# NAME OF THE DEPARTMENT: P.G. Department of Chemistry

**Programme Specific Outcomes (PSOs) and Course Outcomes (COs) of the Programmes offered by the University**

## PROGRAMME SPECIFIC OUT COMES (PSO)

The courses are designed in such a manner that the student feels an essence of studying the specialized courses of Chemistry in various semesters with a keen interest. The curriculum of Choice Based Credit System of M.Sc. program in Chemistry is designed to motivate Post Graduate students to achieve the following program specific outcomes:

1. To enable the students to modulate, simulate and validate the advanced concepts related to different branches of Chemistry.
2. To practice and solve numerical problems and also to understand the mechanism of advanced organic/inorganic reactions and various theories associated with the latest developments.
3. To develop communication and other skills for use in a wide range of industrial areas.
4. To give a practical training with the sophisticated instruments/equipments.
5. To create an awareness and the impact of chemistry on the environment, society and development outside the scientific community.
6. To inculcate the scientific temperament in the students and outside the scientific community.
7. To understand good laboratory practices and safety measures and to develop research oriented skills.

M.Sc. Chemistry inculcate in-depth knowledge regarding to core courses, laboratory courses, elective, and optional courses. These courses also provide deep insight regarding to different areas adopted in research.

After getting diverse knowledge in chemistry such as synthetic chemistry, material chemistry, solution chemistry, organometallic chemistry etc. students are absorbed at different levels in Higher education, School education, administrative services, as Scientists etc.

In M.Phil and Ph.D. course work, research methodology is also a part of it. Recently, a research Ethics course also introduced as per the current requirements.

Various scientists and academicians visit the department, deliver lectures giving opportunity to students and scholars to interact and broaden their horizons of thinking and innovating activity.

## Course Outcomes (COs)

| S.No. | Course No. | Course Title | Course Outcome (CO) |
|---|---|---|---|
| **Semester-I** | | | |
| 1. | PSCHTC101 | Inorganic Chemistry-I | This course will enable the students to learn the concept of group theory and its applications, stereochemistry and bonding, theories of bonding, metal-ligand equilibria as well as electronic spectra of transition metal complexes |
| 2. | PSCHTC102 | Quantum Chemistry | This course will help to understand the various aspects of quantum mechanics. In addition, the students will gather knowledge about angular momentum, approximation methods, chemical |



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| | | | bonding, HMO methods and its applications |
| 3. | PSCHTC103 | Organic Chemistry-I | This course is focussed on nature of bonding in organic molecules, stereochemistry, reaction mechanism, aliphatic nucleophilic substitution and free radical reactions |
| 4. | PSCHTC104 | Principles of Spectroscopy | By studying this course, the students are able to concentrate on physical aspects of various techniques of spectroscopy, namely, microwave, vibrational, Raman, NMR. Information about X-ray and neutron diffraction techniques will also be dealt |
| 5. | PSCHLC105 | Laboratory Course: Inorganic Chemistry | This course will help the students to learn how the rare analysis of metals is analyzed and simultaneously to separate and estimate the quantity of two metal ions in the given mixture |
| 6. | PSCHLC106 | Laboratory Course: Physical Chemistry | Error analysis and statistical analysis data will be analyzed by the students before proceeding to the actual performance of various experiments as mentioned in the following details |
| 7. | PSCHLC107 | Laboratory Course: Organic Chemistry | The organic synthesis of various compounds with characteristic functional groups will be carried out. IR spectra will be used to identify various functional groups |
| **Semester-II** | | | |
| 1. | PSCHTC201 | Inorganic Chemistry-II | By studying this course, the students will come to know the mechanism of reactions in inorganic complexes, magnetic properties of complexes and metal clusters framework of complexes |
| 2. | PSCHTC202 | Chemical Dynamics, Surface and Electro Chemistry | This course will help to understand chemical kinetics using various theories of bimolecular and unimolecular reactions. Polymer Chemistry, Micelles and Advanced Electrochemistry details will be imparted to the students. A brief idea of nano materials is also introduced |
| 3. | PSCHTC203 | Organic Chemistry-II | The contents of this course are focussed on electrophilic, nucleophilic substitution, addition, elimination reactions from their mechanistic point of view. Rearrangement and pericyclic reactions will also be dealt in this course |
| 4. | PSCHTC204 | Applications of Spectroscopy in Organic Chemistry | The course is designed from application point of view. The different spectroscopic techniques used in organic chemistry will be considered and number of examples will be put before the students to solve making use of different |



