

PHARMACOLOGY

GUIDE BOOK

**ACADEMIC YEAR:
2022-23**

**PROF. DR SAMIA
PERWAIZ KHAN**

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1. VISION STATEMENT:

To become an internationally recognized university that contributes towards development of nation through excellence in education and research.

2. MISSION STATEMENT

To produce medical professionals who are humane, ethical and competent physicians and researchers by ensuring excellence in medical education, applied research and practices, in a collegiate environment supported through national and international linkages, to improve the health of community and society.

3. VALUES

- Equity
- Quality
- Compassionate behaviour
- Social accountability
- Social justice
- Humanistic approach
- Leadership
- Innovation
- Integrity
- Collaboration

4. OUTCOME OF THE BDS PROGRAM:

The BDS programs aims to produce Dental graduates who are able to:

- Recognize signs and symptoms of common illnesses in population of different ages from different settings, and provide cost effective treatment to alleviate suffering
- Recognize signs and symptoms of chronic and acute illnesses, and refer to appropriate health care provider for appropriate management
- Obtain accurate medical history that covers essential aspects of history that relates to individual's health

- Conduct a complete and focused physical examination in adults and children in a respectful and logical manner
- Communicate effectively with patients, relatives, attendants to gather accurate information that will lead to appropriate diagnosis and treatment
- Develop insight, imagination and curiosity, define one's unique self, one's values and one's place in the world, while incorporating the qualities of a good physician.
- Answer complex questions facing physicians, including the role they should play in society, politics, and promotion of social justice.
- Display enlightenment and moral values to prepare themselves for life and work in a problematic, changing and diverse world.
- Be responsible leaders for their own good of their family, community and country.
- Be humane and socially equipped individuals, in tune with rights of patients and vulnerable groups
- Develop moral reasoning for ethical dilemmas
- Be experts of critical situational analysis
- Believe in diversity and medicine in practice
- Display effective communication
- Be able to address population health system issues on the basis of demography, by statistics, epidemiology and cultural nuances.
- Demonstrate team work with colleagues, health care team in both college and health care settings
- Perform procedures and skills in accordance with established protocols and standards
- Counsel on health promotion to improve the health of individuals, and families including marginalized population
- Inculcate and demonstrate ethical and moral values in patient care, research and professional development
- Develop life-long learning skills to keep pace with the exponential growth of information in the field of sciences relevant to health of the individual and population at large
- Engage in research activity aimed at improvement of quality of health care including behaviour modification of individual and community for quality life.

5. COMPETENCIES:

The graduate dentist must be a:

5.1 CARE PROVIDER

Provide care on ethical principles in different settings, emergencies; applies scientific principles of basic, clinical and behavioural sciences to formulate diagnosis; suggest essential investigations, cost effective drugs for treatment. Perform physical examination, basic skills, procedures according to protocol.

5.2 COMMUNICATOR

Interview patients, families skilfully to gather information for formulating diagnosis, treatment; counsel patients, families, communities on health maintenance and promotion; communicate effectively with health care team including peers, supervisors

5.3 ADVOCATE FOR HEALTH PROMOTION

Counsel individuals, families, communities on improved lifestyle; maintenance and promotion of health

5.4 PROFESSIONAL

Value and Display behaviours befitting to the profession such as honesty, empathy, punctuality, patience, respect for patients and their families, colleagues; accepting one's limitations

5.5 CRITICAL THINKER

Engage in research projects, assignments, surveys. Search for evidence; analyse facts, data, pros and cons to identify and solve problems. Reflect and write articles, short notes, commentaries.

5.6 LIFELONG LEARNER

Seek and update knowledge from multiple sources; Consult scientific evidence including journals, web-based knowledge and others; discussion with scholars, practitioners, colleagues; reflection; participation in activities; continuously improve computer skills

5.7 TEAM WORKER

Respect and value the contribution of the health team; collaborate with the team to provide efficient patient care.

6. COURSE: PHARMACOLOGY

COURSE CODE: 2.2

ALLOCATION OF CREDIT HOURS: 50 lecture hours;
200 practical hours

6.1 INTRODUCTION

Pharmacology is the study of how a drug affects a biological system and how the body responds to the drug. The discipline encompasses the sources, chemical properties, biological effects and therapeutic uses of drugs. These effects can be therapeutic or toxic, depending on many factors. Pharmacologists are often interested in therapeutics, which focuses on the effects of drugs and other chemical agents that minimize disease, or toxicology, which involves the study of adverse, or toxic, effects of drugs and other chemical agents. Toxicology can refer to both drugs used in the treatment of disease and with chemicals that may be present in household, environmental, or industrial hazards.

