

Department of Pharmacology



**Study Guide For
3rd Year MBBS**

**Sharif Medical & Dental College,
Lahore**



PREFACE

Study guides can make a major contribution to learning. They are sometimes likened to a tutor sitting on the student's shoulder-available 24 hours a day to advise the student what he/she should be doing at any stage in their study. Study guides are different from textbooks. They apprise the student at the beginning of an academic session about the course outline, the teaching methodology to be followed throughout the year, learning objectives of each academic activity and the assessment methodology to be followed in an academic session.

At SMDC we follow the traditional annual academic schedule in which the subject of Pharmacology and Therapeutics is taught in the third academic year of a medical student. Keeping in view the mission of UHS, Lahore and vision of our institute we have designed a training program which is intensive and at the same time interesting for the young minds. This guide includes details about various teaching activities which are to take place throughout the academic year along with the time allocation of each. A list of lectures to be conducted in this session with names of the instructors is attached. Broad learning outcomes of every section of the course accompanied by specific learning objective of every lecture is also included. A complete list of practical work to be carried out in the laboratory is part of this document. Details of various assessment and testing methodology are included and marks distribution for the subject in the 3rd Professional examinations has been given. Names and email contacts of faculty have also been mentioned to foster better interaction between the teacher and the taught. A list of prescribed text and reference books forms part of this study guide. Since this document is the first of its kind we intend to improve upon it in light of the student-feedback every year. For now happy reading.

Dr. Salman Bakhtiar
MBBS, M.Phil
Prof. & HOD of Pharmacology Deptt
SMDC, Lahore

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Vision & Mission of UHS

Qualitative and Quantitative Revolution in Medical Education and Research through Evolution and thereby improve Health Care delivery to Populace.

UHS shall be innovative global center of excellence in learning and research, supporting a community of scholars and professionals committed to serving society, promoting the development of students to reach their true potential in becoming competent, ethical, caring, and inquiring health professionals for the benefit of the country and the wider world.

Mission of SMDC

Sharif Medical & Dental College is dedicated to best serve the nation through preservation and dissemination of advanced knowledge and educating the students by latest trends in learning and research reaching levels pars excellence.

The Institution is committed to provide standardized quality medical education to its students by inculcating professional knowledge, skills and responsibilities in them with the aim of:

- Preparing them as modern physicians having initiative to act as future leaders in their respective fields and becoming lifelong learners.
- Encouraging the spirit of critical thinking through research and publication.
- Building up an understanding of the ethical values compatible with our religion, culture and social norms.
- Developing a sense of being responsible citizens of the society possessing professional competence and instilling in them the values of hard work and dedication thus preparing them to be accountable to the stakeholders and the state.

The Institution is devoted to keep abreast its faculty with the latest trends in Medical Education encompassing teaching/learning methodologies, assessment tools, research opportunities and professionalism to facilitate their professional development, competencies and commitment towards continues learning.

Our patient-centered mission is achieved by outstanding medical care & services in professional practice with due emphasis and focus on our local health needs.

Our mission further elaborate upon establishing academic and research facilities in areas of local demand under global gold standards and leading advancement in research, education & patient care.

Vision of SMDC

To be recognized for the provision of a safe and functional environment conducive to collaborative teaching & learning, comfortable working atmosphere and conducting world class research through professionalism and excellence.



LIST OF CONTENTS

Sr. No	Topic	Page No's
01	Planned Teaching Activities	01
02	Training Program for Lectures	02
03	List of Lectures in the Subject of Pharmacology and their Learning Objectives	08
04	List of Practical's	31
05	Assessment Plan	32
06	Staff Contacts	33
07	Prescribed Text Books & References	34



PLANNED TEACHING ACTIVITIES FOR 3rd YEAR MBBS DEPARTMENT OF PHARMACOLOGY

PMC has allocated 300 hours of teaching in the subject of Pharmacology and Therapeutics for the MBBS course. In order to meet this requirement following teaching modules have been planned. These modules have been carefully designed to impart core knowledge of Pharmacology in a manner that an undergraduate student can grasp the subject fully and is adequately prepared for university examinations.

Lectures:

A total of 140-150 lectures are planned for the entire year. The lectures will be conducted by the Professor, associate and assistant professors or by senior lecturers that have completed their post-graduation in the subject of pharmacology. The lectures will be interactive and students should actively participate in them to clear their doubts. The students are required to take notes of the lectures and study the topic with the help of prescribed text books in light of the learning objectives of the topic enunciated by the teacher at the beginning of each lecture.

Practical classes:

One practical class has been planned per week. It will comprise of pharmacodynamics practicals on isolated tissues and intact animals, pharmaceutical calculations, dosage forms and their intended use, prescription writing and P-drug concepts, basic biostatistics and standardization of drugs. The class will be divided into 03 batches to conduct the practicals effectively and one batch will be entertained once a week for these sessions. Practical will be conducted by demonstrators under an active supervision of senior instructors. Students are required to enter their work in their practical note books and get them checked by the instructors regularly.

Tutorials:

One tutorial class per week is proposed throughout the academic session. The class will be divided into 03 batches. Topics for the tutorial will be notified at least one week before the class. Two instructors, one senior and one junior, will be deputed for every batch on rotation basis. A pre-tutorial quiz or test will be held before tutorial discussion so that the students come prepared for the topic. During this interactive session the students must clear their concepts regarding the topic by actively engaging with their respective teachers.

Case based learning:

Case based learning classes will be conducted from time to time throughout the academic year. A clinical problem with a short history will be notified at least one week before the occurrence. The learning objectives and suggested reading material will also be notified along with it. The class will be divided into smaller groups for effective conduct of the proceedings. A senior instructor will be facilitating the discussion in interactive session and students are required to generate the discussion amongst themselves in line with the learning objectives of the topic.

Seminars:

Departmental seminars are to take place periodically once the students have covered a substantial quantum of course work. Preferably clinical topics will be allocated to students and they will present a very short case history with ongoing treatment of the patient along with other available drug treatment options. Each presentation will be of 10-15 minutes duration with a Q & A session after it. All seminars on clinical topics will be conducted in coordination with the clinical side and wherever possible relevant clinical consultant would be requested to participate in the session.



TRAINING PROGRAM FOR
LECTURES DEPARTMENT OF
PHARMACOLOGY
3rd YEAR MBBS CLASS

GENERAL

- Pharmacology should be considered as a bridge between the basic and clinical medical subjects. The teaching of this subject should encompass both the basic and the applied aspects.
- Teaching of Pharmacology should be integrated with other subjects e.g. General Pathology, Microbiology and clinical disciplines where ever possible.
- Interactive modes of teaching e.g. tutorials, seminars, case –based learning modules etc. should be an essential part of teaching methodology.
- Keeping in view the expanding scope of the subject and an exponential increase in the number of available drugs, the subject may be divided into areas of high, intermediate and low priority so that more emphasis could be laid on the areas which are more pertinent to treatment of common illnesses.

GENERAL PHARMACOLOGY

Sr. No	Title of Lecture	Instructors
01	Pharmacology: Introduction	Dr. Salman
02	Pharmacology: Branches / Divisions of Pharmacology, Role in Medicine.	Dr. Maira
03	Scientific sources of drug information, pharmacopeias, formularies, essential drug list. Sources of drugs/active principals	Dr. Sabeen
04	Absorption of drugs: processes	
05	Factors modifying drug absorption.	
06	Distribution and plasma protein binding of drugs	Dr. Maira
07	Biotransformation of drugs.	Dr. Fouzia
08	Factors modifying biotransformation	
09	Bioavailability: clinical significance and factors affecting	Dr. Salman Bakhtiar
10	Half life of drugs: factors affecting and clinical significance.	
11	Excretion of drugs. Drug clearance, Elimination and kinetics	
12	Mechanisms of drug action – I	
13	Mechanisms of drug action – II	
14	Factors modifying actions & doses of drugs – I	Dr. Salman Bakhtiar
15	Factors modifying actions & doses of drugs – II	
16	Factors modifying actions & doses of drugs – III	
17	Drug dependence – Drugs of abuse	Dr. Fouzia



DRUGS ACTING ON ANS

Sr. No	Title of Lecture	Instructors
01	A N S : Introduction-I&II	Dr. Salman Bakhtiar
02	Catecholamines – I Adrenaline.	
03	Catecholamines – II Nor adrenaline, Dopamine & Dobutamine.	
04	Non Catecholamines: Ephedrine, Amphetamines α receptor agonists etc.	
05	Adrenergic Blockers. Alpha-receptor Blockers.	Dr. Fouzia
06	Adrenergic Blockers: Beta receptor Blockers – I.	Dr. Salman
07	Beta Receptor Blockers- II	
08	Central Sympathoplegics	Dr. Fouzia
09	Cholinergic drugs. Classification, Cholinesters, alkaloids etc.	Dr. Sabeen Arjuman
10	Anti Cholinesterases	
11	Organophosphate poisoning & Oximes	
12	Cholinergic blockers; Natural alkaloids. Comparison between Hyoscine & Atropine.	Dr. Salman
13	Semisynthetic Anticholinergics.	
14	Skeletal Muscle Relaxants-I	Dr. Maira
15	Skeletal Muscle Relaxants-II	

