

# Pharmacology & Therapeutics

## DEPARTMENTAL OBJECTIVES:

The objective is to provide a need based integrated 'Basic Pharmacology for a safe and effective prescribing' Course so that the students on graduation will be competent to:

- Describe the pharmacological effects, mechanisms of action, pharmacokinetic characteristics and adverse reactions of drugs in order to be able to prescribe safely and effectively.
- describe the basic principles and concepts considered essential for rational (effective, safe, suitable and economic) prescribing and use of medicines in clinical practice.
- understand the principles of rational prescribing and the basis of utilizing the principles of rational evaluation of therapeutic alternatives.
- Recognize, manage and report the adverse drug reactions (ADRs) and drug interactions.
- Obtain informed consent by providing enough information about disease(s), treatment(s) and alternative options available, in order to allow the patient to make informed decision about their treatment.
- identify and assess objectively the drug information sources.
- state the Essential Drug List and principles underlying the 'Concept of Essential Drugs', and apply them in community oriented health care delivery service.
- recognize the implications of poly pharmacy and other means of irrational prescribing, identify influences favouring irrational prescribing and develop means to resist them.
- evaluate the ethical and legal issues involved in drug prescribing, development, manufacture and marketing.
- acquire methods of learning needed for evaluation of existing and new drugs and to follow trends and approaches in pharmacological research.
- develop attitude for continuous self learning and professional development throughout their practicing life.

## **Competencies related to Pharmacology to be acquired by the graduates-**

### **A) Knowledge and Understanding**

- Basic pharmacodynamics (effects, mechanism), and clinical pharmacokinetics required for safe and effective prescribing.
- Adverse Drug Reactions (ADRs): recognizing, management & reporting
- Basic principles & concepts essential for rational (effective, safe, suitable and economic) prescribing and use of drugs in clinical practice.
- Concept of essential drugs and selection of essential drug list for use in community oriented health care services.
- Drug information sources: access to unbiased drug compendia and use of standard treatment guidelines , formularies to support safe and effective prescribing
- Ethics of Prescribing: Informed patient consent about disease, treatment given and alternative options available.
- The ethical and legal issues involved in drug prescribing, development and marketing.

### **B) Skill –**

- Taking drug history.
- Prescription writing: choosing safe & effective drugs and appropriate dosage formulations.
- Selecting appropriate drugs (P Drug) to support rational prescribing considering efficacy, safety, suitability and cost.
- Recognizing, managing and reporting Adverse Drug Reactions (ADRs) and drug interactions.
- Obtaining accurate objective information to support safe and effective prescribing.
- Prescribing drugs for special groups: elderly, children, pregnancy, breast feeding mothers, renal &/or hepatic impairment or failure.
- Getting informed consent from patients
- Analyzing new evidence:
  - Reading, assessing and critically analyzing clinical trial results
  - Practicing evidence based medicine
  - Assessing the possible benefits and hazards of new therapy

### **C) Attitude –**

- Continuous self learning to keep their knowledge & skill up to date through continuous professional development.
- Communicating with patients regarding disease, the drug treatment and alternative options to obtain informed consent and respecting patients' own views and wishes in relation to drug treatment.

## Distribution of teaching - learning hours

Lecture	Tutorial	Practical and Demonstration	Clinical Case Report	Total teaching hours	Formative Exam		Summative exam	
					Preparatory leave	Exam time	Preparatory leave	Exam time
100 hrs	30 hrs	50 hrs	20 hrs	200 hrs	10 days	15 days	10 days	15 days
<i>(Time for exam. preparatory leave and formative &amp; summative assessment is common for all subjects of the phase )</i>								

## Teaching-learning methods, teaching aids and evaluation

Teaching Methods				Teaching aids	In course evaluation
Large group	Small group	Self learning	Others		
Lecture	Tutorial Practical & Demonstrations	Assignment	Integrated teaching/Assignment with presentation, clinical case report Block Placement at the end of term II	Laptop multimedia Microphone, Speaker Overhead Projector With Screen, Laser Pointer, Slide Projector, Black Board, White Board, Marker, Duster Tracing paper showing drug effect, reference books	<ul style="list-style-type: none"> <li>• Item Examination</li> <li>• Card final (written)</li> <li>• Term Examination</li> <li>• Term final (written, oral+ practical)</li> </ul>

### 3<sup>rd</sup> Professional Examination:

#### Marks distribution of Assessment of Pharmacology & Therapeutics:

#### Total marks – 300

- Written = 90 (MCQ-20, SAQ-70) + formative assessment marks -10= 100
- Structured oral examination= 100
- Practical (Traditional + OSPE) =100

