, antipyretics, antidiabetic, antiinflammatory drugs etc.
CO-3	To study the concept of dyes, its property and nomenclature dyes and study the concept of natural and synthetic dyes.
CO-4	To familiarize with the types of fibers, application of dyes and how the dyes are attached to them as well as concept of optical brighteners and their classes.
CO-5	Learn Witt's theory and complementary colour theory and the relation between colour and chemical compounds.
CO-6	To get insight into various commercially important processes such as nitration, sulphonation and diazotization etc. and to study the synthesis of Dyes intermediate

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SEMESTER-VI

COURSE CODE: USCH601

COURSE NAME: PHYSICAL CHEMISTRY

After successful completion of this course, students will be able to:	
CO-1	To develop the understanding of electrochemistry and its application in real time
CO-2	To acquaint the understanding of Polymers, its merits and demerits on current era.
CO-3	To create awareness from the learning of Quantum Chemistry and its corelation with black holes
CO-4	To enable the learner the importance and merits of of renewable resources

COURSE CODE: USCH602

COURSE NAME: INORGANIC CHEMISTRY

After successful completion of this course, students will be able to:	
CO-1	To develop an understanding of organometallic chemistry metallocenes and catalysis
CO-2	To acquaint the learner with metallurgy, chemistry of group 18 and Bio inorganic molecules
CO-3	To make them aware of mechanism of organic reactions
CO-4	To enable the learner to understand the theories of metal-ligand bond, stability of metal complexes, reactivity of metal complexes and electronic spectra of complexes

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COURSE CODE: USCH603

COURSE NAME: ORGANIC CHEMISTRY

After successful completion of this course, students will be able to:	
CO-1	Apply the stereochemistry concept to the reaction of olefins
CO-2	Understand the chemistry of biomolecule like amino acid, proteins and Nucleic Acid.
CO-3	Apply the mechanism concept to the rearrangement reactions
CO-4	Understand the Chemistry of Carbohydrates
CO-5	Understand the basic principles of Mass and P-NMR Spectroscopic techniques
CO-6	Know how to use spectroscopic techniques to determine structure and stereochemistry of known and unknown compounds
CO-7	Understand the synthetic polymers and natural polymer and its application of it applied chemistry
CO-8	Apply the various catalyst and reagent in synthesis of target organic molecules
CO-9	Separate liquids mixture of Organic compounds, its purification and Identification

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COURSE CODE: USCH604

COURSE NAME: ANALYTICAL CHEMISTRY

After successful completion of this course, students will be able to:	
CO-1	To aquaint the learners on various electroanalytical methods spespecific reference to Polarography
CO-2	To aquaint the learners on various electroanalytical methods specific reference to Amperometric Titration
CO-3	To provide learners a complete insight to method of separation - HPLC HPTLC & Ion Exchange Chromatography.
CO-4	To provide learners a complete insight to method of separation - HPTLC
CO-5	To provide learners a complete insight to method of separation - Ion Exchange Chromatography.
CO-6	Students will gain a comprehensive understanding of thermal methods and their applications in analyzing material properties.
CO-7	Students will understand the Principles of different types of Radioanalytical Techniques
CO-8	To Provide learner understanding of NAA and their applications in various fields.
CO-9	To introduce students about food chemistry and cosmetics

COURSE CODE: UACDD601

COURSE NAME: DRUGS AND DYES

After successful completion of this course, students will be able to:	
CO-1	To study the discovery of drug from different sources,to know the uses and the side effects of certain drugs for various diseases as well as to study the basic

	concept of drug designing
CO-2	To study the different classes of chemotherapeutic agents and synthesis of durg intermediate.
CO-3	To study the importance of nanomaterial in medicinal chemistry.
CO-4	To study the classification of dyes based on chemical constitution, its synthesis and applications
CO-5	To create an awareness of the current concern about the toxicity of dyes and their effect on ecology.
CO-6	To study the non-textile use of dyes as well as to familiarize the students with the application of dyes in the medical field and concept of pigments.