Pharmacology has two major branches:

Pharmacokinetics, which refers to the absorption, distribution, metabolism, and excretion of drugs

Pharmacodynamics, which refers to the molecular, biochemical, and physiological effects of drugs, including drug mechanism of action

In simple terms, pharmacodynamics is what the drug does to the body, and pharmacokinetics is what the body does to the drug.

A major contribution of pharmacology has been the advancement of knowledge about the cellular receptors with which drugs interact. The development of new drugs has focused on steps in this process that are sensitive to modulation. Understanding how drugs interact with cellular targets allows pharmacologists to develop more selective drugs with fewer undesirable side effects.

The field of pharmacology is at the forefront of some of the most exciting developments in modern medicine, including:

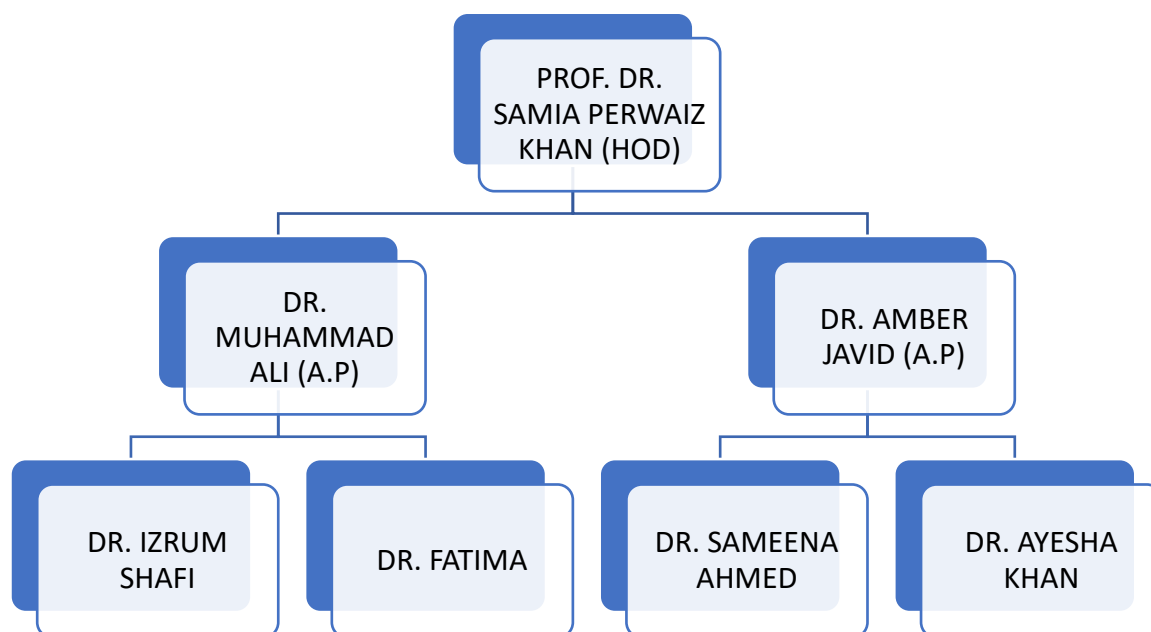
Personalized precision medicine and gene therapy through genomic and proteomic approaches

Regenerative pharmacology to optimize development of bioengineered tissues

Computational and modelling approaches as drug discovery tools

Nanotechnology-based approaches to fighting disease
Pharmacology integrates the knowledge of many disciplines, including medicine, pharmacy, nursing, dentistry, and veterinary medicine. The integrative nature of the field yields a diverse array of career opportunities in academic research, industry, government and regulatory affairs, tech transfer, patent law, science policy, and more.
At the undergraduate level Pharmacology is introduced in second year of teaching to familiarize them with the subject. In the following years of teaching, the students are taught drugs and their uses in clinical practice. Students are expected to acquire theoretical knowledge with its application, decision making skills, clinical skills and procedural skills relevant to each of these subject areas as mentioned in detail in the following sections.

6.2 HIERARCHY OF THE DEPARTMENT



6.3 LEARNING OUTCOMES FOR BDS

SECOND YEAR

By the end of teaching of Pharmacology (second year BDS program), the student should be able to:

- i. Identify the sources of drugs.

