COURSE MODULE

Program Title	M. Pharmacy
Department	Pharmaceutical Chemistry
Course Title	Advanced Medicinal Chemistry (MPC 103T)

1. **NAME OF INSTITUTION** : Y. B. Chavan College Of Pharmacy, Aurangabad

2. **AFFILIATED UNIVERSITY** : Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

3. **DEPARTMENT** : Pharmaceutical Chemistry
4. **PROGRAM TITLE** : M. Pharm.

4.1. Program Specific Outcome:

After completing the program, the student will be able to:

PSO-1: Highlight advancements in knowledge associated with medicinal chemistry, Natural products chemistry, drug discovery, drug design and analytical techniques.
PSO-2: Independently carry out the design of bioactive molecules and synthetic research work.
PSO-3: Interpret the spectra of synthetic compounds, natural products and determine their structures.
PSO-4: Build professional, computational, analytical and critical thinking skills
PSO-5: Explain unit operation and unit reactions in process chemistry

5. COURSE SPECIFICATION :

5.1.Course Identification and General Information

a. Course Title:	**Advanced Medicinal Chemistry**	
b. Course Number/Code	**MPC 103T**	
c. Credit Hours	Theory	Practical
	04	NA
d. Study level/semester at which this course is offered	Sem I	
e. Pre-requisite	Knowledge of Medicinal Chemistry subjects taught at B. Pharm level	
f. Co-requisite	Stereochemistry and mode of action, SAR, Rational design, Peptidomimetics	
g. Program in which the course is offered	M Pharm	
h. Language of teaching the course	English	
i. Prepared by	Dr. Santosh n Mokale	
j. Approved by HOD	Dr. K.G Baheti	

5.2.Course Description:

The subject is designed to impart knowledge about recent advances in the field of medicinal chemistry at the molecular level including different techniques for the rational drug design.

5.3.Course Objectives:

- Different stages of drug discovery
- Role of medicinal chemistry in drug research
- Different techniques for drug discovery

- Various strategies to design and develop new drug like molecules for biological targets
- Peptidomimetics

6.0.Course Outcomes (COs) : (Min. 4 and Max. 6)

(Use Bloom's Taxonomy words)

CO Code	Course outcome
CO 103.01	Describe Stages of drug discovery and Biological drug targets
CO 103.02	Demonstrate Prodrug Design and Analog design
CO 103.03	Relate Systematic study, SAR, Mechanism of action and synthesis of New generation molecules
CO 103.04	Explain detailed concepts of Rational Design of Enzyme Inhibitors.
CO 103.05	Elaborate Therapeutic values of Peptidomimetics and design of Peptidomimetics.

6.1. Knowledge and Understanding

(Alignment of PSOs to COs)

Course Code	Program Specific Outcome				
	PSO-1	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**
CO 103.01	H	H	L	H	-
CO 103.02	H	H	L	M	-
CO 103.03	H	H	M	H	L
CO 103.04	H	H	-	H	-
CO 103.05	H	M	L	L	-

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low); 2: Moderate (Medium);

3: Substantial (High); If there is no correlation, put '-'

6.2.Teaching and Assessment Methods for achieving learning outcome:

Teaching Strategies(methods)/Tools used	Methods of Assessment
Lectures (Constructivist learning) Collaborative learning (Discussion) Project based Learning Blended learning Inquiry based learning Flash cards Video Equipment models	Formative Assessment Case study Class test Multiple choice questions Assignments Seminar Viva Voce Synopsis Tutorials Summative Assessment

6.3.Tools for the Teaching and learning

Theory subjects	Practical Subjects
• PowerPoints presentation • Videos • Flash Card • Models • Software • Charts • Smart Boards • White boards • Online Platform	• White boards • Glassware • Chemicals • Instruments • Equipment • Software • Models • Plants/Crude Drugs

6.4.COURSE CONTENT

6.1. Theoretical Aspect:

Order	Topic list/units	Subtopics list	Number of Weeks	Contact Hours
1	**Unit I**	Drug discovery: Stages of drug discovery, lead discovery; identification, validation and diversity of drug targets. Biological drug targets: Receptors, types, binding and activation, theories of drug receptor interaction, drug receptor interactions, agonists vs antagonists, artificial enzymes.	**03**	**12**
2	**Unit II**	Prodrug Design and Analog design: a) Prodrug design: Basic concept, Carrier linked prodrugs/ Bioprecursors, Prodrugs of functional group, Prodrugs to improve patient acceptability, Drug solubility, Drug absorption and distribution, site specific drug delivery and sustained drug action. Rationale of prodrug design and practical consideration of prodrug design. b) Combating drug resistance: Causes for drug resistance, strategies to combat drug resistance in antibiotics and anticancer therapy, Genetic principles of drug resistance. c) Analog Design: Introduction, Classical & Non classical, Bioisosteric replacement strategies, rigid analogs, alteration of chain branching, changes in ring size, ring position isomers, design of stereo isomers and geometric isomers, fragments of a lead molecule, variation in inter atomic distance.	**03**	**12**
3	**Unit III**	Systematic study, SAR, Mechanism of action and synthesis of new generation molecules of	**03**	**12**

