

POST GRADUATE & RESEARCH DEPARTMENT OF CHEMISTRY ST. JOSEPH'S COLLEGE, MOOLAMATTOM

Name of the courses offered by Department: M.Sc. Chemistry

Programme Outcomes

Domain Specific (PSO)

At the end of the PG programme in Chemistry the students will be able to: -

PO1: Solving Ability

Read, understand and interpret chemical information-verbal, mathematical, physical and graphical. The students are equipped to think critically by asking questions on the fundamental concepts in chemistry.

PO2: Scientific Temper and social development

To create men and women free from superstitions with scientific vigilance. Make the students socially responsible by giving awareness regarding the role of chemistry in social development. Making them actively participating in discussions about the destructive possibilities of science.

PO3. Research Culture

Acquire a foundation of chemistry of sufficient breadth and depth in research methodology.

PO4. Analysis Ability

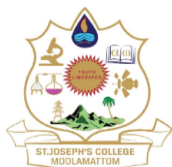
Perform experiments and interprets the results of observation. It will help the students to be efficiently participate in academic as well as industrial organizations.

PO5. Green Approach

To give the importance of green chemistry and educating them to utilize resources in a green method by limiting the use of organic solvents, hazardous chemicals etc.

Domain Independent Outcomes (PO)

PO6. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.



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PO7. Effective Communication

Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language and Communicate effectively on various activities with the community and with society at large, such as being able to comprehend and write effective reports and design documentation make effective presentations, and give and receive clear instructions.

PO8. Social Interaction:

Elicit views of others, mediate disagreements and help reach conclusions in group settings. and demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities.

PO9. Ethics

Understand and commit to professional ethics and responsibilities and norms of relevant to one's field of study, work and practice.

PO10. Environment and Sustainability

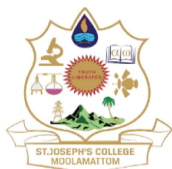
Understand the issues of environmental contexts and demonstrate knowledge of and need for sustainable development through mandatory environmental studies.

PO11 Effective Citizenship

Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering and awareness of human rights.

PO12. Self-directed and Life-long Learning

Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes



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Course Outcomes (CO)

SEMESTER 1

CH500101 Organometallics and Nuclear chemistry

At the end of the course on Organometallics and Nuclear Chemistry, the students will be able to:

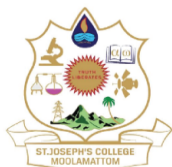
- CO1- Understand the structure, synthesis and reactions of commonly known.
- CO2- Generalize the important applications of organometallic compounds in catalysis.
- CO3- Compile the important aspects of organometallic polymers.
- CO4- Understand the functions and applications of bioorganic compounds.
- CO5 -Chart a basic idea about nuclear Chemistry and its applications.

CH500102 Structural and Molecular Organic chemistry

- CO1- Understand the basic concepts and mechanism in organic chemistry
- CO2- Compile the various kinetic and thermodynamic factors which control the organic reactions.
- CO3- Compare stereochemistry and various possible conformations of organic compound and how it affects the reaction outcome.
- CO4- Familiarize with the important photochemical reactions in Organic Chemistry.

CH500103 Quantum chemistry and Group Theory

- CO1- Understand the basic postulates of quantum mechanics.
- CO2- Enable to solve the simple quantum mechanical models such as Simple harmonic oscillator, particle in a 1D- box, rigid rotor, H atom etc.
- CO3- Compile the quantum mechanical aspect of angular momentum and spin.
- CO4- Enable the students to predict the point group of important molecules and to know how they are classified.
- CO5- Understand the idea of space groups and to learn the theory of molecular symmetry.
- CO6- Apply group theory to vibrational and electronic spectroscopy.



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CH500104 Thermodynamics, Kinetic Theory and Statistical Thermodynamics

- CO1- Understand the basic concepts in classical thermodynamics and to learn the thermodynamic aspects of various processes.
- CO2- Compile the different aspects of statistical thermodynamics and its applications.

SEMESTER 2

CH500201 Coordination chemistry

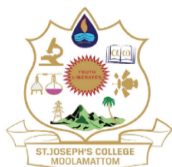
- CO1- Understand the structure and bonding of important coordination compounds.
- CO2- Compare the magnetic properties of complexes and to know how Magnetic moments can be employed for the interpretation of their structure.
- CO3- Generalize overview about the stereochemistry of coordination compounds.
- CO4- Understand the reaction mechanisms of metal complexes.
- CO5- Enable the students to elucidate the structure of metal complexes using various spectroscopic methods.
- CO6- Compare the basic coordination chemistry of Lanthanides and Actinides.

CH500202 Organic Reaction Mechanism

- CO1- Familiarize with the mechanism of organic reactions and different factors which affect the reaction rate.
- CO2- Understand the role of various reaction intermediates like carbanion, carbocation, carbenes, radicals etc. in organic reactions.
- CO3- Generalize the chemistry of carbonyl compounds.
- CO4- Compare the different types of concerted reactions in organic chemistry and orbital correlation approaches.

CH500203 Chemical Bonding and Computational chemistry

- CO1- Understand the requirement of approximation methods in quantum mechanics.
- CO2- Compile the knowledge to apply important approximation methods to problems in quantum mechanics.