- ii. Know basis terminologies
- iii. Identify pharmaceutical preparations.
- iv. Identify units, weight, measurement belongs to different system.
- v. Identify routes of administration
- vi. Calculate drug dosage
- vii. Demonstrate an understanding of action of drugs
- viii. Drugs interactions
- ix. Drugs discovery
 - x. Describe the pharmacokinetic of drugs
 - xi. Describe the pharmacodynamics of drugs
- xii. Demonstrate an understanding of the action of drugs and factors affecting the interactions of drugs with the human body.
- xiii. Outline the process of drug discovery.
- xiv. Describe the pharmacokinetics & pharmacodynamics of the drugs effecting autonomic nervous system and pain
- xv. Describe the principles of neoplasia and anti-cancer drugs, disease processes causing dyspepsia, dysphagia, constipation, diarrhea & their treatment
- xvi. Describe immunopharmacology, pharmacogenetics
- xvii. Discuss drugs acting on CNS & endocrine system

6.4 TEACHING AND LEARNING STRATEGIES

6.4.1 LECTURES (LARGE GROUP TEACHING)

Second year BDS students are taught basics of pharmacology in the lecture for a better understanding and a smooth transition.

For student engagement and active participation to its fullest, following are employed:

- a. Quizzes
- b. Active learning strategies.
- c. Mini-student presentations

6.4.2 SMALL GROUP TEACHINGS

Tutorials:

Small classes in which material from lectures and readings can be discussed in more detail.

6.4.3 LEARNING GUIDANCE:

To complement the lectures, students are provided with videos, relevant book chapters and materials for better understanding.

Along with these individual and group tasks are assigned.

6.4.4 LAB/ PRACTICAL EXAMINATION

This will comprise Objective Structured Clinical Examination (OSCE). The OSCE will have both observed and non-observed stations. The end of clinical posting will be of 2 hours duration.

The OSPE/OSCE will be conducted in batches. The students will be having different pattern of OSPE/OSCE in the subject's otolaryngology

6.5 ASSESSMENT TOOLS AND STRATEGIES:

6.5.1 IN-CLASS ASSESSMENT:

- a. Participation/ interaction
- b. Quizzes.
- c. Presentations.
- d. Assignments.

6.5.2 INTERNAL ASSESSMENT:

A continuous monitoring of attendance and practical assessment in short groups.

It may be in the form of MCQS (BCQS), Tests and OSCE

6.5.3 MID TERM EXAMINATIONS:

These are conducted in the mid of the academic year. It has the following components:

Component	Marks
BCQs	100
OSCE	50
VIVA	50
TOTAL	200

6.5.4 PRE-PROFESSIONAL EXAMINATIONS:

These are conducted at the end of the academic year before the final professional examination. The break-up is as follows:

Component	Marks
BCQs	100
OSCE	75
VIVA	75
TOTAL	250

6.5.5 INTERNAL EVALUATION/ CONTINUOUS ASSESSMENT POLICY: CONTINUOUS ASSESSMENT

Continuous Assessment Policy		
1.	Assignment/ class test/ ward test etc.	25%
2.	Mid-term exam	35%
3.	Pre-prof. exam	35%
4.	Extra effort	5%

Details of Assignments/ Test/Mid-term/ Pre-professional examinations.		
	Present and fail	25%
	Pass	Actual percentage

	ABSENT	ZERO
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PROFESSIONAL ANNUAL EXAMINATIONS:

Professional annual examinations are conducted by the University (JSMU) and comprise theory examinations and OSPE/OSCE.

Eligibility criteria for sitting in the Professional Annual Examinations is as follows:

1. Minimum of 40% aggregate marks in all continuous assessment examinations (Mid- Term Examinations, Pre-Professional Examinations, Assignments and Tests)
2. Students less than 75% overall attendance will not be allowed to sit in the Annual Professional Examinations.
3. Clinical attendance will be maintained separately. Attendance in any clinical rotation which falls below 75% must be made up by students.
4. Students must obtain passing marks in the clinical ward tests. Failing to do so, students will have to sit for re-take ward test (Only one re-take is allowed).

To be considered successful in annual professional examination the students must pass individual components of the professional examination.

This is to say, that the students must pass theory and OSPE/ OSCE examinations independent of each other. Failing one component will result in failing that component of the subject only. The student will then have to appear for supplementary examination in that component of the subject.

