Department:- M.Sc. NEP (Organic Chemistry)

Programme Outcomes (POs)

PO-1	Understand the fundamentals and practical applications of chemistry.
PO-2	Possess the ability to use their knowledge in their social, professional, and personal lives.
PO-3	Possess the skills necessary to work in chemistry or conduct research.
PO-4	Possess the capability and self-assurance to continue your chemistry education.
PO-5	Possess knowledge of laboratory procedures and device handling skill
PO-6	Grow in awareness of social issues and become productive members of the nation

Programme Specific Outcomes (PSOs)

PSO-1	Gain knowledge of the advanced concepts in the branch of chemistry, scrutinize and accomplish a solution to problems encountered in the field of research and analysis.
PSO-2	Imbibe the attitude as well as aptitude of a scientific approach along with analytical reasoning with respect to the novel techniques actually implemented in the Industry.

PSO-3	Apply the basic knowledge of chemistry to perform various tasks assigned to them at the workplace in industry and academia to meet the global standards.
PSO-4	Deduce qualitative and quantitative information of chemical compounds using advanced spectroscopic methods which can further be analysed using practical skills inculcated in them during the course.
PSO-5	Use the subject knowledge, communication and ICT skills to become an effective team leader/team member in the interdisciplinary fields.
PSO-6	Understand, Manage and contribute to solve basic societal issues and environmental concerns ethically based on principles of scientific knowledge gained.
PSO-7	Exhibit professional work ethics and norms of scientific development

COURSE OUTCOMES (COs)

SEMESTER-I

COURSE CODE: PSCH101

COURSE NAME: CHEMISTRY PAPER I (Physical Chemistry)

After successful completion of this course, students will be able to:	
CO-1	The learners will apply the advanced thermodynamics, Maxwell equation and its applications to ideal gasses.

CO-2	The learners will implement the applications of chemical thermodynamics to real gases, solutions, surfaces and their energetics.
CO-3	The learners will understand the applications of operators and Schrodinger equation in the field of quantum Chemistry.
CO-4	The learners will try to accomplish a solution to problems encountered in the fieldof research.

COURSE CODE: PSCH102

COURSE NAME: CHEMISTRY PAPER II (Inorganic Chemistry)

After successful completion of this course, students will be able to:	
CO-1	The learner will know the important fundamental concept of Group Theory, which helps them in understanding the properties and bonding in polyatomic molecules.
CO-2	The learner get the knowledge about the various techniques used for Characterization coordination compounds.
CO-3	The learners develops the skill in interpretation of the spectra.
CO-4	The learners will get comprehensive idea about established instrumental techniques andSignificant characterization tools available to study inorganic complexes having wide applications in industries.

COURSE CODE: PSCH103

COURSE NAME: CHEMISTRY PAPER III (Organic Chemistry)

After successful completion of this course, students will be able to:	
CO-1	predict the reactivity of organic compound from its structure.
CO-2	understand different methods used for determination of Organic Reaction Mechanism
CO-3	understand the fundamental concept in stereochemistry by applying various symmetry elements of organic molecule.
CO-4	acquire the knowledge of chirality by taking examples of
CO-5	develop interest in stereochemistry by
CO-6	identify the nomenclature of various stereochemical phenomena
CO-7	organize the techniques of aromatic nucleophilic substitution reactions for synthesizing/transforming molecules.
CO-8	understand the concept of aromaticity and to know the nature of bonds, electronic effects and other properties of molecules.
CO-9	understand the preparation of important oxidizing reagent and predict the selectivity of the reagents in organic reactions.
CO-10	explain the preparation and uses of important reducing reagents in various organic transformation reaction.

COURSE CODE: PSCH104

COURSE NAME: CHEMISTRY PAPER IV (Analytical Chemistry)

After successful completion of this course, students will be able to:	
CO-1	Understand various terms used in analytical chemistry.
CO-2	Identify the different types of errors in analysis.
CO-3	Sketch out the role and importance of total quality management, safety, accreditationsand GLP in industries.
CO-4	Understand the efficacy of automation in chemical analysis.
CO-5	Design and specify applications of advanced analytical techniques in various fields.6. Explore the applications of IR spectroscopy and thermal methods.
CO-6	Perform basic calculations required in chemical analysis
CO-7	Interpret the experimental results of analytical techniques. transformation reaction.

