



QUETTA INSTITUTE OF MEDICAL SCIENCES
DEPARTMENT OF PHARMACOLOGY
STUDY GUIDE 2024 - 2025

YEAR	3 rd YEAR MBBS
BLOCK	I, II, III
SUBJECT	PHARMACOLOGY



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MBBS PHARMACOLOGY PROGRAMME AT QIMS

Vision:

An efficient center of excellence for medical education, research and healthcare, educating/qualifying healthcare professionals to serve communities thus contributing to the overall well-being of the society.

Mission:

To prepare health professionals by providing comprehensive, high quality medical education that fosters professional competence, logical thinking, ethical values and sense of social responsibility.

Objectives:

These objectives will allow the students to grasp the essential knowledge, skill and attitude and will enable them to:

- Recognize the etiology, pathophysiology and morphological changes of human diseases in relation with its clinical significance.
- Apply the fundamental concepts of pharmacokinetics, pharmacodynamics, applied pharmacology and therapeutics in medicine.
- Apply the fundamental concepts of social and behavioural sciences in clinical settings. □

Develop a research proposal for a given topic.

- Take detailed relevant history and perform physical examination of common medical and surgical disorders.

LIST OF FACULTY

NAMES	DESIGNATION
Prof. Dr. Abdul Salam	Professor & HOD
Dr. Komal Mumtaz Malik	Assistant Professor
Dr. Syeda Rabia Anwar	Demonstrator
Dr. Aqib Rasheed	Demonstrator
Dr. Jyasha Fayyaz	Demonstrator
Dr. Um E Kalsoom	Demonstrator
Dr. Asma Khaliq	Demonstrator
Dr. Javeria Nasir	Demonstrator

Dr. Muhammad Khizer Ali	Demonstrator
Dr Jasia Durrani	Pharmacist

PHARMACOLOGY MODULE PLANNING COMMITTEE

Year Coordinator	Prof. Dr. Abdul Salam
Module Coordinator	Dr. Jasia Durrani
Members	Dr. Syeda Rabia Anwar Dr. Jyasha Fayyaz

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INTRODUCTION

1. Preamble

Integration has been accepted as an important educational strategy in medical education. NUMS believes in continuous curriculum revision through regular reviews and feedback of stakeholders. This curriculum has been updated with Correlation as a minimum level of integration in MBBS. This curriculum is outcome based, patient centered, community relevant, promotes health and prevents disease. It has been revised by the faculty of basic and clinical sciences from constituent/affiliated colleges in collaboration with NUMS Academic Directorate and NUMS department of Health Professions Education.

2. Curriculum perspective

NUMS curriculum is evolved taking into consideration constructivist and behaviorist with some element of cognitivist approach. It allows students to construct their own knowledge based on what they already know and to use that knowledge in purposeful activities requiring decision making, problem solving, and judgments.

3. Level of integration

NUMS will follow Correlation i.e level 7 of Harden's level of Integration in first four years. The emphasis remains on disciplines or subjects with subject-based courses taking up most of the curriculum time. Within this framework, an integrated teaching session or course is introduced in addition to the subject-based teaching. This session brings together areas of interest common to each of the subjects. Though the teaching is discipline based, topics are correlated and taught with clinical context for better understanding and application of concepts. However clinical teaching increases gradually with advancing years. MBBS Year V is for clerkships.

4. Curricular organization and structure

a. NUMS MBBS curriculum in the first four years shall be delivered in a System Based Modular Format with clinical relevance. However, in year III & IV, students shall get clinical exposure through rotations in the wards and OPDs and in Year V through clerkships b. There will be three blocks in year III, each will have modules, duration of which depends upon the number and complexity of the objectives to be achieved in that module c. The curriculum will be delivered by modular teams of multidisciplinary basic science faculty and relevant clinical faculty.

- d. The planning and delivery will be coordinated by year coordinators who will guide module coordinators of their respective years for efficient implementation
- e. Modular Coordinator- responsible for teaching and assessment during each module. To be appointed by HoDs in coordination with HPE team
- f. Clinical Coordinator - responsible for placement, teaching and assessment during clinical rotations
- g. All NUMS colleges will provide study guides of each module to the students
- h. To attain the integration in MBBS program, teaching shall be done in three spirals followed by Clerkships in final year
- i. **Preclinical aspect of Medicine (Spiral II -Years III)** Integration of Pre-Clinical/ Clinical Sciences (General Pathology, Microbiology, Pharmacology, Community Medicine and clinical subjects) into system-based modules. System based modules will link preclinical science knowledge to clinical problems. Students will be taught in an integrated manner so that subjects will be presented as a meaningful whole. Additional chunks of content will be added in a module that exactly does not fit in the central theme of the module.
- j. Year III will deal with abnormal structure and function, pharmacological aspects of therapeutics with clinical relevance. Forensic Medicine and Community Medicine will be taught in relevance wherever applicable.
- k. Students will go for their clinical rotations in Medicine & Surgery and ward test will be taken at the end of each clinical rotation, which will contribute towards its internal assessment
- l. Longitudinal themes (Behavioral Sciences, Research Methodology & EBM and Infection Control) are an integral part of year III
- m. Apart from attending daily scheduled sessions, students shall engage in self-directed learning to achieve the desired objectives
- n. Students shall be encouraged to participate in community services and extracurricular activities
- o. Students shall be encouraged to enroll in elective courses in summer vacations
- p. Professional Exams will be discipline based. In third Prof, Pharmacology, General Pathology & Microbiology, and Forensic Medicine will be assessed

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5. Competencies The focus of this curriculum is on the roles of a general physician as identified in by PMC. These are skillful, knowledgeable, community health promoter, critical thinker, professional and role model, researcher, and leader.

Generic competencies addressed in year III are:

- a. Medical Knowledge
- b. Procedural skills
- c. Clinical skills
- d. Problem solving
- e. Communication skills
- f. Empathy
- g. Professionalism
- h. Research

6. Outcomes

By the end of third year, students will be able to:

- a. Comprehend the mechanisms behind cell and tissue injury and how the body responds to and repairs injury

Correlate the important morphological and pathogenic characteristics, laboratory diagnosis, prevention and virulence factors produced by various microbes with their clinical significance

Apply the fundamental concepts of pharmacokinetics, pharmacodynamics, applied

pharmacology and therapeutics in medicine

- b. Identify the importance of medico legal aspects in medicine
- c. Apply the fundamental concepts of social and behavioural sciences in clinical subjects
- d. Apply the knowledge of infection control in clinical settings
- e. Finalize a research topic and related literature review
- f. Take a detailed relevant history and perform physical examination of common relevant medical and surgical disorders

7. Proposed Contact Hours Distribution Year-III

SUBJECT	CONTACT HOURS
Pharmacology	300
Self Directed Learning	25
Total Hours	325

8. a. Clinical Rotations in year III – Medicine & Surgery

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During the clinical rotation in year III, students will be introduced to the outpatients and inpatients clinics of Surgery and Medicine. Aim is to build relevant clinical skills and apply pathological concepts of diseases and behavioral sciences in clinical practice.

b. Learning Outcomes: At the end of third year clinical rotation, students will be able to: 1) Identify common symptoms

- 2) Differentiate between normal and abnormal clinical signs
- 3) Communicate effectively with the patients, seniors and colleagues
- 4) Follow the steps of history taking
- 5) Take detailed relevant history
- 6) Perform general physical examination and systemic examination
- 7) Observe/ assist relevant procedures examination

Logbooks will be maintained to keep the record of student performance during the rotation to be countersigned by the faculty supervising the sessions.

c. At the end of each clinical rotation, the whole group will have a clinical exam which will contribute towards the internal assessment in the final year (20 %).

d. Assessment at the end of clinical rotations will focus on application of knowledge, competence in specific clinical skills, and appropriate professional attitude. Satisfactory performance will be required in each of these areas for progress and promotion.

e. Failure in assessment requires the student to repeat the end rotation exam. Passing marks are 50%
f. Attendance of 75% and satisfactory performance in the rotation/clerkship in each year is mandatory.

