Gyanmanjari
Innovative University

Subject: Pharmacology-I (BPHBP14317)

Type of course: Major

Prerequisite: NA

Rationale: 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.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	Theory Marks		Practical Marks		CA	
				ESE	MSE	V	P	ALA	
3	1	4	6	75	25	10	25	15	150

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Chapter No.	Course content	Hrs	% Weightage
1.	**General Pharmacology**: a. Introduction to Pharmacology- Definition, historical landmarks and scope of pharmacology, nature and source of drugs, essential drugs concept and routes of drug administration, Agonists, antagonists(competitive and noncompetitive), spare receptors, addiction, tolerance, dependence, tachyphylaxis, idiosyncrasy, allergy. b. Pharmacokinetics- Membrane transport, absorption, distribution,	8	18

	metabolism and excretion of drugs .Enzyme induction, enzyme inhibition, kinetics of elimination		
2.	**General Pharmacology**: a. Pharmacodynamics- Principles and mechanisms of drug action. Receptor theories and classification of receptors, regulation of receptors. drug receptors interactions 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 (pharmacokinetic and pharmacodynamic) d. Drug discovery and clinical evaluation of new drugs -Drug discovery phase, preclinical evaluation phase, clinical trial phase, phases of clinical trials and pharmacovigilance.	12	26
3.	**Pharmacology of drugs acting on peripheral nervous system** a. Organization and function 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	10	22
4.	**Pharmacology of drugs acting on central nervous system** a. Neurohumoral transmission in the C.N.S.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. Anti-epileptics e. Alcohols and disulfiram	8	18
5.	**Pharmacology of drugs acting on central nervous system** a. Psychopharmacological agents: Antipsychotics, antidepressants, anti-anxiety 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	7	16

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1.	**Poster Presentation:** Faculty will assign students to make a poster on various receptors and pharmacokinetic property of class of drug and students have to write and upload on GMIU web portal.	10
2.	**Creating a mechanistic pathway of drug with compliance of receptor.** Faculty will assign students to create model of receptors or draw the recent pathways theory for various treatments and same should be upload on GMIU web portal.	05
	Total	15

Suggested Specification table with Marks (Theory):75

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	45 %	25%	05%	05%	-

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:	
CO1	Understand the pharmacological actions of different categories of drugs
CO2	Explain the mechanism of drug action at organ system/sub cellular/ macromolecular levels
CO3	Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
CO4	Observe the effect of drugs on animals by simulated experiments
CO5	Recognize the interconnections between pharmacology and other biomedical sciences

List of Practical

Sr. No	Descriptions	Hrs
1.	Introduction to experimental pharmacology.	4
2.	Commonly used instruments in experimental pharmacology.	4
3.	Study of common laboratory animals	4
4.	Maintenance of laboratory animals as per CPCSEA guidelines	4
5.	Common laboratory techniques. Blood withdrawal, serum and plasma separation, anesthetics and euthanasia used for animal studies.	4
6.	Study of different routes of drugs administration in mice/rats	4
7.	Study of effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice.	4
8.	Effect of drugs on ciliary motility of frog oesophagus	4
9.	Effect of drugs on rabbit eye.	
10.	Effects of skeletal muscle relaxants using rota-rod apparatus.	4
11.	Effect of drugs on locomotor activity using actophotometer	4
12.	Anticonvulsant effect of drugs by MES and PTZ method.	4
13.	Study of stereotype and anti-catatonic activity of drugs on rats/mice	4
14.	Study of anxiolytic activity of drugs using rats/mice	4
15.	Study of local anesthetics by different methods	4
Note: All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos		
	Total	60

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

[1] Clinical pharmacy and therapeutics. Roger Walker and Cate Whittlesea.

[2] Satoskar, R.S. and Bhadarkar, S.D. Pharmacology and pharmacotherapeutics.

[3] Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology,.Churchil Livingstone Elsevier

[2] Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill

[3] Goodman and Gilman's, The Pharmacological Basis of Therapeutics

[4] Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams &Wilkins

[5] Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews PharmacologyPhysical Pharmaceutics by Ramasamy C, and Manavalan R.

[6] K.D.Tripathi. Essentials of Medical Pharmacology, JAYPEE Brothers Medical Publishers (P) Ltd, New Delhi.

[7] Sharma H. L., Sharma K. K., Principles of Pharmacology, Paras medical publisher

[8] Modern Pharmacology with clinical Applications, by Charles R.Craig& Robert,

[9] Ghosh MN. Fundamentals of Experimental Pharmacology. Hilton & Company, Kolkata.

[10] Kulkarni SK. Handbook of experimental pharmacology. VallabhPrakashan

[11] G. Parathsarthee, K. Nyfort-Hansen and M. C. Nahata. A textbook of clinical pharmacy practice.