CO-8	Understand various terms used in analytical chemistry.

SEMESTER II

COURSE CODE: PSCH201

COURSE NAME: Physical Chemistry

After successful completion of this course, students will be able to:	
CO-1	To learn the concept of quantum chemistry and able to solve problems related to 1Dbox, 2D box, 3D box and to explain the role of operators in quantum chemistry.
CO-2	To understand the use of Schrodinger wave equation in one and two electron systemsalong with applications of HMO.
CO-3	To develop the skill to solve the problems based on chemical thermodynamics, molecular dynamics and quantum Chemistry.
CO-4	To apply the concept of Jabolonski mechanism in photochemical reactions.

COURSE CODE: PSCH202

COURSE NAME: CHEMISTRY PAPER II (Inorganic Chemistry)

After successful completion of this course, students will be able to:	
CO-1	The learners will be able to learn ligand substitution reactions of Octahedral and Squareplanar complexes, Trans effect and factors affecting these substitution reactions.
CO-2	The learners will be able to understand the 18 e^- and 16 e^- electron square planar complexes by studying different examples. They will also learn the preparation and properties of a few selected compounds including sandwich compounds of Fe, Cr
CO-3	The learners will understand the structure and bonding of a few inorganiccompounds like Ziese's salt, ferrocene and bis(arene)chromium(0)
CO-4	The learners will understand the occurrence and effect of toxic metals like Pb, As, Cu, Cd, and Hg on the environment, the different diseases caused by poisoning of metals and the impact these metals have on the living organism.
CO-5	The learners will be familiar with the role of Inorganic chemistry in Biological systems, understand the structure of various biological oxygen carriers and molecules involved in electron storage and transport.

COURSE CODE: PSCH203

COURSE NAME: CHEMISTRY PAPER III (Organic chemistry)

After successful completion of this course, students will be able to:	
CO-1	Recognise the type of mechanism & intermediates involved in the given organicreaction and to prove mechanism for the reaction.
CO-2	Identify the ways to modify aliphatic and aromatic compounds via Nucleophilcsubstitution reactions.
CO-3	Predict the mechanism and stereochemistry of important organic reactions.
CO-4	Understand and write the mechanism of rearrangement reactions with stereochemistryand its applications.
CO-5	Understand the HOMO-LUMO concept and it significance in organic chemistry.
CO-6	Understand the basic principle and concepts in UV and IR spectroscopy
CO-7	Understand the basic concepts of ^{1}H, ^{13}C NMR, and mass spectroscopy.
CO-8	Understand how ^{1}H, ^{13}C NMR and Mass spectroscopy are important for the structure determination of organic compounds.

K. L. E. Society's

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SCIENCE AND COMMERCE COLLEGE

Affiliated to University of Mumbai, NAAC Accredited B+ (first cycle)

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

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

COURSE CODE: PSCH204

COURSE NAME: CHEMISTRY PAPER IV (Analytical Chemistry)

After successful completion of this course, students will be able to:	
CO-1	Able to compare the advantages/disadvantages of SEM, STM and TEM.
CO-2	Able to develop different techniques to separate the components of mixture.
CO-3	Conversant with basic principles and theories of mass spectrometry.
CO-4	Able to apply the electroanalytical methods to sample under consideration
CO-5	Able to elaborate on electrogravimetry and coulometry techniques.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

SEMESTER III

PSO-1	Gain knowledge of the advanced concepts in the branch of chemistry, scrutinize andaccomplish a solution to problems encountered in the field of research and analysis.
PSO-2	Apply the basic knowledge of chemistry to perform various tasks assigned to them attheworkplace in industry and academia to meet the global standards.
PSO-3	Deduce qualitative and quantitative information of chemical compounds using advancedspectroscopic methods which can further be analyzed using practical skills inculcated inthem during the course.
PSO-4	Imbibe the attitude as well as aptitude of a scientific approach along with analytical reasoning with respect to the novel techniques actually implemented in the industry.
PSO-5	Use the subject knowledge, communication and ICT skills to become an effective teamleader/team member in the interdisciplinary fields.
PSO-6	Understand, Manage and contribute to solve basic societal issues and environmentalconcerns ethically based on principles of scientific knowledge gained.
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COURSE OUTCOMES (COs)