6.6 CONTENTS

CLINICAL PHARMACOLOGY - I

	Lecture Title
	1. General concept of pharmacology
1.	• Introduction and general aspects
2.	• Pharmacodynamics 1
3.	• Pharmacodynamics 2
4.	• Pharmacokinetics 1
5.	• Pharmacokinetics 2
6.	• Pharmacokinetics 3
7.	• Dosage forms

8.	• Dosage calculations
9.	• Review
	2. Drugs affecting on the autonomic nervous system
10.	• Introduction to ANS
11.	• Sympathetic Agonists
12.	• Sympathetic Antagonists 1
13.	• Sympathetic Antagonists 2
14.	• Parasympathetic Agonists
15.	• Parasympathetic Antagonists 1
16.	• Parasympathetic Antagonists 2
17.	• Neuromuscular blockers and muscle relaxants
18.	• Review - ANS
	3. Drugs acting on the cardiovascular system
19.	• Drugs used in the treatment of hypertension 1
20.	• Drugs used in the treatment of hypertension 2
21.	• Drugs used in the treatment of angina
22.	• Drugs used in the treatment of congestive cardiac failure
23.	• Drugs used in the treatment of arrhythmia
	4. Drugs acting on the renal function
24.	• Diuretics 1
25.	• Diuretics 2
	5. Drugs acting on the respiratory system
26.	• Bronchodilators
27.	• Antitussive agents and expectorants
	6. Drugs acting on the gastro-intestinal system
28.	• Drugs used in the treatment of peptic ulcer 1
29.	• Drugs used in the treatment of peptic ulcer 2
30.	• Emetics and antiemetics
31.	• Purgatives and antidiarrheal agents
32.	• Antidiarrheal agents
33.	• Review session
	7. Drugs acting endocrine and reproductive system
34.	• Pituitary and hypothalamic Hormones
35.	• Drugs to treat thyroid gland disorders
36.	• Adrenal gland hormones
37.	• Drugs to treat diabetes mellitus 1
38.	• Drugs to treat diabetes mellitus 2
39.	• Androgens as drugs
40.	• Estrogens and progestins as drugs
41.	• Hormonal Contraceptives
42.	• Review

CLINICAL PHARMACOLOGY - II

	Lecture Title
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	8. Drugs acting on nervous system
1.	• Sedatives and hypnotics
2.	• Antipsychotic agents
3.	• Opioid analgesics
4.	• General Anesthetics
5.	• Local Anesthetics
6.	• CNS stimulants
7.	• Drug dependance
8.	• Review
	9. Autacoids
9.	• Autacoids 1
10.	• Autacoids 2
11.	• Analgesics and NSAIDs
12.	• Drugs used in rheumatoid arthritis
13.	• Drugs used in Gout
14.	• Review
	10. Drugs Affecting Hematopoiesis and Hemostasis
15.	• Antiplatelet drugs
16.	• Anticoagulant drugs
17.	• Thrombolytics and Drugs in bleeding disorders
18.	• Drugs to treat anemia
19.	• Review
	11. Chemotherapy
20.	• Antibacterial drugs 1
21.	• Antibacterial drugs 2
22.	• Antibacterial drugs 3
23.	• Antibacterial drugs 4
24.	• Antituberculosis drugs
25.	• Review-1
26.	• Antiviral drugs 1
27.	• Antiviral drugs 2
28.	• Antiviral drugs 3
29.	• Antifungal drugs
30.	• Antiprotozoal drugs
31.	• Antimalarial drugs
32.	• Anthelmintic drugs
33.	• Antiseptics and disinfectants
34.	• Review-2
35.	• Cancer chemotherapy 1
36.	• Cancer chemotherapy 2
	12. Miscellaneous
37.	• Intravenous feeding
38.	• Plasma substitutes
39.	• Colloidal and crystalloid preparation
40.	• Uterine stimulants and relaxant
	13. Care of medicine in the ward