DRUGS ACTING ON CNS

Sr. No	Title of Lecture	Instructors
01	Central Neurotransmission – I	Dr. Salman
02	Central Neurotransmission – II	
03	Gen Anaesthetics – I, Classification, Method of administration, Pharmacokinetics of inhalational Anaesthetics	Dr. Sabeen Dr. Sabeen
04	Gen Anesthetics-II, Pre- anesthetic medication, Stages of Anesthesia, Mechanism of action	
05	General Anesthetics-III, Volatile liquids	
06	General Anesthetics-IV, Gases& Intravenous anesthetics	
07	Local Anaesthetics-I	Dr. Salman
08	Local Anaesthetics-II	
09	Aliphatic Alcohols. Chronic alcoholism, Aversion therapy	Dr. Sabeen
10	Sedative & Hypnotics – I. Introduction & Classification	Dr. Fouzia
11	Sedative & Hypnotics- II. Barbiturates	
12	Sedative & Hypnotics- III. Benzodiazepines	Dr. Fouzia

13	Antiepileptic drugs-I .Classification, hydantoin derivatives	Dr. Salman Bakhtiar
14	Antiepileptic drugs- II. Carbamazepine, valproic acid	
15	Antiepileptic drugs- III. Barbiturates, Succinimides, Benzodiazepines and newer drugs	
16	Introduction to Psycho Pharmacology	
17	Antipsychotic drugs-I Classification, Mechanism of action	
18	Antipsychotic drugs-II	
19	Anti depressants-I. Introduction, Classification, Mechanism of Action	Dr. Maira Bhatti
20	Anti depressants-II	
21	Drugs used in Parkinsonism -I	
22	Drugs used in Parkinsonism -II	
23	Analgesics –I : Introduction, Classification	Dr. Fouzia
24	Analgesics – II: Morphine	
25	Analgesics –III: Semisynthetic/ synthetic opioids. & opioid antagonists	
26	NSAIDs: Classification, Mechanism of Action	Dr. Salman Bakhtiar
27	Aspirin & other Salicylates	
28	Propionic acid, Acetic acid der. Paracetamol	
29	Analgesics - IV: Gold & Other Ant rheumatoid drugs	
30	Anti gout drugs	

DRUGS ACTING ON C V S

Sr. No	Title of Lecture	Instructors
01	Physiology of Heart	Dr. Maira Bhatti Dr. Maira Bhatti
02	Drug treatment for heart failure	
03	Cardiotonic drugs. Management of cardiotoxicity of cardiac glycosides	
04	Anti anginal drugs – I	Dr. Salman Bakhtiar
05	Anti anginal drugs - II	
06	Drug Treatment of IHD	
07	Antihypertensive drugs-I Sympatholytic drugs	Dr. Sabeen Arjumand
08	Antihypertensives drugs-II Diuretics. Ca ⁺⁺ Channel blockers	
09	Antihypertensives-III, ACE inhibitors, AT receptor Antagonist Directly acting vasodilators	
10	Anti arrhythmic drugs – I	Dr. Salman
11	Anti arrhythmic drugs – II	



12	Anti arrhythmic drugs – III	Bakhtiar
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DRUG AFFECTING WATER & ELECTROLYTES BALANCE

Sr. No	Title of Lecture	Instructors
01	Diuretics: Introduction, Classification. Carbonic Anhydrase Inhibitors.	Dr. Salman Bakhtiar
02	Diuretics: Thiazides	
03	Diuretics: Loop	
04	Diuretics: K ⁺ sparing	
05	Osmotic & Misc groups	

CHEMOTHERAPY

Sr. No	Title of Lecture	Instructors
01	Introduction, General Principles of Chemotherapy	Dr. Salman
02	Mechanism of resistance	
03	Sulfonamides	Dr. Maira
04	Trimethoprim & Cotrimoxazole	
05	Antibiotics, Penicillins	Dr. Salman
06	Antibiotics, Penicillins – Semisynthetics	
07	Antibiotics, Cephalosporins	
08	Macrolides. Antibiotics: Broad spectrum	
09	Antibiotics: Broad spectrum, Tetracyclines	Dr. Maira
10	Chloramphenicol	
11	Antibiotics: Aminoglycosides	Dr. Salman
12	Quinolones	Dr. Maira
13	Misc Drugs: Clindamycin, Fusidic acids, vancomycin, Nitrofurantoin,	Dr. Sabeen
	Linezolid	
14	Antituberculosis drugs – I	Dr. Fouzia Perveen
15	Antituberculosis drugs – II	
16	Antituberculosis drugs – III	
17	Anti fungal drugs-I	Dr. Maira
18	Anti fungal drugs-II	
19	Anti viral drugs –I	Dr. Fouzia Perveen
20	Anti viral drugs –II	
21	Anti viral drugs –III	
22	Anti Malarial – I	Dr. Sabeen
23	Anti Malarial – II	
24	Anti Malarial – III	

25	Anti Amoebics – I	Dr. Salman
26	Anti Amoebics – II	
27	Antihelmintics – I	Dr. Sabeen
28	Antihelmintics – II	
29	Antineoplastics – I. Alkylating agents	Dr. Salman
30	Antineoplastics – II. Antimetabolites	
31	Antineoplastics – III. Vinca Alkaloids, Antibiotics & Hormones	
32	Immunosuppressants	Dr. Maira

ENDOCRINOLOGY

Sr. No	Title of Lecture	Instructors
01	Antidiabetic drugs: Introduction Classification	Dr. Salman
02	Antidiabetic drugs:, Insulins	
03	Antidiabetic drugs: Oral antidiabetic agents	
04	Thyroid hormones	Dr. Maira bhatti
05	Antithyroid drugs	
06	Adrenal Hormones – I	Dr. Salman
07	Adrenal Hormones – II	
08	Sex Hormones: Estrogens & Progestins, Anabolics	Dr. Sabeen Arjuman
09	Drug used in the treatment of infertility	
10	Hormonal contraceptives	
11	Oxytocic drugs and Uterine Relaxants	
12	Drug treatment of osteoporosis	Dr. Salman
13	Hypothalamic & Pituitary hormone - I	Dr. Fouzia
14	Hypothalamic & Pituitary hormone - II	

DRUGS ACTING ON BLOOD

Sr. No	Title of Lecture	Instructors
01	Haematinics-I	Dr. Maira Bhatti
02	Haematinics-II	
03	Anticoagulants. Introduction, Classification. Heparin	Dr. Fouzia Perveen
04	Oral Anticoagulants	
05	Thrombolytic	
06	Antiplatelet drugs	



07	Anti Hyperlipoproteinaemics-I	Dr. Salman Bakhtiar
08	Anti Hyperlipoproteinaemics-II	
09	Anti Hyperlipoproteinaemics-III	

DRUGS ACTING ON G I T

Sr. No	Title of Lecture	Instructors
01	Anti emetics	Dr. Maira
02	Antidiarrhoeals	Dr. Sabeen
03	Purgatives/laxatives	Dr. Fouzia
04	Drugs used in Peptic Ulcer – I	Dr. Salman
05	Drugs used in Peptic Ulcer – II	
06	Drugs used in Peptic Ulcer – III	
07	IBD & IBS	Dr. Sabeen

DRUGS ACTING ON RESPIRATORY SYSTEM

Sr. No	Title of Lecture	Instructors
01	Expectorants & Antitussives	Dr. Fouzia
02	Antiasthmatics– I	Dr. Maira
03	Antiasthmatics– II	

MISC

Sr. No	Title of Lecture	Instructors
01	Antihistamines-I	Dr. Salman
02	Antihistamines-II	
03	Autacoids and prostaglandins	Dr. Sabeen
04	Drug treatment of Migraine	Dr. Maira
05	Heavy Metal Poisoning & Antidotes (Chelating Agents)	Dr. Fouzia
06	Drug treatment of glaucoma	Dr. Salman
07	Drug - Drug Interactions	
09	Drugs of choice – Rational use of drugs	Dr. Salman



**LIST OF LECTURES IN THE SUBJECT OF PHARMACOLOGY
AND THEIR LEARNING OBJECTIVES
DEPARTMENT OF PHARMACOLOGY &
THERAPEUTICS 3rd YEAR MBBS CLASS**

GENERAL PHARMACOLOGY

This course deals with the general principles of Pharmacology & Therapeutics. This serves to make the base for study of systemic Pharmacology and rational use of drugs in clinical practice. For this purpose emphasis should be laid on the clinical Pharmacokinetic and Pharmacodynamic parameters and the phenomena that lead to drug-drug interactions. At the end of the course student must be able to define the basic terminology of pharmacology, describe the various mechanism of drug actions and other concepts of pharmacodynamics.

S.NO.	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1.	Pharmacology: Branches / Divisions of Pharmacology, Role in Medicine. By the end of the lecture the student will be able to <ol style="list-style-type: none">1. Enumerate various branches of pharmacology.2. Define branches of pharmacology.3. Explain the branches of the subject with the help of at least one example.4. Relate the role of various branches in medicine.
2.	Scientific sources of drug information, pharmacopeias, formularies, essential drug list. Sources of drugs/active principles. By the end of the lecture the student will be able to <ol style="list-style-type: none">1. Recall authentic sources of drug information.2. Define pharmacopeia.3. Explain the importance of pharmacopeias, formularies and essential drug list.4. Enumerate various sources of drugs.5. Describe DNA recombinant technique and its role as a source of drugs.6. Define and explain the active principles of drugs with examples.
3.	Absorption of drugs: processes By the end of the lecture the student will be able to <ol style="list-style-type: none">1. Enlist different processes involved in passage of drugs through membranes.2. Define various processes of absorption of drugs.3. Explain the characteristics of absorptive processes with examples of each.
4.	Factors modifying drug absorption. By the end of the lecture the student will be able to <ol style="list-style-type: none">1. Enumerate factors modifying absorption of drugs.2. Classify various factors into those related to body and those related to drugs.3. Explain various factors by quoting at least one example for each factor.
5.	Distribution and plasma protein binding of drugs. By the end of the lecture the student will be able to <ol style="list-style-type: none">1. Define distribution of drugs.2. Explain phases of drug distribution: Fast and Slow3. Explain redistribution of drugs with an example4. Enumerate factors effecting distribution of drugs.5. Explain the importance of plasma protein binding.6. Define volume of distribution7. Explain volume of distribution as a measure of drug distribution with examples.

