

CH-227 Pharmaceutical Chemistry

Credit Hours: 2-1

Pre-requisite: Nil

Course Objectives

1. This course aims to introduce students to the fundamental concepts of medicinal chemistry, including the distinction between drugs and medicines, and the processes of drug discovery, design, and development. Students will learn about drug action, pharmacokinetics, and pharmacodynamics, along with routes of administration and drug metabolism. The course also covers drug-receptor interactions, formulation principles, and the importance of quality control, safety, and Good Manufacturing Practices (GMP) in pharmaceutical production.

Course Contents

2. Introduction to medicinal chemistry. Drug and medicine: difference and customary use. Drug discovery and development. Rational drug design and synthesis. Physicochemical properties in relation to biological action and drug transport. Pharmacodynamics (drug action) and Pharmacokinetics. Modes and sites of drug action. Routes of drug administration, absorption, distribution, metabolism and excretion. Bioavailability, toxicity, safety and therapeutic index of drugs. Drug-receptor interactions. Drug formulations. Active ingredients and excipients. Quality control and assurance. Good Manufacturing Practices (GMP).

Course Outcomes

By the end of this course, the students will be able to:

3. Explain fundamental concepts in pharmaceutical chemistry, including drug design and synthesis, physico-chemical properties of drugs, and their interactions with biological systems.
4. Analyze the principles of drug action, absorption, distribution, metabolism, excretion and toxicity to understand drug efficacy and safety.

5. Design, develop and investigate pharmaceutical compounds, emphasizing quality control and assurance.

Relevant Experiments

1. Performance of weight-variation, friability, disintegration and dissolution tests on solid dosage forms. Assays (UV methods) of marketed drug molecules like ofloxacin, cetirizine dihydrochloride, esomeprazole magnesium, and pantoprazole sodium etc.

Recommended Books

1. Jain, K. & Yadav, A. K. (2025). *Advances in Pharmaceutical Product Development*. Springer Nature Singapore. ISBN: 978-9-81-979229-0.
2. Rosa, J. M. C. (2024). *Pharmaceutical Chemistry: Drug Design and Action* (2nd ed.). De Gruyter Textbook Series. ISBN: 978-3-11-131654-3.
3. Patrick, G. L. (2023). *An Introduction to Medicinal Chemistry* (7th ed.). Oxford University Press. ISBN: 978-0-19-886666-4.
4. Watson, D. J. (2011). *Pharmaceutical Chemistry* (1st ed.). Elsevier Health Sciences. ISBN: 978-0-443-07232-1.
5. Sriram, D. & Yogeewari, P. (2010). *Medicinal Chemistry* (2nd ed.). Dorling Kindersley (India) Pvt. Ltd. ISBN: 978-81-317-3144-4.
6. Hanson, J. R. (2019). *Chemistry and Medicine; An Introductory Text*. Royal Society of Chemistry, UK. ISBN: 978-0854046454.
7. Wilson, C. O. (2011). *Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry*. (12th ed.; J. M. Beale Jr., & J. H. Block, Eds.). Lippincott Williams & Wilkins, Philadelphia, USA. ISBN: 978-0-7817-7929-6.
8. Dharuman, J. (2024). *Chemistry of Synthetic Drugs*. (3rd ed.). AITBS Publishers and Distributors, New Delhi, India. ISBN: 978-8-17-473337-5.