Dr. Rafiq Zakaria Campus
Maulana Azad Educational Trust
Y.B. Chavan College of Pharmacy
An ISO 9001:2008 Certified Institute
(B. Pharm., M. Pharm & Research Center)

COURSE MODULE

Program Title	B. Pharmacy
Department	Pharmacology
Course Title	Pharmacology-I

1. **NAME OF INSTITUTION** : Y. B. CHAVAN COLLEGE OF PHARMACY, AURANGABAD

2. **AFFILIATED UNIVERSITY** : DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

3. **DEPARTMENT** : PHARMACOLOGY

4. **PROGRAM TITLE** : B. PHARM.

4.1. Program Outcomes (PO):

PO 01: Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

PO 02: Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.

PO 03: Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

PO 04: Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

PO 05: Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well being.

PO 06: Professional Identity: Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).

PO 07: Pharmaceutical Ethics: Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

PO 08: Communication: Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.

PO 09: The Pharmacist and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

PO 10: Environment and sustainability: Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 11: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

5. COURSE SPECIFICATION :

5.1.Course Identification and General Information

a. Course Title:	**Pharmacology-I**		
b. Course Number/Code	**B. Pharm (BP 404 T and BP 408 P)**		
c. Credit Hours	**Theory**	**Practical**	**Total**
	45(3h/wk)	**60 (4h/wk)**	**105 (07h/wk)**
d. Study level/semester at which this course is offered	**IV semester B. Pharm**		
e. Pre-requisite	**Core concepts of Pathophysiology and Human Anatomy & Physiology**		
f. Co-requisite	**N/A**		
g. Language of teaching the course	**English**		
h. Prepared by	**Dr. Khan Dureshahwar**		
i. Approved by	**Dr. Syed Ayaz Ali**		

5.2.Course Description:

The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics. The subject covers the information about the drugs like mechanism of action, physiological and biochemical effects (pharmacodynamics) as well as absorption, distribution, metabolism and excretion (pharmacokinetics) along with the adverse effects, clinical uses, interactions, doses, contraindications and routes of administration of different classes of drugs.

5.3. Course Objectives:

Upon completion of this course the student should be able to

- Understand the pharmacological actions of different categories of drugs
- Explain the mechanism of drug action at organ system/sub cellular/macromolecular levels
- Apply the basic pharmacological knowledge in the prevention and treatment of various diseases
- Observe the effect of drugs on animals by simulated experiments
- Appreciate correlation of pharmacology with other bio medical sciences.

5.4. Course Outcomes (CO): (around 5 to 8)

(e.g. CO101.1 (CO - course code, 101 subject code as per syllabus, & .1 is first CO)

Code	Course outcome
CO 404.01	**Describe the basic scientific concepts and principles of pharmacology & pharmacokinetics.**
CO 404.02	**Relate with pharmacodynamics, mechanism of action, adverse drug reactions, drug interactions, drug discovery & clinical evaluation of new drugs.**
CO 404.03	**Choose and plan the applications, mechanism of action, adverse drug reactions, drug interactions of drugs affecting Peripheral Nervous System**
CO 404.04	**Demonstrate and find the applications, mechanism of action, adverse drug reactions, drug interactions of drugs affecting Central Nervous System**
CO 404.05	**Explain the pharmacological and psychological effects of drugs acting n CNS, opioid analgesics & antagonists, drug addiction, drug abuse, tolerance and dependence.**

5.4.1 Alignment of PO to CO: (PO: Program Outcome; CO: Course Outcome)

Course code (CO)	Program Outcome (PO)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO 404.01	**H**	**-**	**-**	**-**	**-**	**H**	**-**	**-**	**H**	**-**	**H**
CO 404.02	**H**	**M**	**-**	**H**	**-**	**H**	**M**	**-**	**H**	**H**	**H**
CO 404.03	**H**	**-**	**S**	**-**	**-**	**H**	**-**	**-**	**H**	**-**	**H**
CO 404.04	**H**	**-**	**S**	**-**	**-**	**H**	**-**	**-**	**H**	**-**	**H**
CO 404.05	**H**	**-**	**S**	**-**	**-**	**H**	**-**	**-**	**H**	**-**	**H**

Correlation levels H, M or S as defined below:
H: High; M: Moderate (Medium); S: Slight (Low); If there is no correlation, put '-'

5.4.2 Teaching and Assessment Methods for achieving learning outcome:

Teaching Strategies /methods used	Methods of Assessment
Conventional Method **Digital Method (PPT, AVs, Animations)**	**Question-Answer Sessions, Class Test**