6.	<p>Biotransformation of drugs.</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Define biotransformation. 2. Enumerate the aims of biotransformation with examples. 3. Enlist phase-I biotransformation reactions with examples. 4. Name phase-II biotransformation reactions with examples.
7.	<p>Factors modifying biotransformation.</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Enumerate factors effecting biotransformation. 2. Explain factors effecting biotransformation with examples. 3. Define enzyme induction and enzyme inhibition. 4. Name at least three important enzyme inhibitors and inducers. 5. Explain the importance of enzyme induction and inhibition with examples.
8.	<p>Bioavailability of drugs: clinical significance and factors affecting. By the end of this lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Define bioavailability of drugs 2. Describe the method of its measurement. 3. Enumerate factors effecting bioavailability of drugs 4. Explain the clinical significance of bioavailability of drugs 5. Differentiate between bioequivalence, therapeutic equivalence & chemical equivalence.
9.	<p>Half-life of drugs: factors affecting and clinical significance. By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Define plasma half-life of drugs. 2. Enumerate factors effecting half-life of drugs. 3. Explain the way these factors affect this entity. 4. Describe the clinical significance of plasma half-life.
10.	<p>Excretion of drugs. Drug clearance.</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate major and minor routes of excretion. 2. Explain the processes involved in excretion of drugs through this route with examples. 3. Define clearance of drugs. 4. Explain factors effecting clearance of drugs. 5. Describe the clinical significance of clearance of drugs.
11.	<p>Mechanisms of drug action – I.</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enlist various mechanisms of drug action 2. Explain physical & chemical mechanisms of drug action with examples 3. Describe drug enzyme and drug ion channel interactions with examples
12.	<p>Mechanism of drug action – II.</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Enumerate different types of receptors involved in drug action. 2. Explain various receptor types in detail with examples. 3. Describe G-protein coupled receptors with 2nd messenger system citing examples. 4. Explain some of the other diverse mechanisms of drug action with examples.
13.	<p>Factors modifying actions and doses of drugs – I.</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Classify various factors modifying actions and doses of drugs. 2. Enumerate and describe physiological factors effecting action & dose of drugs with examples. 3. Explain some pathological factors modifying dose and actions of drugs with

	examples.
14.	<p>Factors modifying actions and doses of drugs – II.</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Define Pharmacogenetics and genetic polymorphism with in relation to modification of dose and action of the drugs. 2. Explain how genetics modify actions and doses of drugs by quoting various examples. 3. Define drug synergism and its types. 4. Explain drug synergism, summation and potentiating through examples.
15.	<p>Factors modifying actions and doses of drugs – III.</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Define drug antagonism. 2. Define and explain various types of drug antagonism by giving examples of each. 3. Relate clinical significance of drug antagonism 4. Interpret various graphical representations of the phenomenon. 5. Define and explain other miscellaneous terms & factors which may affect the dose or action of the drug with examples.
16.	<p>Drug dependence.</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Define drug dependence. 2. Differentiate drug dependence from addiction. 3. Define and explain tolerance and withdrawal syndrome through examples. 4. Explain briefly different theories and hypothesis regarding the mechanism of drug dependence.

DRUGS ACTING ON AUTONOMIC NERVOUS SYSTEM

This course comprises of the study of autonomic drugs. The students are expected to acquire a thorough back ground of the receptors and neurotransmitters of autonomic nervous system, their role in different organs and systems of body and their interactions with various drugs. At the end of the course the student must be able to classify different drug groups acting on ANS, describe their mechanism of action and enumerate their clinical uses and major side-effects with important contra-indications.

S.NO.	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1.	<p>A N S : Introduction</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Recall salient anatomical and physiological features of ANS. 2. Enlist types and sub types of various ANS receptors along with their locations indifferent structures and organ systems of the body. 3. Describe the synthesis, storage, release and degradation of the neuro-transmittersof the ANS. 4. Explain the negative and positive feedback controls of neurotransmitter release.
2.	<p>Catecholamines – I Adrenaline.</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify sympathomimetics on the basis of chemistry & receptor selectivity. 2. Explain the mechanism of action of adrenaline, the prototype drug of the group. 3. Describe the important pharmacological actions of adrenaline on different organ systems of the body.
3.	<p>Catecholamines – II Nor adrenaline, Dopamine, isoproterenol & Dobutamine.</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enlist and explain the therapeutic uses of adrenaline. 2. Enumerate important adverse effects& contraindications of the drug.

	<p>3. Explain the differences in response, therapeutic uses & side-effects of other catecholamines with reference to adrenaline.</p>
4.	<p>Non Catecholamines: Ephedrine, Amphetamines α receptor agonists etc. By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Differentiate between catecholamines and non-catecholamines. 2. Explain the pharmacological actions of important non-catecholamines in light of their mode of action. 3. Enlist important therapeutic uses and side-effects of important non-catecholamines. 4. Classify sympathomimetics according to their clinical indications.
5.	<p>Adrenergic Blockers. Alpha-receptor Blockers. By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify alpha blockers according to receptor selectivity. 2. Explain the pharmacological actions of alpha blockers. 3. Enlist and important clinical uses and side-effects of this drug group. 4. Describe their role in benign prostatic hyperplasia & pheochromocytoma.
6.	<p>Beta receptor Blockers – I. By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify beta blockers according to receptor selectivity, ISA, MSP, lipid solubility & duration of action. 2. Describe the pharmacological actions of beta blockers on different systems of the body. 3. Explain important pharmacokinetic features of the group.
7.	<p>Beta receptor Blockers – II. By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enlist and explain important clinical uses of beta blockers especially with reference to CVS. 2. Enlist important side effects of beta blockers 3. Enumerate important contraindications of this group of drugs. 4. Describe salient features of management in overdose of beta blockers.
8.	<p>Central Sympathoplegics. By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Name central Sympathoplegics and centrally acting alpha-2 agonists. 2. Explain mechanism of action of alpha methyl Dopa & clonidine. 3. Enumerate therapeutic uses of the above drugs. 4. Enlist important side-effects and contra-indications of the above mentioned drugs. 5. Differentiate between alpha methyl Dopa & clonidine.
9.	<p>Adrenergic neuron blockers. By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify adrenergic neuron blockers on the basis of mechanism of action. 2. Describe the mechanism of action of guanethidine and reserpine. 3. Enlist therapeutic uses of the two drugs. 4. Enumerate important side-effects of both the drugs. 5. Differentiate between guanethidine and reserpine. 6. Recall important pharmacological features of bretylium.
10.	<p>Cholinergic drugs – I. Classification, Cholinesters, alkaloids etc. By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify cholinomimetics according to chemistry & mechanism of action. 2. Describe actions of acetylcholine on different organ systems of body.

	3. Enumerate the adverse effects of acetylcholine & cholinergic drugs.
11.	Cholinergic drugs – II. Anti-Cholinesterases. By the end of the lecture the students will be able to <ol style="list-style-type: none"> 1. Explain the salient pharmacological properties of Cholinesterases with their appropriate clinical uses. 2. Differentiate between cholinergic and myasthenic crisis. 3. Describe the management of myasthenia gravis. 4. Explain the role of Pilocarpine in glaucoma.
12.	Cholinergic drugs – III. Organophosphates & oximes. By the end of the lecture the students will be able to <ol style="list-style-type: none"> 1. Enumerate the signs and symptoms of organophosphate poisoning due to cholinergic excess. 2. Enlist steps in the management of organophosphate poisoning. 3. Describe aging and role of oximes in the management. 4. Explain the prevention of above mentioned poisoning.
13.	Cholinergic blockers – I. By the end of the lecture the students will be able to <ol style="list-style-type: none"> 1. Classify anti-cholinergic drugs based on chemistry. 2. Describe pharmacological actions of atropine. 3. Differentiate between atropine and hyoscine
14.	Cholinergic blockers – II. By the end of the lecture the students will be able to <ol style="list-style-type: none"> 1. Enlist valid therapeutic uses of atropine 2. Enumerate adverse effects of anti-cholinergic drugs 3. Describe features of atropine poisoning. 4. Explain the management of atropine poisoning. 5. Classify anti-cholinergics according to their therapeutic use.
15.	Skeletal Muscle Relaxants-I. By the end of the lecture the students will be able to <ol style="list-style-type: none"> 1. Recall physiology of neuromuscular junction. 2. Classify skeletal muscle relaxants according to their mechanism of action. 3. Describe mechanism of action of non-depolarizing skeletal muscle relaxants. 4. Explain pharmacological actions of non-depolarizing skeletal muscle relaxants.
16.	Skeletal Muscle Relaxants-II. By the end of the lecture the students will be able to <ol style="list-style-type: none"> 1. Describe mechanism of action of succinylcholine. 2. Enumerate therapeutic uses of peripherally acting skeletal muscle relaxants. 3. Explain salient pharmacological properties of centrally acting muscle relaxants. 4. Describe mechanism of action and uses of Dantrolene.