9. Educational Strategies

- a. Interactive Lectures
- b. Small group discussion
- c. Lab practical
- d. Case based learning
- e. Case based discussions

10. Internal Assessment

Formative assessment (low stake) is at faculty discretion like mid module test and other class tests. There will be two end of blocks and one pre-annual examination, which contributes

towards the weighting of internal assessment i.e 20% in 3rd professional MBBS Examination.

12. Annual Professional Examination

The University will take the third professional Examination as per PMDC guidelines at the end of the academic year. Annual Theory & Practical Examination will be of 300 Marks for General Pathology & Microbiology, 300 marks for Pharmacology and 200 marks of Forensic Medicine. The passing score is 50% in theory and practical separately.

13. Evaluation of the Course

- a. The major goals of the evaluation are to monitor quality of and improve curriculum
- b. Student portfolio shall be maintained in the departments in which students will give their feedback either by name or anonymously. Feedback may be taken at the end of module, online and informal student feedback during the running module
- c. Faculty suggestions if any, for improvement of training may be incorporated in the next Rotation

ACADEMIC CALENDER

ACADEMIC/EXTRA-CURRICULAR ACTIVITIES	FROM	TO
COMMENCEMENT OF NEW SESSION	11 th NOVEMBER 2024	
BLOCK I (11+1=12 WEEKS)		
FOUNDATION II (5 WEEKS) CVS II (3 WEEKS)	11 th NOV 2024	3 RD JAN 2025
WINTER BREAK (3 WEEKS)	6 TH JAN 2025	24 TH JAN 2025
CVS II (1 WEEK) GENITOURINARY II (2 WEEKS)	27 TH JAN 2025	14 TH FEB 2025
EOB-I EXAM (1 WEEK)	17 TH FEB 2025	21 ST FEB 2025
BLOCK II (10+1=11 WEEKS)		
HEME & IMMUNOLOGY II (3 WEEKS) GENETICS & NEUROSCIENCES II (2 WEEKS)	24 TH FEB 2025	28 TH MARCH 2025
EID-UL-FITR HOLIDAYS (1 WEEK)	31 ST MARCH 2025	4 TH APRIL 2025
GENETICS & NEUROSCIENCES II (2 WEEKS) RESPIRATORY II (3 WEEKS)	7 th APRIL 2025	9 TH MAY 2025
LABOUR DAY	1 ST MAY 2025	
EOB-II EXAMS (1 WEEK)	12 th MAY 2025	16 TH MAY 2025
BLOCK III (11 + 2= 13 WEEKS)		
DIGESTIVE SYSTEM & METABOLISM II (3 WEEKS)	19 TH MAY 2025	6 TH JUNE 2025
EID-UL-ADHA HOLIDAYS (3 DAYS)	7 th JUNE 2025	9 th JUNE 2025
MULTISYSTEM I (NEOPLASIA) (4 WEEKS)	10 th JUNE 2025	4 th JULY 2025
MULTISYSTEM II (INFECTIOUS DISEASES) (4 WEEKS)	7 th JULY 2025	1 ST AUG 2025
INDEPENDENCE DAY HOLIDAY	14 TH AUG 2025	
PRE ANNUAL & PROF EXAMS		
PRE-ANNUAL EXMAS (2 WEEKS)	4 TH AUG 2025	15 TH AUG 2025
PREP LEAVE FOR ANNUAL EXAMS (3 WEEKS)	18 TH AUG 2025	7 TH SEP 2025
ANNUAL/PROF EXAM DATE BY NUMS	8 th SEPTEMBER 2024	

TIMETABLE OF 3rd YEAR MBBS DEPICTING PHARMACOLOGY SESSIONS

Pharm

- Copy to:
- > Principal QIMS
 - > Comdt / VP QIMS
 - > Concerned HODs & Instructors
 - > Students Affairs



TRAINING PROGRAM
 3rd Year MBBS (11th Batch) – 2023

DEPARTMENT OF ACADEMICS / DEPARTMENT OF MEDICAL EDUCATION
1st Academics Week (VENUE: LECTURE HALL 3)

- Block – I (13 Week)
- Module : Foundation II
- Week 1st (13 Week)

DAYS	0830-0920	0920-1010	1010-1100	1100-1115	1115-1205	1205-1305	1305-1320	1320-1410	1410-1500		
MONDAY 11 th Nov 2024	PHARMACOLOGY-LGIS Introduction to Pharmacology Prof Dr. Abdul Salam	FORENSIC MEDICINE-LGIS Introduction Prof Dr. M. Younas Zarkoon	CBL Pharmacology (A) Orientation Dr. Rabia Pathology (B) Calcification Lt Col Sana Yousaf Forensic Medicine (C) General Toxicology I Dr. Sana Wakeel	BREAK	PATHOLOGY LGIS Introduction To Pathology Prof Dr. M. Luqman Butt	PRACT-LAB Pathology (A) Hyperplasia & Atrophy Dr. Farah, Dr. Sammara Pharmacology(B) Introduction to Instruments Dr. Jasia B. Science TBL (C) Psychological History Taking Hafsa Iqbal	Break	Community Medicine -LGIS Introduction to Community Medicine Dr. Imtensan Sharif	B. SCIENCE-LGIS Psychological aspects of health and disease Ms. Yasmeen Jozzezi		
TUESDAY 12 th Nov 2024	FORENSIC MEDICINE-LGIS Injuries Prof Dr. M. Younas Zarkoon	PHARMACOLOGY-LGIS Branches of Pharmacology Prof Dr. Abdul Salam	CBL Pharmacology (B) Orientation Dr. Rabia Pathology (C) Calcification Lt Col Sana Yousaf Forensic Medicine (A) General Toxicology I Dr. Rahima Mustafa		PATHOLOGY LGIS General Microbiology Introduction to Micro Bacterial Anatomy Brig Faisal Hanif	PRACT-LAB Pathology (B) Hyperplasia & Atrophy Dr. Farah, Dr. Sammara Pharmacology(C) Introduction to Instruments Dr. Jasia B. Science TBL (A) Psychological History Taking Hafsa Iqbal			RESEARCH METHODOLOGY Introduction to Research Methodology Dr. Imtensan Sharif	PHARMACOLOGY-LGIS History of Pharmacology Prof Dr. Abdul Salam	
WEDNESDAY 13 th Nov 2024	SURGERY-LGIS Types of Wounds and its Management Lt Col Raheel	PHARMACOLOGY-LGIS Sources & Active Principles of Drugs Prof Dr. Abdul Salam	CBL Pharmacology (C) Orientation Dr. Rabia Pathology (A) Calcification Lt Col Sana Yousaf Forensic Medicine (B) General Toxicology I Dr. Sana Wakeel		CLINICAL ROTATION (Medicine & Surgery) (Gen.Med-1 A) (Gen.Med-2 B) (Gen.Med-3 C) (Gen.Med-4 D) (Gen.Surg-1 E) (Gen.Surg-2 F) (Gen.Surg-3 G) (Gen.Surg-4 H)				PATHOLOGY LGIS Classification of Bacteria Dr. Iqbal	PHARMACOLOGY-LGIS Routes of drugs Administration I Prof Dr. Abdul Salam	
THURSDAY 14 th Nov 2024	PHARMACOLOGY-LGIS Routes of drugs Administration II Prof Dr. Abdul Salam	Peds-LGIS Developmental Milestones Maj Rehan	Medicine-LGIS Medical Ethics Lt Col Ifat Rafeeq							PATHOLOGY LGIS Bacterial Pathogenesis Dr. Iqbal	PATHOLOGY LGIS Bacterial Physiology & Growth Bacterial Genetics Lt Col Rashan
FRIDAY 15 th Nov 2024	PHARMACOLOGY-LGIS Pharmacokinetics Introduction Prof Dr. Abdul Salam	PATHOLOGY LGIS Cellular Adaptations: Atrophy, Hypertrophy, Hyperplasia, Metaplasia and Dysplasia Prof Dr. M. Luqman Butt	CLS (A) Medicine Recording & Interpretation of BP Maj Rabia Sadiq Venue. Clinical Skill Lab SDL (B) Pathology LAB CMII (C)		PHARMACOLOGY-LGIS Drugs Absorption I Prof Dr. Abdul Salam	PRACT-LAB Pathology (C) Hyperplasia & Atrophy Dr. Farah, Dr. Sammara Pharmacology(A) Introduction to Instruments Dr. Jasia B. Science TBL (B) Psychological History Taking Hafsa Iqbal		Prayer Break	SDL		

