



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

COURSE TITLE: MEDICINAL CHEMISTRY AND BIOGENESIS
SEMESTER-IV
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	:	Four
No. of Credits	:	02
Title of the Course	:	Medicinal Chemistry and Biogenesis
Course Code	:	S614CHT
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-IV

Paper No.- V

Course Title: Medicinal Chemistry and Biogenesis

No. of Credits: 02

Type of Vertical: Elective

COURSE CODE: S614CHT

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	Study modern methods of drug design and primary and secondary metabolites and the building blocks, general pathway of amino acid biosynthesis.
CLO-02	Understand	Discuss concept of prodrugs and soft drugs, Acetate pathway, Shikimic Acid pathway, Mevalonate pathway.
CLO-03	Apply	Derive synthesis of drugs and biosynthesis of acids.

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SEMESTER-IV

Paper No.- V

Course Title: Medicinal Chemistry and Biogenesis

No. of Credits: 02

Type of Vertical: Elective

COURSE CODE: S614CHT

COURSE CONTENT			
Module No.	Content	Credits	No. of Hours
1	<p>Unit-I: Drug design, development and synthesis</p> <ul style="list-style-type: none"> ○ Introduction to quantitative structure activity relationship studies. QSAR parameters: - steric effects: The Taft and other equations; Methods used to correlate regression parameters with biological activity: Hansch analysis- A linear multiple regression analysis. ○ Introduction to modern methods of drug design and synthesis- computer-aided molecular graphics based drug design, drug design via enzyme inhibition (reversible and irreversible), bioinformatics and drug design. ○ Concept of prodrugs and soft drugs. (a) Prodrugs: Prodrug design, types of prodrugs, functional groups in prodrugs, advantages of prodrug use. (b) Soft drugs: concept and properties. ○ Synthesis and application of the following drugs: Fluoxetine, cetirizine, esomeprazole, fluconazole, zidovudine, methotrexate, diclofenac, labetalol, fenofibrate. 	01	15

2	<p>Unit-II: Biogenesis and biosynthesis of natural products</p> <ul style="list-style-type: none"> ○ Primary and secondary metabolites and the building blocks, general pathway of amino acid biosynthesis. ○ Acetate pathway: Biosynthesis of malonylCoA, saturated fatty acids, prostaglandins from arachidonic acid, aromatic polyketides. ○ Shikimic Acid pathway: Biosynthesis of shikimic acid, aromatic amino acids, cinnamic acid and its derivatives, lignin and lignans, benzoic acid and its derivatives, flavonoids and isoflavonoids. ○ Mevalonate pathway: Biosynthesis of mevalonic acid, monoterpenes – geranyl cation and its derivatives, sesquiterpenes – farnesyl cation and its derivatives and diterpenes. 	01	15
Total		02	30

Access to the Course

The course is available for all the students admitted for Second year of 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:

- 1) The organic chemistry of drug design and drug action, Richard B. Silverman, 2nd edition, Academic Press
 - 2) Medicinal chemistry, D.Sriram and P. Yogeewari, 2nd edition, Pearson
 - 3) An introduction to drug design-S. S. Pandeya and J. R. Dimmock (New age international)
 - 4) Burger's medicinal chemistry and drug discovery. by Manfred E. Wolf
 - 5) Introduction to Medicinal chemistry. by Graham Patrick
 - 6) Medicinal chemistry-William O. Foye
 - 7) T. B. of Organic medicinal and pharmaceutical chemistry-Wilson and Gisvold's (Ed. Robert F. Dorge)
 - 8) An introduction to medicinal chemistry-Graham L. Patrick, OUP Oxford, 2009.
 - 9) Principles of medicinal chemistry (Vol. I and II)-S. S. Kadam, K. R. Mahadik and K.G. Bothara, Nirali prakashan.
- Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce and Vid. Dadasaheb Pitre Science College, Devrukh (An Autonomous College Affiliated with University of Mumbai)*

- 10) Medicinal chemistry (Vol. I and II)-Burger
- 11) Strategies for organic drug synthesis and design - D. Lednicer Wiley
- 12) Pharmacological basis of therapeutics-Goodman and Gilman's (McGraw Hill)
- 13) Enzyme catalysis in organic synthesis, 3rd edition. Edited by Karlheinz Drauz, Harold Groger, and Oliver May, Wiley-VCH Verlag GmbH & Co KgaA, 2012.
- 14) Biochemistry, Dr U Satyanarayan and Dr U Chakrapani, Books and Allied (P) Ltd.
- 15) Bioorganic, Bioinorganic and Supramolecular chemistry, P.S. Kalsi and J.P. Kalsi. New Age International Publishers
- 16) The Organic Chemistry of Enzyme-Catalysed Reactions, Academic Press, By Richard B. Silverman
- 17) Enzymes: Practical Introduction to structure, mechanism and data analysis, By Robert A. Copeland, Wiley-VCH, Inc.
- 18) The Organic Chemistry of Biological Pathways By John McMurry, Tadhg Begley by Robert and company publishers
- 19) Bioorganic Chemistry- A practical approach to Enzyme action, H. Dugas and C. Penny. Springer Verlag, 1931
- 20) Biochemistry: The chemical reactions in living cells, by E. Metzler. Academic Press.
- 21) Concepts in biotechnology by D. Balasubramanian & others
- 22) Principals of biochemistry by Horton & others.
- 23) Bioorganic chemistry - A chemical approach to enzyme action by Herman Dugas and Christopher Penney.
- 24) Medicinal Natural Products: A Biosynthetic Approach by Paul M. Dewick. 3rd Edition, Wiley.
- 25) Natural product chemistry, A mechanistic, biosynthetic and ecological approach, Kurt B. G. Torssell, Apotekarsocieteten – Swedish pharmaceutical press.
- 26) Natural products Chemistry and applications, Sujata V Bhat, B.A. Nagasampagi and S. Meenakshi, Narosa Publishing House.
- 27) Natural Products Volume- 2, By O. P. Agarwal.
- 28) Chemistry of Natural Products, F. F. Bentley and F. R. Dollish, 1974.
- 29) Natural Product Chemistry Vol.1 and 2, K. Nakanishi J. Goto. S.Ito Majori and S. Nozoo, Academic Press, 1974.
- 30) Chemistry of natural products, V.K. Ahluwalia, Vishal Publishing Co.