DRUGS ACTING ON CNS

This course should aim at imparting the knowledge on receptors, neurotransmitters and enzymes that regulate activity of the central nervous system along with their interactions with various types of drugs. Both basic and applied aspects of the drugs should be taught. At the end of the course the student must be able to classify different drug groups acting on CNS, describe their mechanism of action and enumerate their clinical uses and major side-effects with important contra-indications.

S.NO.	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1.	Central Neurotransmission – I By the end of the lecture the students will be able to

	<ol style="list-style-type: none"> 1. Recall main functions of different areas of the brain. 2. Describe the basic structure and function of a neuron. 3. Explain different ion channels present in the brain along with their properties. 4. Describe detail of metabotropic receptors in the CNS.
2.	<p>Central Neurotransmission – II</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enlist steps in the synaptic transmission. 2. Identify steps where the drugs can act in the neurons. 3. Classify various neurotransmitters of CNS. 4. Explain the steps in the synthesis of important CNS neurotransmitters along with 5. their receptors.
3.	<p>General Anesthetics –I</p> <ol style="list-style-type: none"> 1. By the end of lecture the students will be able to Classify the Inhalational Anesthetic Agents 2. Identify their pharmacokinetic and pharmacodynamic properties 3. Describe the terms second gas effect & diffusion hypoxia 4. Define Balanced anesthesia and MAC (Minimum alveolar anesthetic concentration)
4.	<p>General Anesthetics –II</p> <ol style="list-style-type: none"> 1. By the end of lecture the students will be able to 1. Classify Pre-anesthetic medications 2. Explain stages of anesthesia 3. Define Neuroleptanesthesia 4. Describe the mechanism of action of Inhaled Anesthetic agents
5.	<p>General Anesthetics – III</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain pharmacokinetic properties of Volatile liquids (Halothane) 2. Describe proposed targets for the actions of these volatile liquids 3. Enumerate their toxic effects 4. Explain drug interactions of these liquids with other CNS drugs
6.	<p>General Anesthetics-IV</p> <p>By the end of lecture the students will be able to</p>
	<ol style="list-style-type: none"> 1. Classify Intravenous anesthetic agents 2. Outline their mechanism of action 3. Explain dissociative anesthesia 4. Describe pharmacokinetic and pharmacodynamic properties of Propofol and etomidate 5. Outline the major adverse effects of Propofol and other I/V anesthetics
7.	<p>Local Anaesthetics – I</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify major classes of local Anaesthetics 2. Describe the mechanism of action of local anesthetics 3. Explain the terms “use-dependent blockade” and “state-dependent Blockade
8.	<p>Local Anaesthetics – II</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe the relationship among tissue pH, drug pKa, and the rate of onset of Local Anesthetic action. 2. Explain rationale of adding local anesthetics with vasoconstrictors 3. List factors that determine the susceptibility of nerve fibers to local anesthetic blockade. 4. Describe the major toxic effects of the local anesthetics

9.	<p>Aliphatic Alcohols Chronic alcoholism, Aversion therapy</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify Clinically important alcohols and their antagonists 2. Sketch the biochemical pathways for ethanol metabolism showing action of fomepizole and disulfiram. 3. Summarize Pharmacodynamic and pharmacokinetic properties of Ethanol. 4. Identify the toxic effects of chronic ethanol ingestion 5. Describe the toxicity and treatment of acute poisoning with methanol and ethylene glycol
10.	<p>Sedative & Hypnotics – I.</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain role of excitatory and inhibitory neurotransmitters in anxiety and sleep disorders 2. Classify major drugs in each sedative-hypnotic subgroup 3. Recall the pharmacokinetic features of the sedative-hypnotic drugs
11.	<p>Sedative & Hypnotics – II</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe the mechanism of action of Benzodiazepines & Barbiturates 2. Summarize actions & adverse effects of BZDs & Barbiturates 3. Differentiate between BZDs and Barbiturates 4. Discuss their drug interactions
12.	<p>Sedative & Hypnotics – III</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Identify the distinctive properties of buspirone and Ramelteon 2. Discuss Mechanism of action with adverse effects of Z compounds like zaleplon 3. Describe the symptoms and management of overdose of sedative-hypnotics along with their antidotes.
13.	<p>Antiepileptic drugs-I .Classification, hydantoin derivatives</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Differentiate between seizure and epilepsy and differentiate between the two. 2. Explain the terminology of various types of epilepsies 3. Classify Antiepileptic drugs according to chemistry and chemical use 4. Describe Pharmacokinetic and pharmacodynamic profile of Phenytoin sodium 5. Enumerate side effects of Phenytoin. 6. Explain Fetal hydantoin syndrome
14.	<p>Antiepileptic drugs- II.</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe the main pharmacokinetic features of Carbamazepine, and valproic acid 2. Discuss the mode of action (anti seizure activity) of the above drugs 3. Enlist the therapeutic applications of carbamazepine other than epilepsy 4. Enumerate major adverse effects of these two drugs
15.	<p>Antiepileptic drugs- III.</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Identify the mechanism of action of Felbamate, lamotrigine, and topiramate. 2. Enumerate major toxicities of these drugs 3. Explain why benzodiazepines are rarely used in the chronic therapy of seizure states but are valuable in status epilepticus 4. Outline the management for status epilepticus

16.	<p>Introduction to Psycho Pharmacology</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe the “dopamine hypothesis” of schizophrenia. 2. Identify 4 receptors blocked by antipsychotic drugs 3. Describe tardive dyskinesia and the neuroleptic malignant syndrome. 4. Briefly explain Bipolar disorder
17.	<p>Antipsychotic drugs-I Classification, Mechanism of action</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify different groups of Anti-Psychotics 2. Describe the mechanism of action of these drugs. 3. Tabulate the differences between High potency & Low potency anti- psychotics 4. Describe the pharmacological effects of anti-psychotics
18.	<p>Antipsychotic drugs-II</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate the psychiatric and non-psychiatric indications of Anti-Psychotics 2. Discuss the adverse effects of Anti-Psychotics 3. Tabulate differences between typical and atypical anti-psychotics 4. Identify the distinctive pharmacokinetic features of lithium, and list its adverse effects and toxicities
19.	<p>Anti depressants-I. Introduction, Classification, Mechanism of Action</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify different classes of Anti-depressants 2. Describe the mechanism of Action of TCAs & SNRIs 3. Enlist the therapeutic applications of Anti- depressants 4. Outline major adverse effects of TCAs 5. Describe mechanism of action & adverse effects of SSRIs
20.	<p>Anti depressants-II</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain mechanism of action of MAO Inhibitors in depression 2. Describe cheese reaction and other drug interactions of MAO inhibitors 3. Classify 5HT₂receptor antagonists for depression 4. Explain mode of action with side effects of Amoxapine and Mirtazapine
21.	<p>Drugs used in Parkinsonism –I</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe the neurochemical imbalance underlying the symptoms of Parkinson’s disease 2. Classify anti-parkinsonian drugs 3. Explain the mechanisms by which levodopa, dopamine receptor agonists alleviate parkinsonism 4. Identify drugs that inhibit Dopa decarboxylase and describe their uses along with their adverse effect.
22.	<p>Drugs used in Parkinsonism –II</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe the mechanism of action of MAO and COMT Inhibitors in Parkinsonism 2. Enumerate their toxicity and drug interactions 3. Explain the role of anti muscarinic drugs in parkinsonism 4. Identify the drugs used in the management of essential tremor, Huntington’s disease, drug-induced dyskinesias, restless legs syndrome, and Wilson’s disease
23.	<p>Analgesics-I: Introduction, Classification</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain physiology of pain: pathway and neurochemical mediators. 2. Enlist commonly used analgesic drug classes and individual drugs.

24.	<p>Analgesics-II: Morphine By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify opioids on the basis of source and effect on their receptor. 2. Describe opioid receptor distribution. 3. Describe the mechanism of action of opioid analgesics. 4. Explain the pharmacological features of Morphine (prototype). 5. Enlist important clinical uses and side-effects of this drug. 6. Discuss the management of morphine toxicity.
25.	<p>Analgesics-III: Semisynthetic/synthetic opioids & opioid antagonists By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe briefly some important aspects of some semisynthetic/synthetic opioids. 2. Recall the signs and symptoms of an opioid overdose. 3. Compare in brief the actions and indications of opioid antagonists.
26.	<p>NSAIDs: Classification, Mechanism of action By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Recall the role of cyclooxygenase enzyme in the synthesis of prostaglandins and leukotrienes. 2. Explain the mechanism of action of NSAIDs. 3. Classify NSAIDs according to the enzyme selectivity.
27.	<p>Aspirin and other salicylates By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Relate chemistry of aspirin with its mechanism of action and actions. 2. Explain the pharmacological effects of aspirin on different organ systems of the body. 3. Describe important pharmacokinetic features of aspirin. 4. Enumerate the therapeutic uses of aspirin. 5. Enumerate side-effects and salient features of aspirin intoxication with its management. 6. Describe briefly some important aspects of other salicylates.
28.	<p>Propionic acid, Acetic acid derivatives. Paracetamol By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe the salient pharmacological features of paracetamol. 2. Explain the pathophysiology behind paracetamol poisoning and its management. 3. Describe briefly some important aspects of other NSAIDs.
29.	<p>Analgesics – IV: Anti-Rheumatoid drugs By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Differentiate between normal and arthritic joint. 2. Enlist the objective of treatment and management strategy of arthritis. 3. Classify the drugs used in Rheumatoid arthritis. 4. Describe briefly some important pharmacokinetic and pharmacodynamic aspects of various anti-rheumatoid drugs.
30.	<p>Anti-gout drugs By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enlist the causes of hyperuricemia. 2. Describe the pathophysiology of acute gouty arthritis. 3. Classify the drugs for acute and chronic gout. 4. Explain the mechanism of action, indications and adverse effects of important anti-gout drugs.