Deputy Manager Academics
(Arbab Arsalan)

Asst Dir. DME
(Dr. Tooba Masood)

Principal, QIMS
(Prof. Dr. Brig. Imran Ahmed)

BLOCK-1

FOUNDATION MODULE

INTRODUCTION

LEARNING OUTCOMES OF THE MODULE

By the end of this module the students will be able to

- Comprehend the basic concepts of all preclinical disciplines.
- Receive the patients in medical and surgical clinics.

SUBJECT PHARMACOLOGY

SUBJECT SPECIFIC LEARNING OUTCOMES (provided in NUMS curriculum)

By the end of this module the students will be able to:

General pharmacology

- Interpret the different pharmacokinetic patterns, their clinical significance and factors affecting these parameters.
- Correlate the concept of molecular mechanistic to the therapeutics.
- Identify the genetic principles in drug disposition.
- Recognize the rational use of drugs.

ANS

- Correlate the physiology of autonomic nervous system with the therapeutic application.

Autocoids

- Rationalize the use of various Prostaglandins in different diseases.

Practical Objectives (if any)

- Justify the advantages and disadvantages of different routes of administration and dosage forms of drugs.
- Interpret and report the effects of drugs in rabbit's eye.

PHARMACOLOGY				
General pharmacology				
Sr#	Topic	Learning Objectives	Instructional Strategies	Assessment Tools
1	Pharmacology: Introduction , Historical overview	Define the term Pharmacology. Define drug according to WHO. Discuss the historical aspects of modern pharmacology.	LGIS	MCQs/ SEQs/VIVA/ OSPE
2	Branches of Pharmacology	Discuss the different Branches of Pharmacology. Illustrate different Pharmacopoeias. Interpret drug nomenclature.	LGIS	

3	Sources & active principles of drugs	Describe the different sources of drug. Discuss various active principles of drugs.	LGIS	
4	Routes of drug administration	Describe different routes of drug administration. Interpret the merits & demerits of each route. Discuss the factors that influence the route of administration of a drug. Choose the appropriate route of administration according to the clinical situation.	LGIS/SGD	

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5	<u>Pharmacokinetics</u> : Absorption of drugs: Processes & Factors modifying drug absorption	Explain Drug Absorption. Discuss the factors affecting drug absorption. Associate the different biological factors with drug absorption. Describe the clinical significance of Drug Absorption.	LGIS /CBL	
6	Bioavailability: clinical significance & factors affecting	Define Bioavailability. Evaluate factors affecting Bioavailability. Explain extraction ratio. Assess clinical significance of Bioavailability.	LGIS	

7	Distribution & plasma protein binding of drugs	<p>Explain "drug distribution".</p> <p>Define volume of distribution (Vd).</p> <p>Summarize factors affecting volume of distribution.</p> <p>Distinguish between the distribution of a drug through different body compartments.</p> <p>Interpret the clinical significance of Vd.</p> <p>Discuss plasma protein binding of drugs.</p> <p>Describe the characteristics of a drug that is bound to plasma proteins.</p> <p>Evaluate the clinical consequences of displacement of a drug from plasma proteins.</p>	LGIS	
8	Biotransformation of drugs & Factors modifying biotransformation	<p>Explain Biotransformation.</p> <p>Enlist phase-I and phase-II biotransformation reactions.</p> <p>Compare characteristics of Phase 1 and Phase 2 biotransformation reactions.</p> <p>Evaluate clinical significance of biotransformation.</p> <p>Differentiate microsomal and non-microsomal biotransformation reactions.</p> <p>Describe factors affecting Biotransformation of a Drug.</p> <p>Discriminate enzyme induction & enzyme inhibition.</p> <p>Interpret clinical significance of enzyme induction & enzyme inhibition.</p>	LGIS	
9	Excretion of drugs	<p>Discuss different routes of drug excretion.</p> <p>Explain the basic mechanisms by which drugs are excreted from the kidneys.</p> <p>Differentiate the factors affecting, filtration, renal tubular secretion, and renal tubular reabsorption. Analyze the clinical significance of drug excretion.</p>	LGIS	
10	Drug clearance	<p>Define drug clearance.</p> <p>Explain renal clearance of drugs.</p> <p>Discuss the factors affecting drug clearance. Infer the clinical significance of different Clearance values of drugs.</p> <p>Compare the drug excretion and clearance.</p>	LGIS	

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11	Half-life of drugs: factors affecting & clinical significance	Define plasma half life. Discuss different factors affecting half life. Interpret clinical significance of plasma half life. Define steady state concentration. Infer clinical significance of steady state concentration.	LGIS
12	First And Zero Order Kinetics Maintenance Dose and Loading Dose	Define first & zero order kinetics with examples. Differentiate between First order and Zero Order Kinetics. Compare their clinical significance. Illustrate Maintenance Dose & Loading Dose with their formulas. Discuss the clinical significance of these formulas.	LGIS
13	<u>Pharmacodynamics</u> : Mechanism of drug action	Define Pharmacodynamics. Describe the general mechanisms by which drugs act. Compare the terms Affinity and Efficacy. Explain with examples Agonist, Partial Agonist, Antagonist, and Inverse Agonist.	LGIS
14	Drug Antagonism	Define drug antagonism. Describe the different types of antagonism. Compare competitive and noncompetitive antagonism with help of graphs.	LGIS
15	Receptor transducer mechanisms	Describe receptor signaling mechanisms. Enlist the different types of receptor transduction mechanisms. Illustrate different transduction mechanisms with the help of diagrams.	LGIS/CBL
16	Dose response curves	Define dose response curve. Enlist the types of dose response curve. Explain "Graded Dose Response Curve". Infer its clinical significance. Explain "Quantal Dose Response Curve". Describe the information that can be obtained from a Graded & Quantal Dose Response Curve. Differentiate between Graded and Quantal Dose Response Curve. Define the terms therapeutic index and Therapeutic Window. Evaluate their clinical significance.	LGIS

17	Tolerance, Tachyphylaxis & Regulation of receptors	Define these terms with examples: Tolerance & Tachyphylaxis. Compare Tolerance and Tachyphylaxis. Explain Receptor Down regulation and Up regulation with examples. Discuss their clinical significance.	LGIS	
18	Factors modifying actions & doses of drugs	Discuss the factors affecting dose and action of a drug. State the formulas for calculating the dose of a drug according to age & weight. Distinguish between the terms Synergism,	LGIS	