		following class of drugs: a) Anti-hypertensive drugs, Psychoactive drugs, Anticonvulsant drugs, H1 & H2 receptor antagonist, COX1 & COX2 inhibitors, Adrenergic & Cholinergic agents, Antineoplastic and Antiviral agents. b) Stereochemistry and Drug action: Realization that stereo selectivity is a pre-requisite for evolution. Role of chirality in selective and specific therapeutic agents. Case studies, Enantio selectivity in drug adsorption, metabolism, distribution and elimination.		
4	**Unit IV**	Rational Design of Enzyme Inhibitors Enzyme kinetics & Principles of Enzyme inhibitors, Enzyme inhibitors in medicine, Enzyme inhibitors in basic research, rational design of non-covalently and covalently binding enzyme inhibitors.	**03**	**12**
5	**Unit V**	Peptidomimetics Therapeutic values of Peptidomimetics, design of peptidomimetics by manipulation of the amino acids, modification of the peptide backbone, incorporating conformational constraints locally or globally. Chemistry of prostaglandins, leukotrienes and thromboxones.	**03**	**12**
	TOTAL		**15**	**60**

6.2.Practical Aspects –

Order	Name of Experiment	Number of weeks
01	Simultaneous Estimation of Multicomponent containing formulation by UV Spectrophotometry	01
02	**Flash Column Chromatography** method to purify individual chemical compounds from mixtures of compounds	01
03	High Performance Liquid Chromatography (HPLC) Analysis of prasugrel hydrochloride and Aspirin in bulk and pharmaceutical formulation	01
04	Estimation of Quinine sulphate by Fluorimetry	01
05	Estimation of Sodium/Potassium Concentration by Flame Photometry	01
06	Estimation of DNA and RNA by UV-Spectrophotometry	01
07	To study the various sections of Material Safety Data Sheet (MSDS)	01
08	To synthesis the Dibenzyl acetone using Claisen Schmidt reaction and perform the TLC of the product	01

09	To synthesis the Benzyllic acid using benzylic acid rearrangement and perform the TLC of the product	01
10	To synthesis anthranilic acid from phthalimide and perform TLC of the product	01
11	To synthesize sulphanilamide from acetanilide and perform TLC of the product	01
12	To estimate the amount of amide in the given sample	01
13	To synthesize N-Benzylidine benzylamine and perform TLC of the product	01
14	Purification of ethanol by simple distillation method	01
15	To synthesis Benzil from benzoin	01
16	To synthesis phenytoin from benzil and urea.	01

6.3.

7.0. ASSESSMENT MECHANISM:

Sr. No.	Assessment Mechanism	Week due	Marks	Proportion of Final Assessment
1	Continuous Assessment (Theory)	2nd week of every month	10	4%
2	Sessional (Internal Theory exam)	As per schedule of examination	15	6%
3	Continuous Practical Assessment (Sessional Practical exam)	Weekly during practical	20	8%
4	Sessional (Internal Practical exam)	As per schedule of examination	30	12%
5	Final exam (theory)	As per University at end of course	75	30%
6	Final exam(practical)		100	40%
Total			150	**100%**

8.0.STUDENT SUPPORT:

Office hours/week	Other procedures
Two hours minimum	**santoshmokale@rediffmail.com**

9.0.TEACHER'S AVAILABILITY FOR STUDENT SUPPORT:

Days	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Time	**1:00-2:00**	**1:00-2:00**	**1:00-2:00**	**1:00-2:00**	**1:00-2:00**	**1:00-2:00**

10.0. LEARNING RESOURCES:

SN	Learning Material	Details
1	Text books	1. Medicinal Chemistry by Burger, Vol I –VI. 2. Wilson and Gisvold's Text book of Organic Medicinal and Pharmaceutical Chemistry, 12th Edition, Lppincott Williams & Wilkins, Woltess Kluwer (India) Pvt.Ltd, New Delhi. 3. Comprehensive Medicinal Chemistry–Corwin& Hansch. 4. Computational and structural approaches to drug design edited by Robert M Stroud and Janet. F Moore
2	Reference material	Text books in college library
3	E-materials and websites	You tube videos, e-books, slide share

11.0. FACILITIES REQUIRED:

Sr.No.	Particular of Facility Required
1	Lecture Rooms (capacity for 60 students)
2	Laboratory (capacity for 20 students)
3	Computing resources: PC with latest version and hardware/software and utilization of open source and licensed application software
4	Other resources: Laboratory tools, Chemicals, Glass ware, Apparatus, Instrumentation

12.0. COURSE IMPROVEMENT PROCESSES:

12.1. Strategies for obtaining student feedback on effectiveness of teaching:

Course delivery evaluation by students using: Questionnaire forms and onlinequestionnaires

12.2. Other strategies for evaluation of teaching by the instructor or by the department: Periodic review by Academic Planning & Monitoring Committee and departmental review committee, Observations and assistance of colleagues, External assessments by advisors/ examiners and auditors.

12.3. Process for improvement of teaching:

Use of ICT tools, teaching aids, Simultaneous practical orientation and theory classes (SPOT), Adoption of reflective teaching.

12.4. Describe the planning procedures for periodically reviewing of course effectiveness and planning for improvement:

Periodic review by departmental meeting, Review of course delivery and outcome through assessment and feedback from all stake holders.

12.5. Course development plans:

Provide inputs for course improvement and update to University Course development Committees (Board of Studies)

13.0. INFORMATION ABOUT FACULTY MEMBER OF THE COURSE:

Name	**Dr Santosh n Mokale**
Location	Department of Pharmaceutical Chemistry
Contact Detail (e-mail &cell no.)	santoshmokale@rediffmail.com, 9890409325
Office Hours	10:00 AM to 5:00 PM