SEMESTER III

MSc. II (Organic chemistry)

COURSE CODE: PSCHO301

COURSE NAME: CHEMISTRY PAPER I (Theoretical organic chemistry-I)

After successful completion of this course, students will be able to:	
CO-1	Identify the intermediate formed, propose the mechanism and predict the product.
CO-2	Analyze the involvement of neighboring groups to determine the mechanism and stereochemistry of the product formed.
CO-3	Identify a reaction as a cycloaddition, electrocyclic reaction, or sigmatropic rearrangement and predict how some organic molecules react with each other under thermal and photochemical conditions in a single step to give important molecules.
CO-4	Estimate the implications of ring size on the stability and strain in medium size ringcompounds.
CO-5	Summarize the unusual properties of medium size ring compounds.
CO-6	Analyze the various conformations adopted by fused ring systems, considering factorssuch as strain and steric interactions.
CO-7	Explain the effect of conformations of reactivity of cyclohexane derivatives.
CO-8	Describe and explain photochemical and photophysical processes using Jablonski diagrams and their quantum yield expressions

CO-9	Illustrate the regioselectivity and stereoselectivity of aromatic olefins and carbonylcompounds

COURSE CODE: PSCHO302

COURSE NAME: CHEMISTRY PAPER II (Synthetic Organic Chemistry-I)

After successful completion of this course, students will be able to:	
CO-1	Explain the mechanisms and applications of key name reactions, apply their knowledge to analyse domino and multicomponent reactions, create new synthetic pathways by integrating concepts from click reactions
CO-2	Discuss the generation, stability, and reactivity of free radicals, evaluate characteristic radical reactions including substitutions and additions.
CO-3	Analyse the reactivity of enamines versus enolates and synthesize asymmetric reactionsusing chiral enamines.
CO-4	Describe and explain the generation of carbanions by strong bases (LDA/n-butyl lithium)and applications in C-C bond formation.
CO-5	Illustrate the methods for synthesizing phosphorus, sulfur, and nitrogen ylides, includingthe role of nucleophiles and electrophiles in their formation.
CO-6	Apply knowledge of metal and nonmetal reagents for synthesis of organic compounds and design advanced organic transformations using different metal reagents

COURSE CODE: PSCHO303

COURSE NAME: CHEMISTRY PAPER III (Natural products and Spectroscopy)

After successful completion of this course, students will be able to:	
CO-1	Identify natural products based on their properties
CO-2	Use analytical evidences to determine structures of natural products
CO-3	Use functional group transformations and reagents to write multistep synthesis ofnatural products
CO-4	Read and correlate aspects of spectral data to structures
CO-5	Systematically analyze different types of spectra and determine structures of molecules

COURSE CODE:

COURSE NAME: Organic Chemistry Practical

After successful completion of this course, students will be able to:	
CO-1	Detect the type of each component in a ternary mixture (S-S-S, S-S-L, S-L-L and L-L-L) based upon differences in the physical and the chemical properties

CO-2	Separate ternary mixture of organic compounds using chemical methods and microscale techniques
CO-3	Purify the separated compounds (any one) and measure physical constants of all threecompounds.
CO-4	Identify the organic compounds(any one)

COURSE CODE:

COURSE NAME: Research Project

After successful completion of this course, students will be able to:	
CO-1	Select the research topics of interest and create a systematic research plan for a chosenresearch project.
CO-2	Develop skills in qualitative and quantitative analysis
CO-3	Demonstrate the ability to choose proper synthetic and analytical methods appropriateto research topic.
CO-4	Demonstrate good practices in research

COURSE CODE: PSCHOEC-I 304

COURSE NAME: CHEMISTRY PAPER IV (Biogenesis and green chemistry)

After successful completion of this course, students will be able to:	
CO-1	Explain some of the important pathways related to synthesis of biomolecules and naturalproducts
CO-2	Explain the principles of Green Chemistry and their importance in addressing environmental issues.
CO-3	Design and evaluate chemical processes that minimize the use of hazardous substancesand energy.
CO-4	Compare and evaluate the greenness of given synthesis.