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		Summation and Potentiation. Explain different types of drug Interaction.		
19	Guideline for rational use of drugs	Recognize the rational use of drugs. Learn the process of prescribing a drug. Discuss the list of essential medicines. Distinguish among the FDA pregnancy categories of drugs.	LGIS	
Drugs acting on ANS				
1	ANS: Introduction	Revise the anatomy and physiology of autonomic nervous system. Enlist the autonomic receptors, their subtypes, location and their function.	LGIS	MCQs/ SEQs/VIVA/ OSPE
2	Parasympathomimetic or cholinergic Drugs	Classify Cholinomimetics based upon their receptor selectivity. Correlate the pharmacological actions and adverse effects of cholinomimetics with different clinical conditions.	LGIS	
3	Anti Cholinesterase, Myasthenia gravis	Classify anticholinesterases based upon their interaction with cholinesterase. Relate the pharmacological actions and adverse effects of anticholinesterases with their clinical uses.	LGIS	

4	Organophosphate (OP) poisoning & Oximes	Discuss the types of irreversible anticholinesterases. Describe the signs and symptoms of organophosphate poisoning. Understand the mechanism of aging. Learn the management and prevention of OP poisoning.	LGIS/CBL
5	Cholinergic blockers: Natural alkaloids, Comparison between Hyoscine & Atropine	Correlate the pharmacological effects of anticholinergics with their clinical application. Identify the adverse effects of anticholinergics in different clinical scenarios. Relate centrally acting cholinomimetics with their clinical uses.	LGIS
6	Catecholamines: Adrenaline., Nor adrenaline, Dopamine & Dobutamine	Classify sympathomimetics according to their receptor selectivity. Distinguish the pharmacological effects produced by direct and indirect acting sympathomimetics.	LGIS
7	Non Catecholamines: Ephedrine, Amphetamines, α/β 2 agonists	Select and justify the use of sympathomimetics in different clinical situations. Compare the safety profile of different sympathomimetics.	LGIS/CBL
8	Adrenergic Blockers: Alpha receptor Blockers	Classify alpha adrenergic blockers based on receptor selectivity. Rationalize the mode of action of alpha blockers in different clinical situations.	LGIS

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		Relate the pharmacological actions of alpha blockers to their adverse effects.		
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9	Beta receptor Blockers	Classify beta adrenergic blockers based on Receptor selectivity & ISA/MSA selectivity. Justify the mechanism of action of beta adrenergic blockers in different clinical scenarios. Relate the pharmacological effects with adverse effects of beta-adrenergic blockers considering their clinical application. Identify the contraindications of beta blockers in different clinical conditions.	LGIS/CBL	
10	Central Sympathoplegic s	Compare different central sympathoplegics based on their: a) Pharmacokinetics b) Pharmacodynamics c) Adverse effects. Select and justify the use of these drugs in different clinical conditions.	LGIS	
11	Drug treatment of glaucoma	Revise the physiology of aqueous humor production and the drainage. Relate the treatment options with location and function of receptors.	LGIS	
Autocoids				
1	Prostaglandins	Explain the synthesis of prostaglandin. Discuss the cyclooxygenase-1 and cyclooxygenase-2. Describe the biosynthesis of leukotrienes. Discuss the various actions of prostaglandins, prostacyclins and thromboxane A2. Enlist the therapeutic uses and adverse effects of prostaglandins.	LGIS/CBL	MCQs/SEQs/VIVA/ OSPE
PRACTICALS (provide name of topics if any)				
1	Justify the advantages and disadvantages of different routes of administration and dosage forms of drugs		Practical	OSPE
2	Interpret and report the effects of drugs in rabbit's eye		Practical	OSPE

Assessment Strategies/Method

Formative assessment will be taken throughout the year. Three medium stake assessments will be taken at the end of each block, and one will be taken at the end of year in form of pre-annual exam. Summative assessment will be taken as a professional exam at the end of year.

Formative assessment: MCQs, Class tests (SAQs, SEQs), Presentations, Assignments, Viva

Summative assessment: MCQs, SAQs, Viva, OSCE

CVS & GENITOURINARY MODULE

INTRODUCTION

LEARNING OUTCOMES OF THE MODULE

By the end of this module the students will be able to:

- Relate the pathophysiology of heart and vessels to its treatment modalities. • Interpret various injuries and causes of death and relate them with their medico legal aspects. • Perform and interpret the effects of cardiac specific drugs on frog's heart.
- Evaluate the effect of drugs on blood vessels of frogs.
- Differentiate between therapeutic application of different diuretics.
- Demonstrate all steps of history taking and examination of cardiac patients in medical and surgical clinics.

SUBJECT PHARMACOLOGY

SUBJECT SPECIFIC LEARNING OUTCOMES (provided in NUMS curriculum)

By the end of this module the students will be able to

CVS

- Relate the pathophysiology of heart and vessels to its treatment modalities.

Genitourinary

- Recollect the anatomical physiological basis of renal system.
- Differentiate between therapeutic application of different diuretics.

Practical Objectives (if any)

- Evaluate the effect of drugs on blood vessels of frog.
- Perform and interpret the effects of cardiac specific drugs on frog's heart.

PHARMACOLOGY				
Drugs acting on CVS				
Sr#	Topic	Course content	Instructional Strategies	Assessment Tools

1	Physiology of CVS (Rev)	Outline the functions of circulatory system on the basis of three basic principles i.e., blood flow, cardiac output and arterial pressure. Differentiate among the interrelationship of pressure, blood flow and resistance with reference to management of tissue blood circulation.	LGIS	MCQs/SEQs/VI VA /OSPE
2	Cardiotonic drugs (Drugs used in Heart Failure): Management of cardiotoxicity of cardiac	Describe the control of normal cardiac contractility. Understand the pathophysiology of heart failure. Discuss the pharmacologic treatment of heart failure. Learn the management of digoxin toxicity. Enlist the drugs used for acute & chronic heart failure.	LGIS	

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	glycosides			
3	Antihypertensive drugs	Define Hypertension and its types. Classify anti-hypertensive drugs. Explain the mechanism of action of centrally acting sympathoplegics. Enlist the clinical uses and adverse effects of centrally acting sympathoplegics. Describe the mechanism of action of vasodilators. Compare safety profile of direct acting vasodilators. Describe the mechanism of action of RAAS inhibitors. Compare safety profile of ACE inhibitors and ARBs. Explain mechanism of action of Calcium Channel Blockers. Compare pharmacological actions, uses & adverse effects of Dihydropyridines & Non dihydropyridines.	LGIS, SGD	

4	Drug Treatment of IHD	<p>Explain the pathophysiology of angina pectoris and IHD.</p> <p>Discuss the pharmacotherapy of angina.</p> <p>Classify antianginal drugs.</p> <p>Describe the ADME, MOA of organic nitrates and nitrites.</p> <p>Enumerate the clinical uses and adverse effects of nitrates and nitrites.</p>	LGIS	
5	Antiarrhythmic drugs	<p>Define Antiarrhythmic Drugs.</p> <p>Review mechanisms of Cardiac Arrhythmias. Understand the Mechanism of Action of Antiarrhythmic Drugs.</p> <p>Classify Antiarrhythmic Drugs.</p> <p>Discuss the Pharmacological actions and Adverse effects of these Drugs.</p>	LGIS	

Diuretics

1	Diuretics: classification, Carbonic Anhydrase Inhibitors & Thiazide diuretics	<p>Classify diuretics according to their mechanism of action.</p> <p>Relate the mechanism of action of carbonic anhydrase inhibitors with their clinical uses. Relate the mechanism of action of thiazide diuretics with their clinical uses.</p> <p>Describe the adverse effects and drug interactions of these diuretics.</p>	LGIS, CBL	MCQs/SEQs/VI VA /OSPE
2	Loop, K-sparing & Osmotic diuretics	<p>Explain the mechanism of action of loop diuretics. Justify the use of these diuretics in different clinical situations.</p> <p>Relate their adverse effects and drug interaction with their mechanism of action.</p> <p>Classify K sparing diuretics according to their receptor selectivity.</p> <p>Justify the use of these drugs in different clinical situations.</p> <p>Relate their mechanism of action with their adverse effects and drug interactions.</p>	LGIS	