41.	• Requisitions
42.	• Storage of drugs in the hospital ward

6.7 THEORY OBJECTIVES

S.NO.	TOPICS	LEARNING OBJECTIVES By the end of second year BDS, the student should be able to	MODE OF TEACHING	ASSESSMENT TOOLS The students will be assessed during class tests, mid-rotation and end-of rotation tests; mid-term and final examination through:
1	General Pharmacology	<ol style="list-style-type: none"> 1. Explain general pharmacology definitions, terms and along with examples. 2. Describe the advantage and disadvantage of routes of administration. 3. List the dosage forms and doses of drugs. 4. Describe the absorption of drugs and factors affecting. 5. Describe bioavailability and factors affecting 6. Describe drug distribution, plasma protein binding. 7. Describe biotransformation and factors affecting biotransformation. 8. Describe plasma half-life, steady state concentration. 9. Describe pharmacology of excretion of drugs and factors affecting. 10. Describe drug receptors, properties and types of receptors and mechanism of action of drugs. 11. Identify dose-response curve relationships, Potency, & efficacy and therapeutic index. 	<ol style="list-style-type: none"> 1. Lectures 2. Tutorials 3. Demonstrations 	<ol style="list-style-type: none"> 1. BCQs 2. OSPE 3. Viva Voce

		<p>12. Identify format and abbreviation in prescription writing</p> <p>13. Identify the adverse drug reactions in given prescription.</p>		
2	Autonomic Nervous System Pharmacology (ANS)	<ol style="list-style-type: none"> 1. Explain various definition, receptors and neurotransmitter related to ANS. 2. Classify Parasympathomimetic drugs. 3. Describe their mechanism of action and adverse effects 4. Classify Parasympatholytics drugs. 5. Describe their mechanism of action and adverse effects 6. Classify Sympathomimetic drugs. 7. Describe their mechanism of action and adverse effects 8. Classify Sympatholytic drugs 9. Describe their mechanism of action and adverse effects 10. Identify the effects of drugs on rabbit eyes- Atropine, Pilocarpine, Epinephrine and Lidocaine 	<ol style="list-style-type: none"> 1. Lectures 2. Tutorials 3. Practical 	<ol style="list-style-type: none"> 1. BCQs 2. OSPE 3. Viva Voce
3	Cardiovascular system pharmacology (CVS)	<ol style="list-style-type: none"> 1. Classify drugs for dyslipidemias 2. Describe their mechanism of action and adverse effects 3. Classify diuretics 4. Describe their mechanism of action and adverse effects 5. Classify drugs used for ACS and anticoagulants 	<ol style="list-style-type: none"> 1. Lectures 2. Tutorials 	<ol style="list-style-type: none"> 1. BCQs 2. OSPE 3. Viva Voce

		<ol style="list-style-type: none"> 6. Describe their mechanism of action and adverse effects 7. Classify drugs used for angina & MI 8. Describe their mechanism of action and adverse effects 9. Classify anti-hypertensive drugs 10. Describe their mechanism of action and adverse effects 11. Classify drugs used for treatment of cardiac failure 12. Describe their mechanism of action and adverse effects 13. Classify anti -arrhythmic Drugs 14. Describe their mechanism of action and adverse effects 		
4	Central Nervous System Pharmacology (CNS)	<ol style="list-style-type: none"> 1. Explain various definition, receptors and neurotransmitter related to central nervous system. 2. Classify sedative- hypnotics 3. Describe their mechanism of action and adverse effects 4. Classify drugs for migraine 5. Describe their mechanism of action and adverse effects 6. Classify general anesthesia 7. Describe their mechanism of action and adverse effects 8. Classify local anesthesia 9. Describe their mechanism of action and adverse effects 10. Classify skeletal muscle relaxants 11. Describe their mechanism of action and adverse effects 12. Classify anti-Parkinson's drugs 	<ol style="list-style-type: none"> 1. Lectures 2. Tutorials 3. Practical 	<ol style="list-style-type: none"> 1. BCQs 2. OSPE 3. Viva Voce

		<ul style="list-style-type: none"> 13. Describe their mechanism of action and adverse effects 14. Classify anti psychotics drugs 15. Describe their mechanism of action and adverse effects 16. Classify anti -depressants 17. Describe their mechanism of action and adverse effects 18. Classify opioids 19. Describe their mechanism of action and adverse effects 		
5	Gastrointestinal Pharmacology	<ul style="list-style-type: none"> 1. Classify drugs used for dyspepsia and prokinetic drugs 2. Describe their mechanism of action and adverse effects 3. Classify drugs used for acid peptic disorders including H. pylori infection 4. Describe their mechanism of action and adverse effects 5. Classify laxatives drugs 6. Describe their mechanism of action and adverse effects 7. Classify antidiarrheal drugs 8. Describe their mechanism of action and adverse effects 9. Classify anti- emetic drugs 10. Describe their mechanism of action and adverse effects 	<ul style="list-style-type: none"> 1. Lectures 2. Tutorials 	
6	Drugs used for Respiratory Disorders	<ul style="list-style-type: none"> 1. Classify drug used In asthma and COPD 2. Describe their mechanism of action and adverse effects 3. Classify anti- tussives & mucolytic 	<ul style="list-style-type: none"> 1. Lectures 2. Tutorials 	<ul style="list-style-type: none"> 1. BCQs 2. OSPE 3. Viva Voce

