

(145-SCI-01-03) M.SC. - ORGANIC CHEMISTRY-DRUG DESIGN & SYNTHESIS

Significance of the Program

M.Sc. Organic Chemistry - Drug Design & Synthesis is aimed to give extensive training in the field of chemistry with emphasis on organic chemistry, drug design and synthesis to cater the needs of pharmaceutical industries, research organizations and academic institutions at national and international level. The programme emerges as an inspiration of knowledge and innovations and also stands at the intersection of organic chemistry and the critical field of drug design, offering students a unique opportunity to research into the realms of molecular synthesis, medicinal chemistry and pharmaceutical innovation. The program places a strong emphasis on equipping students with the skills and knowledge necessary for drug discovery. By exploring into the intricacies of organic chemistry, students gain a deep understanding of molecular structures, mechanisms and interactions. The program emphasis on modern techniques of rational drug design like Quantitative Structure Activity Relationship (QSAR), Docking, Combinatorial Chemistry and Computer Aided Drug Design (CADD). The subject also emphasizes on the chemistry, mechanism of action, metabolism, adverse effects, structure activity relationships (SAR), therapeutic uses and synthesis of important drugs.

Career Options

After completion of this programme students have abundant options and opportunities in various fields like:

- Government organizations like NSTL, DRDO, BARC, ISRO, ONGC, IOCL, NTPC and Forensic labs.
- Pharmaceutical industry as a research and development (R&D) and production scientist.
- Pharmaceutical industry as an analytical research and development (AR&D) scientist.
- Chemical industry as a quality control (QC) scientist.
- Chemical industry as a quality assurance (QA) scientist.
- Job opportunities in Chemical, Polymers, Agrochemical, Paints, Tyres Industries etc., as a chemical analyst.
- Lecturers and Professors in Colleges and Universities.
- Student have option to go for higher education like M.S, Ph.D. and PDF in aboard and national academic institutes.

- They have opportunities to get fellowship by qualifying CSIR (NET/JRF), GATE, TIFER and other competitive examinations national and international levels.

Programme Objectives:

1. To develop student's knowledge in scientific and chemical sciences and applying them in practical problems
2. To give skills in chemical education and its application in industrial level.
3. To develop students with scientific solutions for real life and become professional chemists with ethical and social responsibility serving the society.
4. Students will become successful leaders to handle all kind of problems in interdisciplinary and multidisciplinary environment.
5. To encourage the pursuit of lifelong education.
6. This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs.
7. The subject emphasis on modern techniques of rational drug design like Quantitative Structure Activity Relationship (QSAR), Prodrug concept, combinatorial chemistry and Computer Aided Drug Design (CADD).
8. The subject also emphasizes on the chemistry, mechanism of action, metabolism, adverse effects, Structure Activity Relationships (SAR), therapeutic uses and synthesis of important drugs

Outcomes of the Program:

The students who complete the M.Sc. Organic Chemistry-Drug Design & Synthesis course shall:

1. Apply knowledge of Organic Chemistry-Drug Design & Synthesis specializations to solution of complex scientific problems.
2. Have strong foundation in the fundamentals to Identify, formulate and analyze complex scientific problems and solutions using principles of chemistry.
3. Can apply knowledge of Chemistry to find solution of complex scientific problems.
4. Can think logically and analytically to solve the problem in the area of chemical sciences, pharmaceutical, medicines, etc.
5. Have the abilities to carry out chemical experiments, record and analyze the results and design advanced models.

6. Have the abilities to effectively communicate their knowledge and skills to other chemists and non-chemists in oral or written formats.
7. Can achieve high goals attaining suitable employment in the areas of pharmaceutical, polymers, fuels, teaching and research, etc.
8. Can go for higher education to achieve highest position in life.
9. Upon completion of the course student shall be able to Understand the importance of drug design and different techniques of drug design.
10. Understand the chemistry of drugs with respect to their biological activity.
11. Know the metabolism, adverse effects and therapeutic value of drugs.
12. Know the importance of SAR of drugs.

Major Course Outline

- Fundamental of Organic Spectroscopy
- Reaction Mechanisms of Metal Complexes & Organometallic Compounds.
- Organic Synthesis.
- Applications of Electrochemistry & Polymer Chemistry. Organic Reaction Mechanisms, Pericyclic Reactions & Photochemistry.
- Advanced Organic Spectroscopy & Principles of Instrumentation.
- Modern Methods Organic Synthesis for Pharmaceutical Industry.
- Chemistry of Natural Products.
- AI & ML in Drug Design and Synthesis.
- Medicinal Chemistry.