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		Relate the mechanism of action of osmotic diuretics with their clinical uses and adverse effects.		
PRACTICALS (provide name of topics if any)				
1		Perform and interpret the effects of cardiac specific drugs on frog's heart	Practical	OSPE
2		Evaluate the effect of drugs on blood vessels of frogs	Practical	OSPE
3		Justify the selection of priority drugs for certain indications of CVS and prescribe medicine accordingly	Practical	OSPE
4		Justify the selection of priority drugs for certain indications of renal system and prescribe medicine accordingly	Practical	OSPE

Assessment Strategies/Method

Formative assessment will be taken throughout the year. Three medium stake assessments will be taken at the end of each block, and one will be taken at the end of year in form of pre-annual exam. Summative assessment will be taken as a professional exam at the end of year.

Formative assessment: MCQs, Class tests (SAQs, SEQs), Presentations, Assignments, Viva

Summative assessment: MCQs, SAQs, Viva, OSCE

BLOCK-2**HEMATOLOGY & IMMUNOLOGY MODULE****LEARNING OUTCOMES OF THE MODULE**

By the end of this module the students will be able to

- Justify the use of drugs in different haematology disorders.

SUBJECT PHARMACOLOGY**SUBJECT SPECIFIC LEARNING OUTCOMES (provided in NUMS curriculum)**

By the end of this module the students will be able to:

Blood

- Justify the management plan of anemia, coagulation disorders and HIV by correlating it to the pathophysiological basis of disease.
- Justify the use of immunostimulants including probiotics, immunosuppressants, vaccines and sera.

Malaria

- Discuss the drug treatment of malaria.

Miscellaneous topics

- Outline the essential pharmacological principles of toxicology.
- Justify the use of drugs in the treatment of Rheumatoid Arthritis.
- Justify the use of drugs in the treatment of gout.

Practical Objectives (if any)

- Justify the advantages and disadvantages of different routes of administration and dosage forms of drugs.
- Interpret and report the effects of drugs in rabbit's eye.

PHARMACOLOGY				
Blood				
Sr#	Topic	Learning Objectives	Instructional Strategies	Assessment Tools
1	Drug treatment of anemia	Discuss the role of iron, Vitamin B12 and folic acid in the treatment of different anemias. Compare anti-anemic drugs based on their Pharmacokinetics, Pharmacodynamics & Adverse effects.	LGIS	MCQs/ SEQs/VIVA/ OSCE
2	Anti coagulants	Justify the role of heparin as anticoagulant. Relate the pharmacological actions of heparin with its adverse effects. Relate the pharmacological actions of warfarin with its clinical uses. Explain adverse effects and drug interactions of warfarin.	LGIS/CBL	
3	Thrombolytics	Define and classify fibrinolytics. Explain their mechanism of action. Enumerate their clinical uses and contraindications.	LGIS	

4	Anti-platelets	Classify anti-platelet drugs and discuss their mechanism of action. Explain their pharmacological actions and pharmacokinetics. Enlist clinical uses and adverse effects of anti-platelet drugs.	LGIS/SGD	
5	<u>Anti hyperlipidemics</u>	Classify anti-hyperlipidemics based on their mechanism of action. Justify the use of anti-hyperlipidemics in various types of hyperlipidemic disorders.	LGIS	
6	<u>Immunosuppressants</u>	Classify immunosuppressants based upon their mechanism of action. Compare the safety profile of these drugs.	LGIS	
7	<u>Immunostimulants, Probiotics, Vaccines & Sera</u>	Justify the use of immunostimulants in different clinical situations. Correlate clinical uses of probiotics, vaccines and different sera with their pharmacological actions.	LGIS	

8	Anti-Malarial drugs	<p>Classify anti-malarial drugs.</p> <p>Explain Schizonticide, Gametocide, Sporontocide, Radical cure, Suppressive Prophylaxis, Terminal Prophylaxis and Causal Prophylaxis with examples. Describe the mechanism of action, uses, adverse effects & contraindications of Chloroquine.</p> <p>Describe mechanism of action, uses, adverse effects & contraindications of Primaquine.</p> <p>Describe mechanism of action, uses & adverse effects of folate synthesis inhibitors.</p> <p>Describe the mechanism of action, uses and adverse effects of Artemisinins.</p> <p>Describe the mechanism of action, uses and adverse effects of Mefloquine, Lumefantrine, Quinine and Quinidine.</p> <p>Enlist drugs used for acute malaria.</p>	LGIS/CBL	
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Miscellaneous Topics

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1	Heavy metal poisoning & Antidotes	<p>Describe the major clinical features and treatment of lead, arsenic, mercury and iron poisoning. Explain the general mechanism of metal chelation. Identify the clinically useful chelators and discuss their indications and adverse effects.</p> <p>Describe the steps involved in the supportive care of the poisoned patient.</p> <p>Identify toxic syndromes associated with overdose of the major drugs or drug groups frequently involved in poisoning.</p> <p>Enlist the antidotes available for management of the poisoned patient.</p>	LGIS	MCQs/ SEQs/VIV A/ OSPE
2	Drug-Drug Interactions	<p>Classify drug-drug interactions based on their mechanisms i.e. pharmacokinetic & pharmacodynamic interactions.</p> <p>Identify common examples of drug interactions and their clinical implications.</p> <p>Describe strategies to minimize the risk of drug-drug interactions in clinical practice.</p>	LGIS	

3	Drugs used in Gout	Classify anti gout drugs based upon their mechanism of action & Clinical uses. Correlate the mechanism of action of anti-gout drugs with their pharmacological actions. Describe adverse effects of these drugs.	LGIS/CBL	
4	Drugs used in Rheumatoid Arthritis	Justify the rationale of clinical use of DMARDs in the treatment of rheumatoid arthritis. Correlate the mechanism of action of DMARDs with their adverse effects.	LGIS	
PRACTICALS (provide name of topics if any)				
1	Calculate different concentrations of drugs or solutions I		Practical	OSPE
2	Justify the selection of priority drugs for certain indications and prescribe medicine accordingly		Practical	OSPE
3	Calculate different concentrations of drugs or solutions II		Practical	OSPE

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Assessment Strategies/Method

Formative assessment will be taken throughout the year. Three medium stake assessments will be taken at the end of each block, and one will be taken at the end of year in form of pre-annual exam. Summative assessment will be taken as a professional exam at the end of year.

Formative assessment: MCQs, Class tests (SAQs, SEQs), Presentations, Assignments, Viva

Summative assessment: MCQs, SAQs, Viva, OSCE

NSAIDs & CNS MODULE

INTRODUCTION

LEARNING OUTCOMES OF THE MODULE

By the end of this module the students will be able to

- Apply their theoretical learning about genetics and neuroscience in relevant clinical scenarios encountered in subsequent years of training and practice.

SUBJECT: PHARMACOLOGY

SUBJECT SPECIFIC LEARNING OUTCOMES (provided in NUMS curriculum)

By the end of this module the students will be able to

NSAIDs

- Justify the use of NSAIDs in inflammation.

CNS

- Correlate the patho physiology of psychiatric illnesses to their management.
- Differentiate between different centrally acting pharmacological agents (LA, GA, opioids).