		<ol style="list-style-type: none"> 4. Describe their mechanism of action and adverse effects 5. Classify anti- histamines 6. Describe their mechanism of action and adverse effects 7. Classify anti- tuberculosis drugs 8. Describe their mechanism of action and adverse effects 9. Describe administration of drugs by inhalers & nebulizers 		
7	Endocrine Pharmacology	<ol style="list-style-type: none"> 1. Classify pituitary hormones 2. Describe their mechanism of action and adverse effects 3. Classify drugs used in hyperthyroidism / hypothyroidism 4. Describe their mechanism of action and adverse effects 5. Classify drugs used in hypo/ hypercalcemia, 6. Describe their mechanism of action and adverse effects 7. Classify insulin preparations 8. Describe their mechanism of action and adverse effects 9. Classify oral hypoglycemic 10. Describe their mechanism of action and adverse effects 11. Classify corticosteroids 12. Describe their mechanism of action and adverse effects 13. Classify gonadal hormones 14. Describe their mechanism of action and adverse effects 	<ol style="list-style-type: none"> 1. Lectures 2. Tutorials 	<ol style="list-style-type: none"> 1. BCQs 2. OSPE 3. Viva Voce

8	Vitamins	<ol style="list-style-type: none"> 1. Classify drugs used for iron deficiency anemia 2. Describe their mechanism of action and adverse effects 3. Classify drugs used for megaloblastic anemia 4. Describe their mechanism of action and adverse effects 	<ol style="list-style-type: none"> 1. Lectures 2. Tutorials 	<ol style="list-style-type: none"> 1. BCQs 2. OSPE 3. Viva Voce
9	Locally acting drugs	<ol style="list-style-type: none"> 1. Classify demulcents, Emollients, Irritants, and astringents. 2. Describe their mechanism of action and adverse effects 3. Classify antiseptics & disinfectants 4. Describe their mechanism of action and adverse effects 	<ol style="list-style-type: none"> 1. Lectures 2. Tutorials 	<ol style="list-style-type: none"> 1. BCQs 2. OSPE 3. Viva Voce
10	Anti-inflammatory Drugs	<ol style="list-style-type: none"> 1. Classify eicosanoids 2. Describe their mechanism of action and adverse effects 3. Classify NSAIDs 4. Describe their mechanism of action and adverse effects 5. Classify corticosteroids 6. Describe their mechanism of action and adverse effects 7. Describe aspirin toxicity 8. Describe acetaminophen toxicity 9. Classify DMARDS 10. Describe their mechanism of action and adverse effects 	<ol style="list-style-type: none"> 1. Lectures 2. Tutorials 	<ol style="list-style-type: none"> 1. BCQs 2. OSPE 3. Viva Voce
11	Chemotherapeutic Agents	<ol style="list-style-type: none"> 1. Explain various definition, terms and examples related to chemotherapeutic agents. 2. Classify cell wall inhibitors 3. Describe their mechanism of action and adverse effects 	<ol style="list-style-type: none"> 1. Lectures 2. Tutorials 	<ol style="list-style-type: none"> 1. BCQs 2. OSPE 3. Viva Voce

		<ol style="list-style-type: none"> 4. Classify protein-synthesis inhibitors 5. Describe their mechanism of action and adverse effects 6. Classify fluoroquinolones 7. Describe their mechanism of action and adverse effects 8. Classify sulfonamides & trimethoprim 9. Describe their mechanism of action and adverse effects 10. Classify anti- Viral agents 11. Describe their mechanism of action and adverse effects 12. Classify anti-protozoal agents 13. Describe their mechanism of action and adverse effects 14. Classify antifungal agents 15. Describe their mechanism of action and adverse effects 16. Classify anti- helminthic agents 17. Describe their mechanism of action and adverse effects 18. Classify anticancer therapy 19. Describe their mechanism of action and adverse effects 		
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6.8 PHARMACOLOGY PRACTICAL