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| | | | spectroscopic techniques |
| 5. | PSCHLC205 | Laboratory Course: Inorganic Chemistry | This course will help the students in volumetric as also commercial analysis. The green methods of preparation of inorganic complexes along with spectrophotometric determination will be focused |
| 6. | PSCHLC206 | Laboratory Course: Physical Chemistry | The aim of this course is to develop the experimental skill to the students by taking instrumentation tools and also physical tools to evaluate the various properties of solutions |
| 7. | PSCHLC207 | Laboratory Course: Organic Chemistry | The students will be trained in synthesising the starting materials which may be of useful in the synthesis of more compounds. They will also get training as to how the two components can be separated from each other. The quantitative analysis will also form the part of the experimental course |
| **Semester-III** | | | |
| 1. | PSCHTE301 | Spectroscopy and Photochemistry in Inorganic Chemistry | This course is aimed to have an insight of various spectroscopic tools in analyzing the inorganic molecules/complexes. The ligand field photochemistry is also a part of the course |
| 2. | PSCHTE302 | Thermodynamics and Statistical Mechanics | This course will be useful in understanding the non-equilibrium thermodynamics, transport phenomenon, thermodynamics of mixtures, statistical mechanics / thermodynamics and their applications |
| 3. | PSCHTE303 | Bio-organic and Medicinal Chemistry | The aim of this course is to let the students understand enzymatic action, chemistry of vitamin B complex, coenzymes, drug design, design of drugs, synthesis of antibiotics, etc. |
| 4. | PSCHTE304 | Catalysis: Fundamentals and Chemical Concepts | The students will acquire the advance knowledge of heterogeneous/homogeneous catalysis, catalytic polymerization, electrocatalysis, photolysis and photocatalysis |
| 5. | PSCHTE305 | Advanced Photochemistry and Radiation Chemistry | On completion of this course, the students will gain knowledge about photochemistry and radiation chemistry and the related phenomenon associated with these concepts |
| 6. | PSCHTE306 | Chemistry of Inorganic Rings, Cages, Clusters and Nanomaterials | In this course, the students will acquire the knowledge of chemistry of some important materials and their applications |
| 7. | PSTMOOC320 | MOOC Course | It is an open choice course not for the students of chemistry but for the students from other streams. The course is designed in such a way that the students from different streams get a flavour of the things which surround them in |



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| | | | their day to day activities |
| 8. | PSCHLC308 | Laboratory Course: Inorganic Chemistry | This course aims to develop an understanding of quantitative as also qualitative analysis, separation of cations by paper chromatography. The students will also be trained to prepare and characterise the compounds using the available techniques |
| 9. | PSCHLC309 | Laboratory Course: Physical Chemistry | On successful completion of this course, the student should understand the concepts and conventions of rate of reaction, thermodynamics, pH and conductivity measurements |
| 10. | PSCHLC310 | Laboratory Course: Organic Chemistry | The objective of this course is to make the students to understand how the qualitative analysis is useful for identification of mixture or organic compounds. Some organic compounds are also to be analyzed using spectroscopic techniques |
| **Semester-IV** | | | |
| 1. | PSCHTE401 | Analytical Chemistry | This course is focused on various advanced analytical techniques and its applications |
| 2. | PSCHTE402 | Organotransition Metal Chemistry | This course will enable the students to learn the functions, structures and importance of organotransition metal compounds |
| 3. | PSCHTE403 | Bioinorganic and Supramolecular Chemistry | The focus of this course is to enable the students to learn about the bioinorganic and molecular recognition and design of molecules for the beneficial of society |
| 4. | PSCHTE404 | Solid State Chemistry | The students will have an understanding of general principles of solid state reactions, preparation, methods and crystal symmetry, defects/structure of solids and their electronic, ionic conduction and magnetic properties |
| 5. | PSCHTE405 | Polymer Chemistry | Basic aspects of polymer chemistry and their characterization, structure and properties of polymers, polymer processing and properties of commercial polymers are discussed in this course work |
| 6. | PSCHTE406 | Chemistry of Materials and Liquids | Students will acquaint knowledge about chemistry of materials like alloys, composites, glasses, ceramics, organic superconductors, fullerenes, etc. The properties of liquids along with the various theories of liquids also forms a part of discussion in this course |
| 7. | PSCHTE407 | Heterocyclic Chemistry and Asymmetric Synthesis | An exhaustive study of heterocyclic chemistry will be presented which will help the students to |



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| | | | grasp its chemistry. The non-enzymatic and enzymatic approaches will be discussed as far as asymmetric synthesis is concerned |
| 8. | PSCHTE408 | Organic Synthesis | On successful completion of this course, the students will gain knowledge about disconnection approach, retrosynthesis, transition metal catalysed organic synthesis as well as various oxidising agents used for the oxidation of organic compounds and application of reduction by borrowing hydrogen |
| 9. | PSCHTE409 | Chemistry of Natural Products and Molecular Rearrangements | This course is aimed to deliver the knowledge about the natural products like terpenoids, carotenoids, alkaloids, steroid, plant pigments and marine natural products |
| 10. | PSCHTO410 | Chemistry in Daily life | It is an open choice course not for the students of chemistry but for the students from other streams. The course is designed in such a way that the students from different streams get a flavour of the things in their day to day activities |
| 11. | PSCHLE411 | Laboratory Course: Inorganic Chemistry | Students will employ critical thinking and the scientific method to design, carry out, record and analyze the results of chemical experiments and get an awareness of the impact of chemistry on the environment, society, and other cultures outside the scientific community. There will also be a course based on review of literature on any modern scientific topic |
| 12. | PSCHLE412 | Laboratory Course: Physical Chemistry | Students will employ critical thinking and the scientific method to design, carry out, record and analyze the results of chemical experiments and get an awareness of the impact of chemistry on the environment, society, and other cultures outside the scientific community. There will also be a course based on review of literature on any modern scientific topic |
| 13 | PSCHLE413 | Laboratory Course: Organic Chemistry | Students will employ critical thinking and the scientific method to design, carry out, record and analyze the results of chemical experiments and get an awareness of the impact of chemistry on the environment, society, and other cultures outside the scientific community. There will also be a course based on review of literature on any modern scientific topic |

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