Justify the use of antiparkinsonian drugs on the basis of pathophysiology of the disease. •

Analyze the effects of anti-epileptic drugs in relation to neuro excitatory illnesses. •

Rationalize the management of migraine.

- Correlate the effects of substances of abuse (alcohol, opioids, heroin) on body to its plan for aversion therapy.
- Appraise the pharmacological effects of sedative/Hypnotics.
- Justify the use of Non Narcotic Analgesics.

Practical Objectives (if any)

PHARMACOLOGY				
Drugs acting on CNS				
Sr#	Topic	Course content	Instructi on al Strategies	Assessm ent Tools
1	Introduction to CNS	State different types of ion channels and neurotransmitter receptors of CNS. Enlist the sites of drug action that act in the CNS. Explain the cellular organization of the brain.	LGIS	MCQs/ SEQs/VIV A/ OSPE
2	Anti-psycho tic drugs	Corelate the treatment of psychosis with underlying pathophysiology. Compare the mechanism of action of typical and atypical anti-psychotic drugs to their clinical uses and safety profile.	LGIS/SGD	

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3	Mood stabilizers	Classify mood stabilizing drugs based on their receptor selectivity. Relate the mechanism of action of mood stabilizing drugs with their clinical uses and safety profile.	LGIS	
4	Anti-depressant drugs	Classify Anti-depressants based on their receptor selectivity. Relate the mechanism of action of TCAs & SNRIs with their clinical uses and safety profile. Compare SSRIs and MAOIs. Relate the mechanism of action of typical and atypical anti-depressant drugs with their clinical uses and safety profile.	LGIS, SGD	
5	General anesthetics	Differentiate among the IV anesthetics based on their mechanisms of action. Relate the pharmacological actions and adverse effects of IV anesthetics with different clinical conditions. Compare different inhalational anesthetics based on their: a) Pharmacokinetic properties b) Mechanism of Action. Select and justify the uses of inhalational anesthetics in different clinical situations based on their safety profile.	LGIS/CBL	
6	Local anesthetics	Classify local anaesthetic agents according to their: a) Chemical nature b) Therapeutic uses. Relate the chemical nature of local anesthetics with their pharmacokinetic properties. Relate the mechanism of action of local anesthetics with their adverse effects and contraindications.	LGIS	

7	Neuro Muscular Blockers	<p>Compare different NM blockers based on their: a) Pharmacokinetics b) Pharmacodynamics c) Adverse effects.</p> <p>Select and justify the use of neuromuscular blockers in different clinical conditions.</p>	LGIS	
8	Drugs used in Parkinson's disease	<p>Justify the use of antiparkinsonian drugs on the basis of pathophysiology of the disease.</p> <p>Classify anti Parkinsonism drugs based on their receptor selectivity.</p> <p>Correlate the mechanism of action of anti Parkinsonism drugs with their clinical uses.</p> <p>Compare the safety profile of different drugs in the treatment of Parkinson's disease.</p>	LGIS	

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9	Anti-seizure drugs	<p>Classify Anti-epileptics based on their Receptor selectivity & Therapeutics.</p> <p>Relate the mechanism of action of Anti-epileptics with their clinical uses.</p> <p>Justify the use of Anti Seizure drugs in different diseases and pregnancy.</p> <p>Compare the safety profile of commonly used Anti epileptic drugs.</p>	LGIS	
10	Sedatives & Hypnotics	<p>Classify Sedative/Hypnotics based on their receptor selectivity.</p> <p>Discuss Benzodiazepines and Barbiturates with reference to their actions and therapeutics.</p> <p>Compare the safety profile of Benzodiazepines and Barbiturates.</p> <p>Discuss new emerging trends of sedative hypnotics in clinical practice.</p>	LGIS	
11	Opioids	<p>Classify opioids based on their receptor selectivity. Relate their pharmacological actions to the receptors.</p> <p>Compare adverse effects of opioids with acute and chronic use.</p> <p>Discuss their potential of abuse and management of opioid overdose.</p>	LGIS/CBL	
12	Skeletal muscle relaxants	<p>Classify skeletal muscle relaxants.</p> <p>Compare the M.O.A of different skeletal muscle relaxants.</p> <p>Correlate the pharmacological actions and adverse effects with their clinical uses.</p>	LGIS	

1 3	Aliphatic alcohols	Identify common examples of aliphatic alcohols used in pharmacotherapy. Discuss pharmacokinetics of ethanol and methanol. Recognize the clinical manifestations of acute ethanol intoxication and methanol poisoning and correlate with their pharmacological actions. Identify potential drug interactions involving aliphatic alcohols. Discuss the management of alcohol intoxication.	LGIS	
1 4	Drugs used in Migraine	Classify anti migraine drugs based on their mechanism. Rationalize the management of migraine. Compare the safety profile of different drugs in the treatment of migraine.	LGIS	
NSAIDs				

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1	Non narcotic analgesics/ NSAIDs	Classify NSAIDs based on their receptor selectivity. Correlate the mechanism of action of NSAIDs with their clinical uses. Differentiate between Non Selective and Selective COX-2 Inhibitors. Compare the safety profile of different NSAIDs and discuss management of toxicity.	LGIS, CBL	MCQs/ SEQs/VIVA/ OSPE
PRACTICALS (provide name of topics if any)				
1	Interpret and report the effects of CNS stimulants/ depressants on frog		Practical	OSPE
2	Calculate different concentrations of drugs or solutions		Practical	OSPE
3	Justify the selection of priority drugs for certain indications and prescribe medicine accordingly		Practical	OSPE

Assessment Strategies/Method

Formative assessment will be taken throughout the year. Three medium stake assessments will be taken at the end of each block, and one will be taken at the end of year in form of pre-annual exam. Summative assessment will be taken as a professional exam at the end of year.

Formative assessment: MCQs, Class tests (SAQs, SEQs), Presentations, Assignments, Viva

Summative assessment: MCQs, SAQs, Viva, OSCE

RESPIRATORY SYSTEM MODULE

INTRODUCTION

LEARNING OUTCOMES OF THE MODULE

By the end of this module the students will be able to

- Relate their theoretical learning about respiratory system in relevant clinical situations.

SUBJECT: PHARMACOLOGY

SUBJECT SPECIFIC LEARNING OUTCOMES (provided in NUMS curriculum)

By the end of this module the students will be able to

Respiratory System

- Develop a management plan for cough and obstructive pulmonary disorders (Asthma, COPD) with justification.
- Validate the use of antihistamines in various allergic disorders.

Practical Objectives (if any)

PHARMACOLOGY				
Respiratory System				
Sr#	Topic	Course content	Instructional Strategies	Assessment Tools
1	Drugs used in bronchial asthma	Describe the mechanism of action & adverse effects of Beta 2 agonists used in asthma. Describe the mechanism of action, Pharmacological actions & adverse effects of Methylxanthines. Describe mechanism of action and adverse effects of Mast Cell Stabilizers. Discuss the roles of corticosteroids in the treatment of bronchial asthma. Discuss the role of ipratropium in asthma. Discuss the mechanism of action and adverse effects of leukotrine synthesis inhibitors and receptor blockers used in asthma. Enlist drugs used in acute and chronic asthma.	LGIS, CBL	MCQs/ SEQs/VIVA/ OSPE
2	Anti-Histamines	Classify the histamine antagonists and discuss their pharmacokinetics. Compare first and second generation antihistamines. Enlist their uses, adverse effects and drug interactions.	LGIS	

3	Expectorants & Anti-tussives	Differentiate among anti-tussive, mucolytics and expectorants.	LGIS, SGD	
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		Classify Anti-tussives. Describe Pharmacodynamics of these drugs.		
PRACTICALS (provide name of topics if any)				
1	Interpret the dose response curve		Practical	OSPE
2	Justify the selection of priority drugs for certain indications and prescribe medicine accordingly for Bronchial Asthma & Allergic Rhinitis		Practical	OSPE

Assessment Strategies/Method

Formative assessment will be taken throughout the year. Three medium stake assessments will be taken at the end of each block, and one will be taken at the end of year in form of pre-annual exam. Summative assessment will be taken as a professional exam at the end of year.