CVS

The students, on completion of this course should be able to correlate the actions of cardio active drugs with the electro-physiological properties of heart and should understand the basis of actions of these drugs in common cardio-vascular diseases. They must be able to classify different drug groups, enlist their clinical uses, side-effects and major contraindications.

S.NO.	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1.	<p>Physiology of heart.</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Recall the physiologic principles which govern the function of the heart and the alterations induced by functional and structural abnormalities. 2. Name the elements of the intrinsic conduction system of the heart and describe the pathway of impulses through this system. 3. Enumerate and describe properties of the cardiac muscle 4. Explain the salient events in the action potential generation of cardiac muscle.
2.	<p>Drug treatment for heart failure</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Explain briefly the pathophysiology of heart failure. 2. Recall the compensatory mechanisms in a failing heart. 3. Outline a treatment plan for patients with compensated or decompensated CHF. 4. Enlist major drug groups used for management of congestive heart failure. 5. Explain the role of diuretics, angiotensin-converting enzyme inhibitors and beta blockers, in treating patients with congestive heart failure.
3.	<p>Cardiotonic drugs: Management of cardiotoxicity of cardiac glycosides</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Discuss digoxin and its use in long-term management of congestive heart failure. 2. Describe the mechanism of action of Digoxin. 3. Recount the mechanical and electrical effects of Digoxin. 4. Enumerate and explain the clinical uses of Digoxin. 5. Describe the important side-effects, contraindications & drug interactions of Digoxin. 6. Explain the treatment and management of digitalis toxicity.
4.	<p>Anti-anginal drugs-I</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Define angina pectoris 2. Recall the relevant physiological aspects of coronary circulation 3. Enumerate and explain briefly the pathophysiology of different types of anginas. 4. Classify the drugs used in the management of angina pectoris
5.	<p>Anti-anginal drugs-II</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Describe important pharmacokinetic aspects of nitrates. 2. Explain mechanism of action of nitrates. 3. Describe other important actions of nitrates. 4. Enumerate and describe important side-effects of nitrates.
6.	<p>Drug treatment of IHD</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Describe mechanism of action of calcium channel blockers in angina pectoris. 2. Explain the relevance of beta blockers in IHD. 3. Describe the mechanism of FOX inhibitors, nicorandil and ivabradine in angina pectoris. 4. pectoris.

7.	<p>Anti-hypertensive drugs-I Sympatholytic drugs</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Recall the basic physiology of blood pressure regulation. 2. Classify antihypertensives according to site and mechanism of action. 3. Describe the role of sympatholytic drugs in hypertension.
8.	<p>Anti-hypertensive drugs-II Diuretics, Ca⁺⁺ Channel blockers</p> <p>By the end of this lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Recall the role of diuretics in hypertension. 2. Recount the relevance of calcium channel blockers in hypertension.
9.	<p>Anti-hypertensive drugs-III ACE inhibitors, AT receptor antagonist, Direct acting vasodilators</p> <p>By the end of lecture, the students will be able to</p> <ol style="list-style-type: none"> 1. Classify vasodilators on the basis of site, route & mechanism of action. 2. Describe the pharmacokinetic properties and side effects of vasodilators. 3. Classify the drugs acting on RAS. 4. Explain their mechanisms of action. 5. Describe the clinical indications and contraindications. 6. Mention their side effects and interactions.
10.	<p>Anti-arrhythmic drugs-I</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Recall physiological aspects relevant to the understanding of anti-arrhythmic drugs. 2. Describe basic pathophysiological features of arrhythmias. 3. Enumerate the principles of treatment. 4. Classify anti-arrhythmic drugs.
11.	<p>Anti-arrhythmic drugs-II</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe cardiac, noncardiac effects of class I drugs (all subgroups). 2. Enumerate therapeutic uses and major side-effects of all class I anti-arrhythmic drugs. 3. Describe the important anti-arrhythmic actions of class II drugs. 4. Enumerate clinical indications and side-effects of class II drugs.
12.	<p>Anti-arrhythmic drugs-III</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Explain the actions, uses and side-effects of class III drugs (amiodarone). 2. Describe the actions, uses and adverse effects of calcium channel blockers (class IV drugs). 3. Describe briefly the salient features of adenosine as an anti-arrhythmic and its 4. toxicity.

DRUGS AFFECTING WATER AND ELECTROLYTE BALANCE

At the end of the course the student must be able to classify different drug groups acting as diuretics, describe their mechanism of action and enumerate their clinical uses and major side-effects with important contra-indications

1.	<p>Diuretics: Introduction, Classification. Carbonic Anhydrase Inhibitors</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Recall salient features of renal physiology relevant to the topic. 2. Classify diuretics on the basis of mechanism and site of action. 3. Enumerate carbonic anhydrase inhibitors. 4. Describe the mechanism of action of CAIs. 5. Enumerate & explain therapeutic uses of CAIs. 6. Describe the important side-effects & contraindications of CAIs.
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2.	<p>Diuretics: Thiazides</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate thiazide diuretics. 2. Describe the mechanism of action of thiazide diuretics. 3. Enumerate & explain therapeutic uses of thiazide diuretics. 4. Describe the important side-effects & contraindications of thiazide diuretics.
3.	<p>Diuretics: Loop</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate loop diuretics 2. Describe the mechanism of action of loop diuretics. 3. Enumerate & explain their therapeutic uses. 4. Describe the important side-effects, contraindications & drug interactions of loop diuretics.
4.	<p>Diuretics: K⁺ sparing</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate k⁺ sparing diuretics. 2. Describe the mechanism of action of k⁺ sparing diuretics. 3. Enumerate & explain their therapeutic uses. 4. Describe the important side-effects, contraindications & drug interactions of k⁺ sparing diuretics.
5.	<p>Osmotic and miscellaneous groups</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate osmotic diuretics 2. Describe the mechanism of action of osmotic diuretics. 3. Enumerate & explain their therapeutic uses. 4. Describe their important side-effects, contraindications & drug interactions. 5. Name and recall salient features of vaptans.

CHEMOTHERAPY

The student should be imparted knowledge about the mechanisms of action, spectrum of activity, clinical uses and adverse effects of therapeutic agents. Stress should be laid on prevention of emergence of resistance by rational use of chemotherapy. At the end of course the student must be able to classify different antimicrobials, antifungal, and anti-neoplastic. They may be able to describe their mechanism of action and enumerate their clinical uses and major side-effects with important contra-indications.

S.NO.	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1.	<p>Introduction, General principles of Chemotherapy.</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Define chemotherapy, anti-microbial and antibiotics. 2. Differentiate between empiric, definitive and prophylactic therapy. 3. Explain the basis of combination therapy and causes of failure of chemotherapy. 4. Classify the chemotherapeutic agents on the basis of their mechanism of action.
2.	<p>Mechanism of resistance.</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Explain post-antibiotic effect. 2. Differentiate between time-dependent killing and concentration dependent killing. 3. Describe genetic and biochemical basis of drug resistance.

3.	<p>Sulfonamides</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Classify sulfonamides on the basis of their therapeutic uses. 2. Describe their spectrum, mechanism of action and resistance. 3. Enumerate their adverse effects. 4. Enlist their relevant clinical indications.
4.	<p>Trimethoprim & Co-trimoxazole</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Describe the spectrum, mechanism of action and resistance of trimethoprim. 2. Explain rationale and advantages of combination of trimethoprim and sulfamethoxazole in co-trimoxazole. 3. Enlist adverse effects of trimethoprim 4. Enumerate clinical uses of Co-trimoxazole
5.	<p>Antibiotics, Penicillins</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Understand source and structure activity relationship. 2. Classify penicillins as natural and semisynthetic preparations. 3. Explain the mechanism of action and mechanism of resistance. 4. Elaborate important pharmacokinetic properties of penicillins.
6.	<p>Antibiotics, Penicillins- Semisynthetic</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Enumerate the clinical uses of natural and semisynthetic penicillins 2. Explain the adverse effects of penicillins 3. Enlist important drug interactions of penicillins
7.	<p>Antibiotics-Cephalosporins</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Classify cephalosporins on the basis of their spectrum into four generations. 2. Explain their mechanism of action and resistance. 3. Enumerate their adverse effects. 4. Enlist clinical uses of all four generations.
8.	<p>Macrolides, Antibiotics: Broad spectrum</p> <p>By the end of this lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate macrolides. 2. Describe their structure, spectrum and pharmacokinetic properties. 3. Explain their mechanism of action and resistance. 4. Enumerate adverse effects and therapeutic indications. 5. Enlist advantages and disadvantages of Clarithromycin and Azithromycin.
9.	<p>Antibiotics: Broad spectrum Tetracyclines</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate tetracycline. 2. Explain their pharmacokinetic properties and spectrum of activity. 3. Describe their mechanism of action and resistance. 4. Enlist adverse effects. 5. Define their valid therapeutic indications.
10.	<p>Chloramphenicol</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain pharmacokinetic properties and spectrum of activity. 2. Describe its mechanism of action and resistance. 3. Enumerate its adverse effects. 4. Enlist its therapeutic indications.