## Term I

Learning Objectives	Core Contents	Teaching-Learning Strategies	Teaching Hours	* Evaluations
<p><b>A. <u>GENERAL PRINCIPLES OF PHARMACOLOGY</u></b></p> <p>At the end of the course students shall be able to:</p> <ul style="list-style-type: none"> <li>• describe the role and scope of pharmacology</li> <li>• understand the principles of drug disposition (kinetics)-absorption, distribution, metabolism and excretion</li> <li>• understand the basic principles related to cellular and molecular aspects of drug action (dynamics), selectivity, specificity and quantitative aspects of drug action</li> <li>• recognize adverse drug reactions, interactions and problems of drug misuse and abuse</li> <li>• describe the ethical, legal and economic aspects of prescription writing and compliance</li> </ul>	<p><b>A. GENERAL PRINCIPLES OF PHARMACOLOGY</b></p> <p><b>LECTURES:</b></p> <p>01: <b>Introducing Pharmacology</b></p> <p>02: <b>Drug Administration</b> Routes, drug delivery and Formulations for local &amp; systemic effects</p> <p>03: <b>Drug Absorption</b> Transfer of drugs across cell membrane &amp; specialized barriers, Factors influencing absorption</p> <p>04: <b>Bio-availability</b> Studies to compare bio-equivalence &amp; to monitor therapy</p> <p>05: <b>Drug Distribution</b> <math>V_d</math>, Plasma protein &amp; tissue binding, redistribution</p> <p>06: <b>Drug Metabolism</b> Where, why and how of bio-transformation, hepatic microsomal enzymes- induction &amp; inhibition Genetic influence on Drug metabolism (Pharmacogenetics)</p> <p>07: <b>Drug Elimination</b> Routes, Renal Excretion &amp; Factors influencing renal excretion</p>	<p><b>Lectures/ Practical/ Tutorials/ Assignments</b></p>	<p>15 hrs</p>	<p>Three item Examinations (Item 1,2,3)</p>

Learning Objectives	Core Contents	Teaching-Learning Strategies	Teaching Hours	* Evaluations
	<p><b>08: Clinical Pharmacokinetics</b>  <math>V_d</math>, Cl, First &amp; Zero order kinetics of Elimination, <math>t_{1/2}</math>, Steady state concentration, loading dose &amp; maintenance dose</p> <p><b>09: Dynamics: How do drugs act?</b>  Receptor-effectors linkages</p> <p><b>10: Quantitative aspects of drug action</b>  Dose-response relationships &amp; curves  Information obtained from D-R curves:  Agonists – efficacy, potency, shift of curves  Antagonists -</p> <p><b>11: Individual variations in drug responses</b></p> <p><b>12: Drug safety and vigilance</b>  Adverse drug reactions:  Types, detecting &amp; managing ADR  ADR monitoring &amp; reporting</p>			

Learning Objectives	Core Contents	Teaching-Learning Strategies	Teaching Hours	* Evaluations
<p><b>B. AUTONOMIC PHARMACOLOGY</b></p> <p>At the end of the course the students will be able to:</p> <ul style="list-style-type: none"> <li>▪ understand the organization of autonomic nervous system, physiology of neuro-chemical transmission, co-transmission and their pre and post synaptic modulation</li> <li>▪ understand the physiology of cholinergic neurotransmission, classify the cholinceptors and identify the drugs affecting cholinergic transmission and cholinceptors</li> </ul>	<p><b>B. AUTONOMIC PHARMACOLOGY</b></p> <p><b>LECTURES:</b></p> <p><b>01: Introduction</b>            Organization of ANS – sympathetic, parasympathetic, and enteric NS            Transmitters in ANS (ACh, NA, NANCs)            Co-transmission, pre and postsynaptic modulation            Cholinergic neurotransmission &amp; drugs modifying the events, Cholinergic receptors</p> <p><b>02: Cholinergic Drugs</b>            Effects of the stimulation of Cholinoceptors            Classification of cholinergic drugs – cholinceptor agonists and anti-cholinesterase</p> <p><b>03: Drugs for Glaucoma</b>            Role of Cholinergic drugs compared to other drugs</p> <p><b>04: OPC insecticide poisoning</b>            Manifestation &amp; management</p> <p><b>05: Anti-cholinergic Anti-muscarinic</b>            Atropine and atropine substitute</p> <p><b>06: Anti-cholinergic anti-nicotinic</b>            Classification – Neuromuscular blockers &amp; their role as skeletal muscle relaxant during anaesthesia            Ganglion blocker (names only)</p>	<p><b>Lectures/ Practicals/ Tutorials/ Assignments</b></p>	<p><b>12 hrs</b></p>	<p>Two item Examinations (Item 4,5)</p>