Formative assessment: MCQs, Class tests (SAQs, SEQs), Presentations, Assignments, Viva

Summative assessment: MCQs, SAQs, Viva, OSCE

BLOCK-3

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INTRODUCTION

LEARNING OUTCOMES OF THE MODULE

By the end of this module the students will be able to

- Justify the use of drugs in GIT and Endocrinological disorders
- Receive the patients of GIT disorders in medical and surgical wards

SUBJECT PHARMACOLOGY

SUBJECT SPECIFIC LEARNING OUTCOMES (provided in NUMS curriculum)

By the end of this module the students will be able to:

GIT

- Develop and justify the management plan of common disorders of gastrointestinal tract (peptic ulcer, vomiting, constipation, diarrhea and hepatitis).

Endocrinology

- Justify different treatment modalities for all types of diabetes mellitus.
- Rationalize the therapeutic uses of thyroid/anti-thyroid drugs, osteoporosis and adrenal hormones in different disorders.
- Justify the clinical use of gonadal hormones in relation to reproductive physiology.

Rationalize different treatment modalities for infertility.

Practical Objectives (if any)

PHARMACOLOGY

Drugs acting on GIT

Sr#	Topic	Learning Objectives	Instructional Strategies	Assessment Tools
1	Anti-emetics	Classify anti-emetics according to: Mechanism of action & Therapeutic uses. Relate the Mechanism of action of anti-emetics with their adverse effects.	LGIS	MCQs/SEQs/VI VA/OSPE
2	Anti-diarrhea drugs	Classify anti-diarrheal therapeutically. Relate mechanism of action of these drugs with their adverse effects.	LGIS	
3	Laxatives/ Purgatives	Compare laxatives, purgatives and cathartics based on their definitions. Differentiate between the mechanism of actions and adverse effects of different drugs of this group. Justify the use of lactulose in the treatment of hepatic encephalopathy.	LGIS	

4	Drugs used in Peptic ulcer	<p>Classify anti-peptic ulcer drugs based on their mechanism of action.</p> <p>Justify the symptomatic use of antacids in acid peptic disease.</p> <p>Relate their chemical reactions with their adverse effects.</p> <p>Explain drug interactions of antacids. Compare the</p>	LGIS/SGD	
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		<p>efficacy of H₂ receptor blockers and proton pump inhibitors in terms of acid suppression. Relate the adverse effects of H₂ blockers with different clinical situations.</p> <p>Justify the safety profile of proton pump inhibitors. Relate the mechanism of action of mucosal protective agents with their clinical uses and adverse effects. Compare the different drug regimens used for the eradication of H. Pylori infection.</p>		
Endocrinology				
1	Anti-Diabetic drugs: Oral Hypoglycemics	<p>Classify oral hypoglycemics based on their: MOA & Chemical nature.</p> <p>Compare different hypoglycemics based on their: Pharmacokinetics & Pharmacodynamics.</p> <p>Relate the mechanism of action of oral hypoglycemics with their clinical uses.</p> <p>Compare the safety profile of oral hypoglycemics.</p>	LGIS	

2	Anti-Diabetic drugs: Insulin	Classify different insulins based on their duration of action. Relate the pharmacokinetic of different insulins with their duration of action and clinical uses. Compare different insulin delivery systems based on their clinical significance. Enlist the adverse effects of insulins.	LGIS/SGD	MCQs/ SEQs/VI VA/OSPE
3	Thyroid/ Anti thyroid drugs	Enlist different thyroid preparations. Compare the pharmacological actions of different preparations with their clinical uses & adverse effects. Classify antithyroid drugs based on their MOA. Compare the safety profile of different anti-thyroid drugs.	LGIS, CBL	
4	Adrenal Hormones	Classify corticosteroids based on their duration of action. Relate the pharmacological actions of these drugs with their adverse effects. Select and justify the use of these drugs in different clinical situations.	LGIS	
5	Drug treatment of Osteoporosis	Classify drugs used in osteoporosis based on their mechanism of action. Identify the adverse effects caused by these drugs.	LGIS	
6	Gonadal Hormones: (Estrogen, Progesterone & Anabolic steroids)	Enumerate estrogen & progestin preparations. Describe uses & adverse effects of estrogen & progestin preparations. Classify estrogen & progesterone antagonists. Describe mechanism of action, uses & adverse effects of estrogen & progestin antagonists. Enumerate androgen preparations. Describe uses & adverse effects of androgen preparations. Enumerate Anti-androgens. Describe mechanism of action, uses & adverse effects of Anti-Androgens.	LGIS	

7	Hormonal Contraceptives	<p>Classify hormonal Contraceptives.</p> <p>Describe the mechanism of action of hormonal contraceptives.</p> <p>Explain the advantages and disadvantages of the Progestin Only Pill (Minipill).</p> <p>Enumerate post-coital contraceptives.</p> <p>Describe adverse effects of Oral contraceptives. Discuss contraindications of Oral Contraceptives.</p>	LGIS/CBL	
8	Oxytocic drugs & Uterine relaxants	<p>Classify Tocolytics.</p> <p>Describe the pharmacodynamics of tocolytic agents. Classify Uterine Stimulants.</p> <p>Describe actions of Oxytocin.</p> <p>Discuss the uses & adverse effects of Oxytocin.</p>	LGIS	

9	Drug treatment of Infertility	Define infertility. Discuss various drugs used for infertility according to their MOA and adverse effects. Compare the efficacy and safety profile of various drugs used to treat infertility.	LGIS	
PRACTICALS (provide name of topics if any)				
1	Justify the selection of priority drugs and prescribe medicine accordingly for Diabetes (type I & II), Hyperthyroidism & Endocrinological disorders		Practical	OSPE
2	Interpret and report the effects of drugs on isolated rabbit's ileum Interpret the dose response curve on rabbits ileum		Practical	OSPE

Assessment Strategies/Method

Formative assessment will be taken throughout the year. Three medium stake assessments will be taken at the end of each block, and one will be taken at the end of year in form of pre-annual exam. Summative assessment will be taken as a professional exam at the end of year.

Formative assessment: MCQs, Class tests (SAQs, SEQs), Presentations, Assignments, Viva

Summative assessment: MCQs, SAQs, Viva, OSCE

INFECTIOUS DISEASES & NEOPLASIA

INTRODUCTION

LEARNING OUTCOMES OF THE MODULE

By the end of this module the students will be able to

- Relate the pathogenesis of common infectious diseases to justify their treatment modalities. •

Recognize the common clinical infectious diseases in community.

- Discuss preventive measures of common infectious diseases in community.
- Follow steps of history taking and examinations for establishing diagnosis.

SUBJECT PHARMACOLOGY

SUBJECT SPECIFIC LEARNING OUTCOMES (provided in NUMS curriculum)

By the end of this module the students will be able to

Infectious Diseases

- Justify the treatment modalities for various microbes (bacteria, viruses) according to mode of action, resistance patterns and regional current practices.
- Justify the management plan of tuberculosis according to mode of action, resistance patterns and regional current practices.
- Justify the use of anti-viral, anti-fungal, anti-amoebic and anti-helminthics in respective diseases. •

Develop and justify the management plan of hepatitis B & C.

- Justify the use of different dermatological drugs, topical drugs, anti seborrheics, locally acting enzymes.