6. COURSE CONTENT:

6.1. Theoretical Aspect:

Order	Topic list/units	Subtopics list	Number of Weeks	Contact Hours
1	**General Pharmacology**	a. Introduction to Pharmacology- Definition, historical landmarks and scope f pharmacology, nature and source of drugs, essential drugs concept and routes of drug administration, Agonists, antagonists, spare receptors, addiction, tolerance, dependence, tachyphylaxis, idiosyncrasy, allergy. b. Pharmacokinetics-Membrane transport, Absorption, Distribution, Metabolism and Excretion of drugs. Enzyme induction, enzyme inhibition, kinetics of elimination.	03	08
2	**General Pharmacology**	a. Pharmacodynamics-Mechanism of drug action, Receptors, classification and drug receptors interaction, signal transduction mechanisms, G-protein-coupled receptors, ion channel receptor, transmembrane enzyme linked receptors, transmembrane JAK-STAT binding receptor and receptors that regulate transcription factors, dose response relationship, therapeutic index, combined effects of drugs and factors modifying drug action. b. Adverse drug reactions. c. Drug interactions. d. Drug discovery and clinical evaluation of new drugs- Drug discovery phase, preclinical evaluation phase, clinical trial phase, phases of clinical trials and pharmacovigilance.	04	12
3	Pharmacology of drugs acting on peripheral nervous system	a. Organization and functions of ANS. b. Neurohumoral transmission, co-transmission and classification of neurotransmitters. c.Parasympathomimetics, Parasympatholytics, Sympathomimetics, Sympatholytics. d. Neuromuscular blocking agents and skeletal muscle relaxants (peripheral). e. Local anesthetic agents. f. Drugs used in Myasthenia Gravis and glaucoma.	03	10
4	Pharmacology of	a. Neurohumoral transmission in the	03	08

	drugs acting on central nervous system	C.N.S with special emphasis on importance of various neurotransmitters like with GABA, Glutamate, Glycine, serotonin, dopamine. b. General anesthetics and pre-anesthetics. c. Sedatives, hypnotics and centrally acting muscle relaxants. d. Antiepileptics e. Alcohols and disulfiram.		
5	Pharmacology of drugs acting on central nervous system	a. Psychopharmacological agents: Antipsychotics, antidepressants, antianxiety agents, anti-manics and hallucinogens. b. Drugs used in Parkinsons disease and Alzheimer's disease. c. CNS stimulants and nootropics. d. opioid analgesics and antagonists. e. Drug addiction, drug abuse, tolerance and dependence.	03	07

6.2. Practical Aspect (If Any):

Order	Tasks/Experiments	Number of Weeks	Contact Hours
1	Introduction to experimental pharmacology.	01	4h/wk
2	Commonly used instruments in experimental pharmacology.	01	4h/wk
3	Study of common laboratory animals.	01	4h/wk
4	Maintenance of laboratory animals as per CPCSEA guidelines.	01	4h/wk
5	Common laboratory techniques. Blood withdrawal, serum and plasma separation, anesthetics and euthanasia used for animal studies.	01	4h/wk
6	Study of different routes of drugs administration in mice/rats.	01	4h/wk
7	Study of effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice.	01	4h/wk
8	Effect of drugs on ciliary motility of frog esophagus.	01	4h/wk
9	Effect of drugs on rabbit eye.	01	4h/wk
10	Effects of skeletal muscle relaxants using Rota-rod apparatus.	01	4h/wk
11	Effect of drugs on locomotor activity using actophotometer.	01	4h/wk
12	Anticonvulsant effect of drugs by MES and PTZ method.	01	4h/wk
13	Study of stereotype and anti-catatonic activity of drugs on rats/mice.	01	4h/wk
14	Study of anxiolytic activity of drugs using rats/mice.	01	4h/wk
15	Study of local anesthetics by different methods.	01	4h/wk

6.3. Assignments/Tutorials:

7. SCHEDULE OF ASSESSMENT TASKS DURING THE SEMESTER:

Sr. No.	Assessment Method	Week due	Marks	Proportion of Final Assessment
1	Assignments, Exercises & Home works CAM	Every two week	10	6.666%
2	Sessional (Internal Theory exam)	After every four weeks and 15 days	15	10%
3	Continuous Practical Assessment (Sessional Practical exam)	Weekly during practical	15	10%
4	Final exam (theory)	As per University at end of course	75	50%
5	Final exam(practical)		35	23.33%
Total			150	100%

8. STUDENT SUPPORT:

Office hours/week	Other procedures
Two hours minimum	**dureshahwar_31@yahoo.com**, **khan_dureshahwar@ybccpa.ac.in**

9. TEACHER'S AVAILABILITY FOR STUDENT SUPPORT:

Days	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Time	**10.00 – 11.00 am**	**10.00 – 11.00 am**	**10.00 – 11.00 am**	**10.00 – 11.00 am**	**11.00 am – 12.00 pm**	**11.00 am – 1.00 pm**
Time	4.00 – 5.00 pm	4.00 – 5.00 pm	----	2.00 – 5.00 pm	4.00 – 5.00 pm	----

10. LEARNING RESOURCES:

Sr. No.	Title of Learning Material	Details
1	Text books	Barar F.S.K., Essentials Of Pharmacotherapeutics, S.Chand & Co.Pvt.Ltd.,
2	Essential references (as per syllabus)	Rang. M.P., Dale M.M., Riter J. M. /4thed, Pharmacology, Churchill, Livingstone
3	Reference material	Text books in college library
4	E-materials and websites	You tube videos
5	Other learning material	Handwritten notes

11. FACILITIES REQUIRED:

Sr. No.	Particular of Facility Required
1	Lecture Rooms (capacity for 60 students)
2	Laboratory (capacity for 20 students)
3	Computing resources: P-IV-PCs with recent hardware/ utilization of open source and licensed application software
4	Other resources: Appropriate laboratory tools, Chemicals, Glass ware, Apparatus,

	Instrumentation

12. COURSE IMPROVEMENT PROCESSES:

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

Course delivery evaluation by students using: Questionnaire forms and online questionnaires

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 review committee, 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. INFORMATION ABOUT FACULTY MEMBER RESPONSIBLE FOR THE COURSE:

Name	**Dr. Khan Dureshahwar (KDR)**
Location	Department of Pharmacology
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Office Hours	10:00 AM to 5:00 PM