11.	<p>Antibiotics: Aminoglycosides</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify aminoglycosides on the basis of their source. 2. Explain pharmacokinetic properties and spectrum of activity. 3. Describe mechanism of action, resistance and post-antibiotic effects. 4. Enumerate their adverse effects. 5. Enlist their therapeutic indications.
12.	<p>Quinolones.</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Classify the quinolones on the basis of their spectrum of antibacterial activity. 2. Describe their pharmacokinetics, mechanism of action and resistance. 3. Enumerate their adverse effects. 4. Enlist their therapeutic indications.
13.	<p>Misc. Drugs: Clindamycin, Fusidic acids, Vancomycin, Nitrofurantoin, Linezolid</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Explain their mechanism of action, resistance and spectrum of antibacterial activity. 2. Enumerate their adverse effects. 3. Enlist their clinical indications.
14.	<p>Antituberculosis drugs – I.</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Understand different types of TB. 2. Enumerate first and second line drugs for TB. 3. Enlist special characteristics of Mycobacterium tuberculosis. 4. Explain mechanism of action, clinical uses and adverse effects of Isoniazid and Rifampicin.
15.	<p>Antituberculosis drugs – II</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Explain the mechanism of action, clinical uses and adverse effects of Ethambutol and Pyrazinamide. 2. Enumerate drugs with doses for prophylaxis of TB. 3. Explain treatment for new patient. 4. Enumerate drugs for Resistant, MDR & XDR TB.
16.	<p>Antituberculosis drugs – III</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Enlist ATT during pregnancy and lactation. 2. Enumerate drugs for DOT with doses and different regimens. 3. Explain types of Leprosy. 4. Elaborate mechanism of action, clinical indication, adverse effects of Clofazimine and Dapsone.
17.	<p>Antifungal drugs-I</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify antifungal drugs on the basis of their mechanism of action. 2. Explain their spectrum, mechanism of action and resistance of Amphotericin B and Flucytosine. 3. Enumerate their adverse effects. 4. Enlist their clinical uses.

18.	<p>Antifungal drugs – II</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate azoles. 2. Explain their spectrum, mechanism of action and resistance. 3. Enumerate their adverse effects. 4. Enlist their therapeutic indications.
19.	<p>Anti-viral drugs –I</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate common properties of viruses. 2. Enlist common characteristics shared by antiviral drugs. 3. Classify antiviral drugs on the basis of therapeutic indications. 4. Classify antiviral drugs on the basis of therapeutic indications 5. Understand the life cycle of virus in accordance with drugs inhibiting the various steps of cycle. 6. Explain mechanism of action, therapeutic indications and adverse effects of anti HSV and VZV drugs.
20.	<p>Anti-viral drugs –II</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe some important properties of anti CMV drugs. 2. Explain HHART. 3. Understand the life cycle of HIV. 4. Elaborate mechanism of action and A/R of fusion and entry inhibitors. 5. Enumerate group properties of NRTI, NNRTI, and INSTIs. 6. Explain Mechanism of action and A/R of PIs.
21.	<p>Anti-viral drugs –III</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate anti HIV drugs safe in pregnancy. 2. Enumerate types of interferon. 3. Explain mechanism of action, A/R and contraindications of INF-α. 4. Enumerate drugs used in DAAS with detail of Sofosbuvir. 5. Elaborate drugs for influenza type A & B virus. 6. Describe mechanism of action, spectrum,A/R and CI of Ribavirin.
22.	<p>Anti-Malarial - I.</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate species of malaria and understand life cycle of malarial parasite. 2. Classify antimalarial drugs on basis of chemical structure and therapeutic indications. 3. Explain mechanism of action and resistance of chloroquine. 4. Elaborate the salient pharmacokinetic features of chloroquine. 5. Enumerate its adverse effects and therapeutic indications.
23.	<p>Anti-Malarial - II.</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain mechanism of action and resistance of Mefloquine, Primaquine, and Quinine. 2. Elaborate their pharmacokinetics. 3. Enumerate their adverse effects. 4. Enlist their therapeutic indications. 5. Enumerate antimalarial drugs for pregnancy and prophylaxis.

24.	<p>Anti-Malarial - III.</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate artemisinin. 2. Explain their mechanism of action and resistance. 3. Enumerate their adverse effects and therapeutic uses. 4. Enlist WHO recommendations of treatment of Falciparum malaria. 5. Describe rationale for combination of antimalarial drugs.
25.	<p>Anti-Amoebic drugs-I</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Define amoebiasis and understand life cycle of ant amoeba histolytica. 2. Classify anti amoebic drugs on basis of chemical structure and therapeutic indications. 3. Explain mechanism of action of metronidazole. 4. Enlist its adverse effects. 5. Enumerate its therapeutic indications with spectrum of activity.
26.	<p>Anti-Amoebic drugs-II</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain mechanism of action of luminal anti amoebic drugs. 2. Enumerate their adverse effects. 3. Describe the rationale for combination of luminal with tissue anti amoebic drugs.
27.	<p>Antihelminthics – I</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enumerate drugs for Nematodes, Trematodes and Cestodes. 2. Explain mechanism of action of Albendazole and Niclosamide. 3. Enlist their adverse effects and therapeutic indications.
28.	<p>Antihelminthics – II</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain mechanism of action for Nematodes and Cestodes. 2. Enumerate their adverse effects. 3. Enlist their clinical uses.
29.	<p>Antineoplastics – I. Alkylating agents</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Define cancer and enlist its causes. 2. Describe different treatment modalities and types of chemotherapy for cancer. 3. Enumerate different mechanism of resistance of anticancer drugs. 4. Explain toxicity of anticancer drugs with their management. 5. Classify anticancer drugs. 6. Elaborate mechanism of action of alkylating agents with their adverse effects and therapeutic indications.
30.	<p>Antineoplastics – II. Antimetabolites</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain mechanism of action and resistance of Methotrexate. 2. Enumerate its adverse effects with rescue therapy. 3. Enlist cancerous and non-cancerous uses of Methotrexate. 4. Explain mechanism of action, adverse effects and therapeutic indications of 5-FU and Anthracyclines.

31.	<p>Antineoplastics-III. Vinca Alkaloids, Antibiotics & Hormones</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 5. Explain mechanism of action of Vinca alkaloids. 6. Enumerate their adverse effects. 7. Enlist their therapeutic indications. 8. Categorize the drugs for treatment of some common cancers.
32.	<p>Immunosuppressants</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify immunosuppressive drugs. 2. Explain mechanism of action of each group. 3. Enumerate their adverse effects. 4. Enlist their important clinical indications.

ENDOCRINOLOGY

The objective of this section is to educate the students about use of various hormones in replacement therapy and other diseases. Basic and applied aspects of other drugs used in commonly occurring endocrine disorders should also be covered. At the end of the course the student must be able to classify different drug groups acting on various endocrine organs, describe their mechanism of action and enumerate their clinical uses and major side-effects with important contra-indications.

S.NO.	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1.	<p>Antidiabetic drugs: Introduction Classification.</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Review the clinical manifestations of type 1 and type 2 diabetes mellitus and its diagnostic criteria. 2. Outline the drug management for diabetes.
2.	<p>Antidiabetic drugs: Insulin</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Understand the major effects of endogenous insulin on body tissues. 2. Classify different types of insulin on the basis of source and mechanism of action. 3. Describe characteristics of various insulins and its analogues. 4. Explain the mechanism of action, uses, adverse effects, contraindications insulin. 5. Review the SGLT 2 inhibitors, incretin mimetics, and dipeptidyl peptidase 4 (DPP-4) inhibitors including mechanisms of action, indications for use and adverse effects.
3.	<p>Antidiabetic drugs: Oral antidiabetic agents</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. List the main groups of oral anti-diabetic drugs. 2. Give a brief description of the pharmacological action of these drugs. 3. Understand the mechanisms by which these drugs lower the blood glucose level. 4. Enlist the common side effects and contraindications of these drugs. 5. Enumerate which drugs interact with oral anti-diabetic drugs.
4.	<p>Thyroid hormones</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Recall the pathway for thyroid hormone synthesis, release, its site of action and mechanism. 2. Review the pharmacological effects of thyroid hormone. 3. Enlist drugs for the treatment of hypothyroidism. 4. Enumerate the toxicities of levothyroxine.