Neoplasia

- Appraise the principles of cancer chemotherapy in relation to its current therapeutic modalities. •

Rationalize the drug therapy in disease states such as renal and hepatic disease. • Classify various anti cancerous drugs on the basis of their mode of action.

Practical Objectives (if any)

PHARMACOLOGY				
Infectious Diseases				
Sr#	Topic	Course content	Instructional Strategies	Assessment Tools
1	Introduction & General principles of Chemotherapy	Classify anti-bacterial based on mechanism of action. Classify antibiotics into bacteriostatic and bactericidal. Explain MIC. Explain post-antibiotic effect with examples. Describe Dose-dependent & time-dependent killing. Discuss the factors affecting selection of an antimicrobial. Discuss the advantages & disadvantages of combination antimicrobial therapy.	LGIS	

		<p>Explain the principles of prophylactic & empirical antibiotic therapy.</p> <p>Discuss the causes of failure of anti-microbial therapy. Discuss the mechanisms by which resistance develops to antibiotics.</p> <p>Explain cross-resistance.</p>		
2	Cell Wall Synthesis Inhibitors: Penicillin	<p>Enlist groups of Cell Wall Inhibitors.</p> <p>Classify Penicillins.</p> <p>Describe mechanism of action of Penicillins.</p> <p>Describe anti-bacterial spectrum of Penicillins. Enlist uses & adverse effects of Penicillins.</p> <p>Describe mechanisms of resistance to Penicillins</p>	LGIS	MCQs/ SEQs/ VIV A/OSP E
3	Cell Wall Synthesis Inhibitors: Cephalosporin & Miscellaneous	<p>Classify Cephalosporins.</p> <p>Describe mechanism of action of Cephalosporins.</p> <p>Discuss anti-bacterial spectrum of different generations of Cephalosporins.</p> <p>Discuss uses and adverse effect of Cephalosporins based on their spectrum knowledge.</p> <p>Describe the Mechanism of action, Spectrum, uses & adverse effects of Monobactams & Carbapenems. Describe the mechanism of action and Spectrum of Vancomycin.</p> <p>Enumerate uses & adverse effects of Vancomycin.</p>	LGIS	
4	Protein Synthesis Inhibitors: (Tetracyclines, Macrolides & Miscellaneous)	<p>Enlist groups of Protein synthesis Inhibitors.</p> <p>Classify Tetracyclines.</p> <p>Describe the mechanism of action of Tetracyclines.</p> <p>Describe the anti-bacterial spectrum of tetracyclines. Enlist uses and adverse effects of Tetracyclines. Describe contraindications of Tetracycline.</p> <p>Enlist Macrolides.</p> <p>Discuss mechanism of action of Macrolides & Clindamycin</p> <p>Discuss the spectrum of antibacterial activity of Macrolides.</p> <p>Discuss the uses of Macrolides based on their</p>	LGIS, SGD	

		spectrum. Discuss the adverse effects of macrolides. Discuss the uses and adverse effects of Clindamycin.		
5	Aminoglycosides	Classify Aminoglycosides. Explain the pharmacokinetics of Aminoglycosides. Explain the mechanism of action of Aminoglycosides. Describe spectrum & clinical uses of Aminoglycosides. Identify adverse effects and contra indications.	LGIS	
6	DNA Synthesis Inhibitors: Sulfonamides	Describe the mechanism of action of Sulfonamides & Cotrimoxazole. Describe spectrum, uses and adverse effects of Sulfonamides & Cotrimoxazole.	LGIS	
7	DNA Synthesis Inhibitors: Quinolones	Classify fluoroquinolones. Describe the mechanism of action of Fluoroquinolones. Discuss the uses of Fluoroquinolones based upon their spectrum. Discuss the adverse effects & contraindications of Fluoroquinolones in pregnancy and in children.	LGIS	

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8	Anti-TB Drugs	<p>Enlist 1st line Anti TB Drugs. Discuss their mechanism of action. Discuss the adverse effects and drug interaction Anti TB Drugs. Enlist 2nd line Anti TB Drugs. Discuss their mechanism of action. Discuss their adverse effects and drug interaction.</p>	LGIS/CBL	
9	Anti-Fungal Drugs	<p>Classify antifungal drugs based on their mechanism of action. Describe the spectrum of antifungal activity of amphotericin B. Describe MOA, uses & adverse effects of amphotericin B. Describe mechanism of action of Flucytosine. Enlist uses & adverse effects of Flucytosine. Discuss MOA, uses and adverse effects of Azoles. Discuss drug interactions of Ketoconazole. Discuss MOA, uses and adverse effects of Griseofulvin and Terbinafine.</p>	LGIS	

		Discuss uses of topical anti-fungal drugs. Describe the MOA, uses and adverse effects of Echinocandins.		
10	Anti-Amoebic Drugs	Classify anti-amoebic therapeutically. Relate the mechanism of action of each group with their adverse effects and drug interactions.	LGIS	
11	Anti Helmintics	Classify anthelmintics therapeutically. Compare different drugs of this group based on: Mode of administration, Mechanism of action & Safety profile.	LGIS	
12	Anti-Viral Drugs: Treatment of Hep B & C	Classify anti-viral drugs based on the viral disease being treated. Classify anti-viral drugs based on mechanism of action of drugs. Discuss drugs used for treatment of Hepatitis B and C viral infections. Discuss the mechanism of action, uses & adverse effects of Interferons.	LGIS, SGD	
13	Anti-Viral Drugs: Treatment of HIV & Influenza virus	Discuss mechanism of action of Anti-Retroviral drugs. Enlist adverse effects of Anti-retroviral drugs. Describe drugs used in the HAART regime. Describe mechanism of action and adverse effects of Acyclovir, Ganciclovir, Ribavirin and Foscarnet.	LGIS	
14	Topical Drugs, Anti-Septics & Disinfectants	Define and differentiate between anti-septics and disinfectants. Discuss the mode of action for common antiseptics and disinfectants. Identify common topical drugs used in dermatology and ophthalmology. Apply knowledge of topical drugs to clinical scenarios.	LGIS	
Neoplasia				
1	General	Understand the principles of chemotherapy.	LGIS	MCQs/

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	Principles of Cancer Chemo & Radio therapy	Discuss the different stages of cell cycle. Explain cancer treatment modalities. Classify anti cancer drugs.]		SEQs/ VIV A/OSP E
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2	Anti-Cancer Drugs	Describe mechanism of action ,uses , adverse effects of anticancer antibiotics. Discuss the role of various anti cancer drugs in chemotherapy. Compare the indications and safety profiles of various anti0cancer drugs.	LGIS, CBL	
PRACTICALS (provide name of topics if any)				
1	Calculate different concentrations of drugs or solutions IV		Practical	OSPE
2	Write an appropriate prescription for various infectious diseases		Practical	OSPE

Assessment Strategies/Method

Formative assessment will be taken throughout the year. Three medium stake assessments will be taken at the end of each block, and one will be taken at the end of year in form of pre-annual exam. Summative assessment will be taken as a professional exam at the end of year.

Formative assessment: MCQs, Class tests (SAQs, SEQs), Presentations, Assignments, Viva

Summative assessment: MCQs, SAQs, Viva, OSCE

LIST OF RECOMMENDED BOOKS & OTHER LEARNING RESOURCES

SUBJECT	RESOURCES
PHARMACOLOGY	<ul style="list-style-type: none"> • Katzung's Basic and Clinical Pharmacology, 16th Edition • Goodman & Gilman's: The Pharmacological Basis of Therapeutics, 14th Edition • Lippincott Illustrated Reviews: Pharmacology, 8th Edition
	<ul style="list-style-type: none"> • Recorded lectures • Websites link • videos • Google classroom • Or any other resource