S.NO.	PRACTICAL TOPICS	LEARNING OBJECTIVES By the end of the session the second year BDS student should be able to demonstrate the following	TEACHING METHODOLOGY	ASSESSMENT TOOLS The students will be assessed in mid-term and final examination through:
1.	Introduction and basic definitions	Mini lecture	1. Explain various basic definitions and terms related to pharmacology.	1. BCQs
2.	Prescription Order writing	Demonstration	1. Write a prescription in a structured form.	1. BCQs 2. Viva Voce
3.	Metrology: Weight and measurement	Demonstration	1. Identify different weights and measurements used in pharmacology.	1 BCQs 2 Viva Voce 3 OSPE
4.	Pharmaceutical formulation and dosage form	Demonstration	1. Identify various pharmaceutical formulation and dosage form.	1. BCQs 2. Viva Voce 3. OSPE
5.	Drug-drug interaction	Mini lecture	1. Explain types and examples of drug- drug interactions.	1. BCQs 2. Viva Voce 3. OSPE
6.	To study the effect of pilocarpine on rabbit's eye	Demonstration and performance	1. Administer pilocarpine in rabbit's eye 2. Identify the effects of the drug on rabbit's eye.	1. BCQs 2. Viva Voce 3. OSPE
7.	To study the effect of epinephrine on rabbit's eye	Demonstration and performance	1. Administer pilocarpine in rabbit's eye 2. Identify the effects of the drug on rabbit's eye.	1. BCQs 2. Viva Voce 3. OSPE

8.	To study the effect of atropine on rabbit's eye	Demonstration and performance	<ol style="list-style-type: none"> 1. Administer atropine in rabbit's eye 2. Identify the effects of the drug on rabbit's eye. 	<ol style="list-style-type: none"> 1. BCQs 2. Viva Voce 3. OSPE
9.	To study the effect of local anesthetic agents on rabbit's eye	Demonstration and performance	<ol style="list-style-type: none"> 1. Administer local anesthetic in rabbit's eye 2. Identify the effects of the drug on rabbit's eye. 	<ol style="list-style-type: none"> 1. BCQs 2. Viva Voce 3. OSPE
10.	Administration of drug using nebulizer and inhaler	Demonstration and performance	<ol style="list-style-type: none"> 1. Administer drug using nebulizer and inhaler 	<ol style="list-style-type: none"> 1. BCQs 2. Viva Voce 3. OSPE
11.	To prepare and dispense 5 % dextrose solution	Demonstration and performance	<ol style="list-style-type: none"> 1. Prepare and dispense 5 % dextrose solution 	<ol style="list-style-type: none"> 1. BCQs 2. Viva Voce 3. OSPE
12.	To prepare and dispense 100ml NaCl mouthwash with peppermint flavor	Demonstration and performance	<ol style="list-style-type: none"> 1. Prepare and dispense 100ml NaCl mouthwash with peppermint flavor 	<ol style="list-style-type: none"> 1. BCQs 2. Viva Voce 3. OSPE
13.	To study the effect of skeletal muscle relaxants on rectus abdominus muscle of frog	Demonstration and performance	<ol style="list-style-type: none"> 1. Identify the effect of skeletal muscle relaxants on rectus abdominus muscle of frog 	<ol style="list-style-type: none"> 1. BCQs 2. Viva Voce 3. OSPE

7. RECOMMENDED BOOKS (Latest editions):

1. Lazo JS & Parker KL. Goodman and Gillman's The Pharmacological basis of therapeutics 12th edition McGraw Hill Company, USA 2011

2. Katzung BG, Masters SB & Trevor AJ. Basic and Clinical Pharmacology-Katzung. 13th edition TATA McGrawHill Education Private Ltd, New Delhi 2010
3. Finkel R Cubeddu L X, Clark MA, Harvey R & Champe P. Lippincott's Illustrated Reviews Pharmacology. 7th edition, Wolters Kluwer-Lippincott Williams & Wilkins New Delhi 2015
4. Lippincott's illustrated review: Pharmacology.
5. Lange Katzung & Trevor's Pharmacology Examination and Board Review.
6. Rang & Dale's pharmacology.
7. Lange: Katzung Basic & clinical pharmacology.
8. Goodman and Gilman's Manual of Pharmacology and Therapeutics.
9. BRS Pharmacology.

8. WEBSITES

1. www.studentconsult.com
2. www.drugs.com
3. www.pharmacology.com
4. www.medicalstudent.com