COURSE CODE: PSCHOEC-I 304

COURSE NAME: Elective II - Biogenesis and green chemistry Practical

After successful completion of this course, students will be able to:	
CO-1	Use various spectroscopic techniques to elucidate the structure of organic compounds

SEMESTER IV

MSc. II (Organic Chemistry)

COURSE CODE: CHEM 647

COURSE NAME: CHEMISTRY PAPER I (Theoretical Organic Chemistry – II)

After successful completion of this course, students will be able to:	
CO-1	Describe the electronic impact of substituents on the rate and equilibrium of reaction
CO-2	Explain the different methods and types of chemical systems used in the assembly of complex molecules and to apply supramolecular chemistry in other areas of biology.
CO-3	Discuss the concepts of conformational analysis, racemisation and resolution.
CO-4	Predict the stereochemical outcome under the conditions of asymmetric synthesis and to apply asymmetric transformations in a logical manner for the synthesis of chiral molecules.

COURSE CODE: CHEM 648

COURSE NAME: CHEMISTRY PAPER II (Synthetic organic chemistry-II)

After successful completion of this course, students will be able to:	
CO-1	Explain the need for protecting groups in organic synthesis and select appropriate protecting and deprotecting strategies for functional groups such as hydroxyl, carbonyl, amino, and carboxyl groups.

CO-2	Apply the concept of umpolung and generate acyl anion equivalents using various methods
CO-3	Utilize the disconnection approach to identify synthons and synthetic equivalents, perform functional group interconversions (FGI), additions (FGA), and removals (FGR), and execute one- and two-group C-X disconnections for difunctionalized compounds.
CO-4	Develop skills in selectivity control during organic transformations, focusing on chemoselectivity, regioselectivity, stereoselectivity, and enantioselectivity.
CO-5	Formulate a general strategy for designing organic synthesis
CO-6	Demonstrate competence in performing one-group and two group C-C disconnections, incorporate acetylenes and aliphatic nitro compounds in their synthetic strategies and synthesize α, β-unsaturated compounds through appropriate synthetic methods.
CO-7	Explain the various terms in electroorganic chemistry and use electroorganic methods in the synthesis of organic compounds
CO-8	Identify the reactions shown by transition and rare earth metals and use them in different reactions and in synthesis of organic compounds.

COURSE CODE: CHEM 649

COURSE NAME: CHEMISTRY PAPER III (Natural products and heterocyclic chemistry)

After successful completion of this course, students will be able to:

CO-1	List structural features of steroids and outline the steps in their synthesis
CO-2	Classify, determine structure based on analytical evidence and write synthesis of vitamins, antibiotics, naturally occurring insecticides and terpenoids
CO-3	Classify and write names using different systems of nomenclature for monocyclic, bicyclic and tricyclic fused heterocycles.
CO-4	Explain structure and reactivity and write synthesis of different classes of heterocycles.

COURSE CODE: CHEM 65012

COURSE NAME: CHEMISTRY PAPER 4 (Intellectual Property Rights and Chemoinformatics)

After successful completion of this course, students will be able to:	
CO-1	Explain about Intellectual property & its types and importance of protecting IP.
CO-2	Use the knowledge of patents for their research which will be more patent oriented.
CO-3	Describe the knowledge of industrial design, copyright, trademarks and geographical indications
CO-4	Explain the scope, risk and legal aspects of trade secret protection
CO-5	Describe the role of judiciary and law of enforcement agencies in IP Infringement issue.

CO-6	Utilize the knowledge of the economic value of intellectual property in their future research.
CO-7	Describe different international agreements under World Trade organization and Paris convention WIPO AND TRIPS
CO-8	Explain the use and prospects of cheminformatics.
CO-9	Apply the knowledge of molecular modeling and structure elucidation to establish the structure