5.	<p>Antithyroid drugs</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Enlist antithyroid drugs. 2. Describe the mechanism of action of antithyroid drugs. 3. Explain the role of Iodides and beta blockers in hyperthyroidism. 4. Outline the major toxicities of antithyroid drugs.
6.	<p>Adrenal hormones-I</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Recall the naturally occurring adrenal steroid hormones, their synthesis and release. 2. Enlist some important synthetic glucocorticoids and mineralocorticoids. 3. Classify glucocorticoids according to the duration of action. 4. Enumerate the glucocorticoids given through inhalational route.
7.	<p>Adrenal hormones-II</p> <p>By the end of this lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe the pharmacological effects of glucocorticoids. 2. Elaborate their therapeutic uses. 3. Outline their adverse effects, contraindications and cautions. 4. Briefly describe the salient features of glucocorticoid antagonists.
8.	<p>Sex Hormones: Estrogens & Progestins, Anabolics</p> <p>By the end of lecture, the students will be able to</p> <ol style="list-style-type: none"> 1. Recall the synthesis, release and regulation of hormones produced by ovaries and testes. 2. Classify estrogens and progesterone. 3. Explain the pharmacokinetic and pharmacodynamic properties of estrogens and progesterone. 4. Enumerate their clinical indications, adverse effects and contraindications. 5. Name anti-estrogens and anti-progestins along with their indications and side effects. 6. Describe the salient features of androgens and anti-androgens.
9.	<p>Drug used in the treatment of infertility</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Recount the salient features of Gonadotropic Releasing Hormone agonists and antagonists in treatment of infertility. 2. Describe the role of FSH, LH, hCG in treating infertility also enlisting their side effects. 3. Explain the mechanism of action, pharmacological effects and therapeutic uses of Clomiphene. 4. Enumerate the important adverse effects of Clomiphene.
10.	<p>Hormonal contraceptives</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enlist various types of hormonal contraceptive preparations. 2. State the mechanism of action and pharmacological effects of hormonal contraceptives. 3. Explain their uses, adverse effects and contraindications. 4. Cite important drug interactions that may occur.
11.	<p>Oxytocic drugs and Uterine Relaxants</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Describe the mechanism of action, indications and major adverse effects of

	<p>oxytocin.</p> <ol style="list-style-type: none"> 2. Explain the effects of Prostaglandins and ergot alkaloids on uterine smooth muscles. 3. Name and explain briefly the salient features of few uterine relaxants.
12.	<p>Drug treatment of osteoporosis</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Define osteoporosis 2. Recall the normal physiology of calcium & phosphate – bone minerals homeostasis. 3. Review the management of osteoporosis. 4. Classify the drugs used in osteoporosis. 5. Describe the mechanism, uses and the adverse effects of some important drugs.
13.	<p>Hypothalamic & Pituitary hormone-I</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Recall the role of the Hypothalamic-Pituitary axis in regulating the production of the major anterior pituitary hormones and discuss the role of negative feedback mechanisms. 2. Explain structure, pharmacokinetic, pharmacodynamics effects of GH 3. Enumerate clinical uses and adverse effects of GH. 4. Enlist clinical uses and adverse effects of Somatropin and Mecasermin.
14.	<p>Hypothalamic & Pituitary hormone-II</p> <p>By the end of this lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Elaborate the effects of Somatostatin analogue (Octreotide). 2. Enlist the clinical uses and side effects of Octreotide. 3. Describe the indications, mechanism of action, and major adverse effects of Leuprolide. 4. Briefly explain the salient features of bromocriptine.

DRUGS ACTING ON BLOOD

Treatment of anaemia should receive maximum attention of the teachers and students. Basic and applied aspects of anticoagulants should be covered. Role of aspirin as Antiplatelet agent should be highlighted. Students should be made to understand the part played by non-pharmacological measures in the treatment of hyperlipaemias. At the end of the course the student must be able to classify different drug groups acting on blood, describe their mechanism of action and enumerate their clinical uses and major side-effects with important contra-indications

S.NO.	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1.	<p>Haematinics-I</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Name the 2 most common types of nutritional anemia and describe their biochemical causes. 2. Draw the normal pathways of absorption, transport, and storage of iron in the human body. 3. Name the anemias for which iron supplementation is indicated and those for which it is contraindicated. 4. List the acute and chronic toxicities of iron and role of Desferrioxamine
2.	<p>Haematinics-II</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Sketch the dTMP cycle and show how deficiency of folic acid and vitamin B12 affects the normal cycle. 2. Explain hazards of folic acid as sole therapy for megaloblastic anemia

	<ol style="list-style-type: none"> 3. Name hematopoietic growth factors with clinical uses and toxicity 4. Explain the advantage of polyethylene glycol to filgrastim. 5. Summarize the role of Epoetin Alfa in treating anemia
03.	<p>Anticoagulants. Introduction, Classification.</p> <p>Heparin By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify major Anticoagulants for treatment of various arterial and venous thrombosis 2. Compare the standard heparin, and LMW heparins with respect to Pharmacokinetics, mechanisms, and toxicity. 3. Explain mechanism of action of Buvalirudin, argatroban, and dabigatran with their toxicity 4. Describe the term HIT (Heparin induced thrombocytopenia)
04.	<p>Oral Anticoagulants</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Describe the mechanism of action of Warfarin 2. Explain its therapeutic applications in various thrombo-embolic events 3. Enumerate its adverse effects, drug interactions and antidotes in case of poisoning 4. Differentiate between Heparin and Warfarin
05	<p>Thrombolytics</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Classify Thrombolytic Agents and their routes of administration 2. Explain the mechanism of action of Streptokinase in coronary artery thrombosis 3. Enlist uses of Alteplase and other thrombolytic agents 4. Summarize the toxicity of these agents
06	<p>Antiplatelet drugs</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Diagram the function of activated platelets at the site of a damaged blood vessel wall and show where the 4 major classes of antiplatelet drugs act. 2. Compare the pharmacokinetics, uses, and toxicities of the major antiplatelet drugs 3. Explain mode of action of Aspirin as an antiplatelet drug. 4. Describe the mechanism of action and side effects of Clopidogrel, Ticlopidine and Prasugrel 5. Summarize mode of action, uses with side effects of Dipyridamole
07	<p>Anti Hyperlipoproteinaemics-I</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain the role of lipoproteins in the formation of atherosclerotic plaques. 2. Summarize the types of lipoproteins and their functions 3. Describe the dietary management of hyperlipidemia 4. Propose a rational drug treatment regimen for different hyperlipidemias
08	<p>Anti Hyperlipoproteinaemics-II</p> <p>By the end of lecture the students will be able to</p> <ol style="list-style-type: none"> 1. List the 5 main classes of drugs used to treat hyperlipidemia. 2. Explain the mechanism of action and adverse effects of Statins 3. Describe mode of action and toxicity of Fibrates 4. Highlight role of bile acid binding resins in hyperlipidemia along with their toxicity
09	<p>Anti Hyperlipoproteinaemics-III</p> <p>By the end of lecture the students will be able to</p>

	<ol style="list-style-type: none"> 1. Explain role of Sterol absorption inhibitor(Ezetimibe) in treating hyperlipidemia 2. Enlist its pharmacokinetic and Pharmacodynamic properties in treating hyperlipidemia 3. Describe the mechanism of action of Niacin 4. Enumerate therapeutic uses and adverse effects of this drug 5. Compare different antihyperlipidemic drugs in reducing VLDL, LDL and raising HDL
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DRUGS ACTING ON GIT

Stress should be laid on the rational treatment of diarrhea. Limitations of purgatives/laxatives in management of habitual constipation should be highlighted. Cost-effective approach in selection of anti-peptic ulcer drugs and treatment of associated H pylori infection should be emphasized. At the end of the course the student must be able to classify different drug groups acting on GIT, describe their mechanism of action and enumerate their clinical uses and major side-effects with important contra-indications.

S.NO.	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1.	Anti-emetics By the end of the lecture the student will be able to <ol style="list-style-type: none"> 1. Explain Pathophysiology of vomiting. 2. Describe Reflex Mechanisms of vomiting. 3. Explain Neuronal Pathways,transmitters and receptors involved in nausea and vomiting. 4. Enlist causes of vomiting. 5. Classify anti-emetic drugs 6. Describe Mechanism of action, clinicaluses and adverse effects of Metoclopramide and other drugs.
2.	Anti-diarrheals By the end of the lecture the student will be able to <ol style="list-style-type: none"> 1. Define diarrhea. 2. Enlist causes of diarrhea. 3. Recall the pathogenesis of diarrhea. 4. Explain the rational treatment of diarrhea. 5. Classify agents used for management of diarrhea. 6. Explain the mechanism of action, uses and adverse effects of each group/drugs. 7.
3.	Purgatives/Laxatives By the end of the lecture the student will be able to <ol style="list-style-type: none"> 1. Recall normal functions of colon 2. Differentiate between laxative and purgative 3. Explain non-pharmacological measures for constipation 4. Classify laxatives into 4 major groups 5. Understand the mechanism of action and enumerate the clinical indications and adverse effects of each group of laxatives
4.	Drugs used in peptic ulcer-I By the end of the lecture the student will be able to <ol style="list-style-type: none"> 1. Recall the pathogenesis of acid peptic disease. 2. Classify various drugs used in acid peptic disease. 3. Describe the mechanism of action of proton pump inhibitors. 4. Enumerate & explain their therapeutic uses.

	<ol style="list-style-type: none"> 5. Enlist the important side-effects & drug interactions of this drug groups. 6. Explain the regimens for H. pylori eradication
5.	<p>Drugs used in peptic ulcer-II</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Enumerate H₂ receptor blockers. 2. Describe the mechanism of action of H₂ receptor blockers. 3. Enumerate & explain their therapeutic uses. 4. Describe their important side-effects and drug interactions.
6.	<p>Drugs used in peptic ulcer-III</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Recall the antacids and mucosal protectants used in acid peptic disease. 2. Identify common uses and adverse effect of antacids. 3. Know the cytoprotective drugs mainly Misoprostol and its use in NSAID induced peptic ulcer.
7.	<p>IBD & IBS</p> <p>By the end of the lecture the student will be able to</p> <ol style="list-style-type: none"> 1. Recall the pathophysiological changes in the bowel in Crohn's disease and UC. 2. Outline the clinical approach to a patient with suspected IBD. 3. Classify the drugs used in the treatment of IBD. 4. Discuss the pharmacokinetics, pharmacodynamics, uses and adverse effects of 5-ASA, glucocorticoids, immunomodulators and TNF-alpha. 5. Describe the salient features of major pharmacological drug classes used to treat IBS.