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CO3- Compare valence bond theory molecular orbital theory and the concept of hybridization.

CO4- Generalize the applications of group theory in chemical bonding.

CO5- Constitute the emerging world of computational chemistry.

CO6- Understand basic idea about computational chemistry calculations.

CH5002C04 Molecular Spectroscopy

CO1- Understand the basic principle of different techniques employed in molecular spectroscopy.

CO2- Compile origin, instrumentation and important applications of Microwave, IR, Raman, UV, NMR, EPR and EQR techniques.

SEMESTERS 1 & 2 PRACTICAL

CH500205 Inorganic chemistry Practical-1

CO1- Compare separate less familiar ions such as Tl, W, Se, Mo, Ce, Th, Ti, Zr, V, U etc.

CO2- Estimate calorimetrically ions such as Fe, Cu, Ni, Mn, Cr etc.

CH500206 Organic chemistry Practical-1

CO1- Understand the separation and purification of an organic mixture by chemical/solvents separation methods.

CO2- Specify to draw the structure of compounds using Chemdraw software.

CH500207 Physical chemistry Practical-1

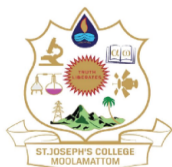
CO1- Compare important principles in physical chemistry and to Determine various physical properties.

CO2- Compile some simple computational chemistry calculations.

SEMESTER 3

CH500301 Structural Inorganic chemistry

CO1- Understand the structure and different properties of solids.



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CO2- Familiarize important aspects of inorganic chains, rings, cages and metal clusters.

CO3- Understand the chemistry and applications of materials such as glasses,

ceramics, composites, nanomaterials etc.

CH500302 Organic Syntheses

CO1- Compare various methods employed for reactions like oxidation, reduction,

carbocyclic and heterocyclic ring formation etc.

CO2- Generalize novel reactions and reagents in organic synthesis.

CO3- Specify the utility of protecting group strategy in organic synthesis.

CO4 Equip the students with the basic principles of retro syntheses, Biosynthesis and

biomimetic synthesis.

CH010303 Chemical Kinetics, Surface chemistry and Crystallography

CO1- Understand the different theories of reaction rates and factors affecting reaction rates .

CO2- Compile the idea about the different types of catalysis and their mechanisms.

CO3- Compare the chemistry of surfaces and different types of surface phenomena.

CO4- Generalize the various techniques employed for the characterization of surfaces.

CO5- Understand the general properties of colloids and macromolecules.

CO6- Create an idea about the important aspects of crystallography.

CH500304 Spectroscopic Methods in chemistry

CO1- Compare various spectroscopic methods used for the characterization

of organic compounds.

CO2- Enable the students to elucidate the structure of compounds by analyzing the Spectrum.

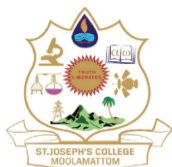
SEMESTER 4

ELECTIVE COURSES

CH800401 Advanced Inorganic chemistry

CO1- Understand the applicability of group theory in coordination chemistry.

CO2- Compile the utility of spectroscopic methods such as IR, Raman, EPR and Mossbauer



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techniques for the characterization of inorganic complexes.

CO3 Distinguish the photochemistry of inorganic compounds.

CO4- Familiarize the emerging field of nano chemistry, synthesis and characterization of nanomaterials and evolving interfaces of nanotechnology to the students.

CO5- Understand the acid –base concept in non-aqueous media and reactions in non-Aqueous media.

CH800402 Advanced Organic chemistry

CO1- Compare emerging branches in chemistry like supramolecular chemistry, nano chemistry, medicinal chemistry, polymer chemistry and its applications. To learn the principles of green chemistry and to know the various green protocols inorganic synthesis.

CO2- Generalize the important stereoselective transformations in organic synthesis.

CO3- Understand the basic aspects of natural product chemistry.

CO4- Synthesize research process and to gain the ability to apply various research methods and techniques.

CH800403 Advanced Physical chemistry

CO1- Compile the structure and properties of solid crystals and Liquid crystals.

CO2- Understand the characterization of crystals using X-Ray diffraction.

CO3- Familiarize the important aspects of gaseous state and electrochemistry.

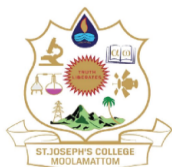
CO4- Compare the principle, instrumentation and applications of diffraction method, fluorescence spectroscopy, atomic spectroscopy and electro analytical techniques.

PRACTICAL- SEMESTERS 3 AND 4

CH010405 Inorganic chemistry practical-2

CO1-Enable the students to estimate the binary mixtures of metallic ions by volumetric and gravimetric methods.

CO2- Analyze some common alloys and ores.



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CH010406 Organic chemistry practical-2

CO1- Acquire skill to prepare organic compounds using greener protocols.

CO2- Enable the students to prepare organic compounds via two step synthetic sequences.

CO3- Understand enzyme/coenzyme catalyzed reactions.

CH010407 Physical chemistry practical-2

CO1- Compare the various physical properties using instrumental methods like polarimetry, refractometry etc.