# FIRST-YEAR OF MASTER OF SCIENCE CHEMISTRY REVISED SYLLABUS ACCORDING TO CBCS NEP2020

## COURSE TITLE: MEDICINAL, BIOGENESIS AND GREEN CHEMISTRY

SEMESTER-III

W.E.F. 2024-2025

**RECOMMENDED BY THE BOARD OF STUDIES IN CHEMISTRY**
**AND**
**APPROVED BY THE ACADEMIC COUNCIL**

Devrukh Shikshan Prasarak Mandal's
Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh.
Tal. Sangameshwar, Dist. Ratnagiri-415804, Maharashtra, India

Academic Council Item No:

| | | |
|---|---|---|
| Name of the Implementing Institute | : | Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh. Tal. Sangameshwar, Dist. Ratnagiri-415804, |
| Name of the Parent University | : | University of Mumbai |
| Name of the Programme | : | Master of Science |
| Name of the Department | : | Chemistry |
| Name of the Class | : | Second Year |
| Semester | : | Third |
| No. of Credits | : | 02 |
| Title of the Course | : | Medicinal and green chemistry |
| Course Code | : | S605CHT |
| Name of the Vertical in adherence to NEP 2020 | : | Elective |
| Eligibility for Admission | : | Chemistry Graduate learner seeking Admission to Post Graduate Programme in adherence to Rules and Regulations of the University of Mumbai and Government of Maharashtra |
| Passing Marks | : | 40% |
| Mode of Assessment | : | Formative and Summative |
| Level | : | PG |
| Pattern of Marks Distribution for SEE and CIA | : | 60:40 |
| Status | : | NEP-CBCS |
| To be implemented from Academic Year | : | 2024-2025 |
| Ordinances /Regulations (if any) | | |

## Syllabus for Second Year of Master of Science in Chemistry

**(With effect from the academic year 2024-2025)**

**SEMESTER-III** **Paper No.- V**

**Course Title: Medicinal and Green Chemistry** **No. of Credits: 02**

**Type of Vertical: Elective** **COURSE CODE: S605CHT**

**Learning Outcomes Based on BLOOM's Taxonomy:**

| After completing the course, the learner will be able to… | | |
|---|---|---|
| Course Learning Outcome No. | Blooms Taxonomy | Course Learning Outcome |
| CLO-01 | Remember | recall the terms used in medicinal and green chemistry. |
| CLO-02 | Understand | explain some basic pharmacokinetics, drug discovery without a lead. |
| CLO-03 | Apply | Express the types of nanocatalyst and traditional processes versus green processes in the syntheses |

## Syllabus for Second Year of Master of Science in Chemistry

**(With effect from the academic year 2024-2025)**

**SEMESTER-III** **Paper No.- V**

**Course Title: Medicinal and Green Chemistry** **No. of Credits: 02**

**Type of Vertical: Elective** **COURSE CODE: S605CHT**

| COURSE CONTENT | | | |
|---|---|---|---|
| **Module No.** | **Content** | **Credits** | **No. of Hours** |
| 1 | **UNIT-I: Drug discovery, design and development**<br>○ **Introduction, important terms used in medicinal chemistry:** Receptor, Therapeutic index, Bioavailability, Drug assay and Drug potency. General idea of factors affecting bioactivity: Resonance, inductive effect, Bioisosterism, spatial considerations.<br>○ **Basic pharmacokinetics:** Drug absorption, Distribution, Metabolism (biotransformation) and Elimination. Physical and chemical parameters like solubility, lipophilicity, ionization, pH, Redox potential, H-bonding, Partition coefficient and Isomerism in drug distribution and Drug-receptor binding.<br>○ **Procedures in drug design:** Drug discovery without a lead: Penicillin, Librium. Lead discovery: random screening, non-random (or targeted) screening. Lead modification: Identification of the pharmacophore, Functional group modification. Structure-activity relationship, Structure modification to increase potency and therapeutic index: Homologation, Chain branching, Ring-chain transformation, Bioisosterism, Combinatiorial synthesis (basic idea). | 01 | 15 |

| | | | |
|---|---|---|---|
| 2 | **Unit-IV: Green chemistry**<br>o Introduction, basic principles of green chemistry. Designing a green synthesis: Green starting materials, green reagents, green solvents and reaction conditions, green catalysts.<br>o Use of the following in green synthesis with suitable examples:<br>a) Green reagents: dimethylcarbonate, polymer supported reagents.<br>b) Green catalysts: Acid catalysts, oxidation catalysts, basic catalysts, phase transfer catalysts [Aliquat 336, benzyltrimethyl ammonium chloride (TMBA), Tetra-n-butyl ammonium chloride, crown ethers], biocatalysts.<br>c) Green solvents: water, ionic liquids, deep eutectic solvents, supercritical carbon dioxide.<br>d) Solid state reactions: solid phase synthesis, solid supported synthesis<br>e) Microwave assisted synthesis: reactions in water, reactions in organic solvents, solvent free reactions.<br>f) Ultrasound assisted reactions.<br>o Comparison of traditional processes versus green processes in the syntheses of ibuprofen, adipic acid, 4-aminodiphenylamine, p-bromotoluene and benzimidazole.<br>o Green Cataysts : Nanocatalyst, Types of nanoctalysts, Advantages and Disadvantages of Nanocatalysts, Idea of Magnetically separable nanocatalysts. | 01 | 15 |
| | **Total** | **02** | **30** |

**Access to the Course**

The course is available for all the students admitted for Second of Year Master of Science.

**Methods of Assessment**

The assessment pattern would be 60:40, 60% for Semester End Examination (SEE) and 40% for Continuous Internal Assessment (CIA). The structure of the SEE and CIA would be as recommended by the Board of Studies and approved by the Board of Examination and the Academic Council of the college.

**References:**


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3. Voet, D. and J. G. Voet (2004) Biochemistry, 3rd Edition, John Wiley & sons, Inc. USA.
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8. The organic chemistry of drug design and drug action, Richard B. Silverman, 2nd edition, Academic Press
9. Medicinal chemistry, D.Sriram and P. Yogeeswari, 2nd edition, Pearson
10. An introduction to drug design-S. S. Pandeya and J. R. Dimmock (New age international)
11. Burger's medicinal chemistry and drug discovery. by Manfred E. Wolf
12. Introduction to Medicinal chemistry. by Graham Patrick
13. Medicinal chemistry-William O. Foye
14. T. B. of Organic medicinal and pharmaceutical chemistry-Wilson and Gisvold's (Ed. Robert F. Dorge)
15. An introduction to medicinal chemistry-Graham L. Patrick, OUP Oxford, 2009.
16. Principles of medicinal chemistry (Vol. I and II)-S. S. Kadam, K. R. Mahadik and K.G. Bothara , Nirali prakashan.
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20. Enzyme catalysis in organic synthesis, 3rd edition. Edited by Karlheinz Drauz, Harold Groger, and Oliver May, Wiley-VCH Verlag GmbH & Co KgaA, 2012.
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22. Bioorganic, Bioinorganic and Supramolecular chemistry, P.S. Kalsi and J.P. Kalsi. New Age International Publishers.
23. The Organic Chemistry of Enzyme-Catalysed Reactions, Academic Press, By Richard B. Silverman.

24. Green Chemistry: An Introductory Text, 2nd Edition, Published by Royal Society of Chemistry, Authored by Mike Lancater.
25. Green chemistry, Theory and Practical, Paul T. Anastas and John C. Warner.
26. New trends in green chemistry By V. K. Ahulwalia and M. Kidwai, 2nd edition, Anamaya Publishers, New Delhi.
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