DRUGS ACTING ON RESPIRATORY SYSTEM

Common irrationalities in the use of expectorants/mucolytics should be highlighted. Limitations of antitussives should be stressed. Use of Anti-asthmatics in various forms and manifestations of the disease should receive maximum priority. At the end of the course the student must be able to classify different drug groups acting on Respiratory Tract, describe their mechanism of action and enumerate their clinical uses and major side-effects with important contra-indications

S.NO.	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1.	<p>Expectorants & Antitussives</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Recall the physiology of cough reflex. 2. Enumerate causes of cough. 3. Classify drugs as antitussives, expectorants and mucolytics. 4. Explain mechanism of action and adverse drug reactions of each group
2.	<p>Anti-asthmatics-I</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Recall the pathophysiology of asthma. 2. Describe the strategies for the treatment of Asthma. 3. Enumerate drugs used for prophylaxis of asthma. 4. Classify the drugs used to treat asthma. 5. Explain the mechanism of action, clinical uses and side effects of β_2 agonists in asthma
3.	<p>Anti-asthmatics-II</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Explain salient features and adverse effects of Methyl xanthines. 2. Understand the effects of antimuscarinic, mast cell stabilizers, and LTIs. 3. Elaborate the anti-inflammatory effects of corticosteroids in asthma. 4. Explain management of acute attack of asthma.

MISC

At the end of the course the student must be able to classify different drug groups in this last portion of the course, describe their mechanism of action and enumerate their clinical uses and major side-effects with important contra-indications.

S.NO.	TITLE OF LECTURES WITH LEARNING OBJECTIVES
1.	<p>Antihistamines-I:</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Recall the histamine receptor subtypes and its mechanism of action. 2. Briefly explain the pharmacological effects and potential indications of histamine. 3. Enlist different types of histamine antagonists. 4. Classify anti-histamines.
2.	<p>Antihistamines-II</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Discuss the pharmacology of H1 antihistaminic with emphasis on clinical uses, adverse drug reactions and interactions. 2. Explain the differences between 1st and 2nd generation histamine antagonists.
3.	<p>Prostaglandins</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Discover and distinguish relationships between different types of eicosanoid molecules. 2. Recall the knowledge of enzymes that create PGs and TXs (cox-1 and -2) 3. Explain the mechanism of action and physiological functions of these molecules. 4. Discuss their clinical uses.
4.	<p>Drug treatment of migraine</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Differentiate between different types of headaches. 2. Classify migraine. 3. Explain the causes, symptoms and pathophysiology of migraine. 4. Describe the drugs used for the prevention (prophylactic treatment) of migraine. 5. Classify the drugs used for the acute management of migraine. 6. Explain the pharmacological actions, clinical indications and adverse effects of Triptans and ergot alkaloids.
5.	<p>Heavy Metal Poisoning & Antidotes (Chelating Agents)</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Enlist the important signs and symptoms of toxicity of As, Pb and Hg. 2. Define chelators. 3. Enumerate chelators. 4. Explain mechanism of action, indications and toxicity of BAL, Succimer, EDTA and Deferoxamine.
6.	<p>Drug treatment of glaucoma</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Recall the pathophysiology of glaucoma. 2. Review types of glaucoma along with sign and symptoms. 3. Classify the drugs used for the treatment of glaucoma. 4. Explain the mechanism of action, advantages and disadvantages of important drugs used for treating glaucoma.
7.	<p>Drug - Drug Interactions</p> <p>By the end of the lecture the students will be able to</p> <ol style="list-style-type: none"> 1. Define drug interaction. 2. Enumerate the drugs most likely involved in interactions. 3. Enlist the factors contributing to drug interactions. 4. Classify and explain different types of interactions. 5. Cite the measures that can be taken to reduce the risk of drug interactions.



LIST OF PRACTICALS FOR 3rd YEAR
MBBS DEPARTMENT OF
PHARMACOLOGY
SHARIF MEDICAL & DENTAL COLLEGE LAHORE

1. Routes of administration: advantages & disadvantages of different routes of administration with basic techniques employed for different routes are explained to the students. Four sessions, each of 02hrs duration
2. Dosage forms : Various dosage forms are discussed with their advantages and shown to the students in four sessions each of 02 hrs duration
3. Pharmaceutical calculations: Following topics are discussed with calculation exercises. One topic in one session of 02hrs duration
 - a) Dilution of stock solutions
 - b) Fractional solutions
 - c) Percentage solutions and powders like ORS.
 - d) Molar solutions
 - e) Equivalent solutions
4. Basic Biostatistics: Following topics are discussed with exercises. One topic in one session of 02 hrs duration.
 - a) Basic Terminology of biostatistics, Central tendencies, frequencies etc.
 - b) Variance, Standard deviation
 - c) Standard Error of Mean
 - d) Student's 'test' and estimation of value of "P".
5. Prescription writing: Six sessions of 02 hrs each in duration for giving the WHO concept of 'P' Drugs, Importance and parts of prescription and actual prescriptions of fifteen common diseases are taught to the students in these sessions.
6. Standardization of Drugs: Two sessions of 02 hrs each are reserved for acquainting the students about the importance of standardization of drugs and different methods employed for it are discussed.
7. Pharmacodynamics' Practicals: one practical per session is done in the laboratory under supervision of all the faculty members of the department. The practicals are
 - a) Effect of drugs on rabbit's eye (Tropicamide, Pilocarpine)
 - b) Effect of drugs on rabbit's eye (Phenylephrine, Proparacaine)
 - c) Effect of drugs on isolated rabbit's ileum (Acetylcholine. Atropine)
 - d) Dose Response Curve of acetylcholine on rabbit's ileum)
 - e) Effect of drugs Frog's Heart (Acetylcholine, Atropine)
 - f) Effect of drugs Frog's Heart (Adrenaline, Propranolol)
 - g) Effect of drugs on Frog's CNS (Caffeine, Strychnine)
 - h) Effect of drugs on Frog's CNS (Diazepam, MgCl₂, CaCl)
8. Pharmacy Practicals: one practical per session of 02hrs duration is performed under the supervision of all the members of the faculty. The practicals are
 - a) Prepare and dispense 50 grams of 10% sulfur ointment.
 - b) Prepare and dispense 20 ml of KMNO₄ lotion
 - c) Prepare and dispense 100 ml of 5% Dextrose water.
 - d) Prepare and dispense 100 ml of 0.9% Normal saline.
 - e) Prepare and dispense 5 doses of APC powder
 - f) Prepare and dispense 50 ml of carminative mixture.



ASSESSMENT PLAN DEPARTMENT OF PHARMACOLOGY **SHARIF MEDICAL AND DENTAL COLLEGE LAHORE**

Following modes of assessment are planned for 3rd year MBBS class in the subject of Pharmacology and Therapeutics. This plan has been designed keeping in view the university curriculum and hopefully will facilitate the students in preparing for 3rd professional examinations in the subject.

Chapter Tests:

These will be conducted at the completion of every chapter. The test will comprise of MCQs and SEQs on the pattern of university examinations. A preparatory time of at least 10 days shall be given prior to these tests. Each test will be followed by viva voce, for which the class will be divided into smaller batches.

Pre-tutorial Tests:

Tutorial topics will be notified minimum one week before the tutorial class. A small test of 10-15 minutes duration, comprising of MCQs, true or false statements or fill in the blanks will be held before the start of each tutorial. The topic will be then discussed by a senior instructor in detail. This will be an interactive session. The paper of the PTT will be marked by demonstrators in quick time and the papers will be returned before the conclusion of each class.

OSPE Tests:

In order to prepare the students for practical examinations at least two OSPE tests will be conducted on the pattern of university examinations.

Term Tests:

Two term tests shall be conducted in coordination with other subjects. This will comprise of theory, practical and viva segments and a sizeable portion of the total course will be included in each of them.

Pre-annual Exam:

This will be undertaken in coordination with other departments, exactly following the format of university professional examinations. It will comprise of MCQs, SEQs, OSPE and Viva voce.

Internal Assessment:

Internal assessment will be calculated out of 30 on the basis of all these tests that will be conducted throughout the year.



STAFF CONTACTS

Sr. No	Name	Email Address
01	Prof. Salman Bakhtiar	salman_bakhtiar@hotmail.com
02	Dr. Maira Bhatti	drmairawaqas@gmail.com
03	Dr. Sabeen Arjumand	sabeen_jabbar@hotmail.com
04	Dr. Fouzia Perveen	drfouziaperveen@gmail.com
05	Dr. Shahid Jamil	drshahid3737@gmail.com
06	Dr. Ayesha Iqbal	drayasha83@gmail.com
07	Dr. Mahwish Najeeb	mahwishnajeeb@yahoo.com



PRESCRIBED TEXT BOOKS & REFERENCES

RECOMMENDED BOOKS:

Text Books

1. Basic and Clinical Pharmacology 14th Edition by Bertram Katzung.
2. Katzung & Trevor's Pharmacology Examination and Board Review, 12th Edition by Anthony Trevor, Bertram Katzung, Marieke Knudering-Hall.
3. Lippincott Illustrated Reviews: Pharmacology (Lippincott Illustrated Reviews Series) 7th Edition by Karen Whalen PharmD BCPS.

Reference Book

1. Goodman & Gilman's: The Pharmacological Basis of Therapeutics, 13 Edition
Laurence L. Brunton, Randa Hilal-Dandan, Björn C. Knollmann.

PRACTICAL COPIES:

1. Handbook of applied pharmacology
2. A manual of experimental pharmacology and pharmacy