Learning Objectives	Core Contents	Teaching-Learning Strategies	Teaching Hours	* Evaluations
	<p><b>07: Adrenergic neurotransmission</b>            Drugs modifying the events            Adrenergic receptors            Effects of stimulation of adrenoceptors</p> <p><b>08: Adrenergic Drugs:</b>            Classification            Adrenergic inotropic agents &amp; their role in therapy            Role of Adrenaline, Noradrenaline, Isoprenaline, Dopamine, &amp; Dobutamine in therapy            Adrenergic vasoconstrictors, nasal decongestants</p> <p><b>09: Selective <math>\beta_2</math> agonists as Bronchodilators,</b> compared to other Drugs used in asthma</p> <p><b>10: <math>\alpha</math>-adrenoceptor antagonist</b>            Role of selective <math>\alpha_1</math> antagonist in therapy</p> <p><b>11: <math>\beta</math> adrenoceptor antagonist</b>            Role of <math>\beta</math> blockers in therapy</p>			

Learning Objectives	Core-Content	Teaching-Learning Strategies	Teaching Hours	* Evaluations
<p><b>RENAL &amp; CARDIOVASCULAR PHARMACOLOGY</b></p> <p>Students will be able to:</p> <ul style="list-style-type: none"> <li>• Classify or list drugs which affect the Cardiovascular System</li> <li>• Identify their pharmacological effects</li> <li>• Interpret mechanisms of actions, kinetics and toxicity</li> <li>• Correlate these knowledge to form the basis for their rational use in a given clinical situation</li> </ul>	<p><b>Renal &amp; Cardiovascular Pharmacology Lectures :</b></p> <p><b>01: Diuretics</b>  Classification of diuretics: based on sites &amp; mechanism of action and efficacy  Pharmacology of Thiazides, Loop, Potassium sparing diuretics: their role in therapy edema and hypertension</p> <p><b>02: Drugs used in hypertension</b>  Epidemiology and pathophysiology of hypertension, Objectives of anti-hypertensive therapy, Classification of anti-hypertensive drugs.  Pharmacology of Diuretics, <math>\beta</math> blockers, Ca channel blockers, ACE inhibitors, Angiotensin receptor antagonists, <math>\alpha</math> blockers, <math>\alpha</math> methyl dopa, Vasodilaotrs  Principles of selection of drug in different clinical situations</p> <p><b>03: Drugs used in congestive cardiac failure</b>  Pathophysiology of heart failure  Objectives of therapy  Drugs used in CCF: Diuretics, ACE inhibitors &amp; ARBs, Selective <math>\beta</math>-blockers,  (Additional) Cardiac glycosides, vasodilators, Phosphodiasterease inhibitors.</p> <p><b>04: Antianginal drugs</b>  Pathophysiology of angina, Objectives of therapy  Drugs used in angina: Nitrates, <math>\square</math> blockers, <math>Ca^{2+}</math> channel blockers.</p> <p>Additional: <b>Antiarrhythmic Drugs</b>  Pathophysiology of arrhythmia  Pharmacology of antiarrhythmic drugs</p>	<p>Lecture/ Tutorial/ Class Assignments</p>	<p>8 hrs</p>	<p>Two item Examinations (Item 6, 7)</p>



Learning Objectives	Core Contents	Teaching-Learning Strategies	Teaching Hours	* Evaluations
<p><b>HEMATOPOIETIC PHARMACOLOGY</b></p> <p>Students will be able to:</p> <ul style="list-style-type: none"> <li>• Classify or list drugs which affect the hematopoietic system</li> <li>• Identify their pharmacological effects</li> <li>• Interpret mechanisms of actions, kinetics and toxicity</li> <li>• Correlate these knowledge to form the basis for their rational use in a given clinical situation</li> </ul>	<p><b>HEMATOPOIETIC PHARMACOLOGY</b></p> <p><b>LECTURES:</b></p> <p>01: <b>Anticoagulants &amp; Thrombolytics</b>  Pathophysiology of thrombo-embolism  Pharmacology of Anti-coagulants: Heparin and LMW heparin, warfarin.  Pharmacology of thrombolytics: Streptokinase, Alteplase, Reteplase etc.</p> <p>02: <b>Antiplatelet drugs</b>  Pharmacology of low dose aspirin, clopidogrel, glycoprotein IIb/IIIa inhibitors and their role in therapy</p> <p>03: <b>Lipid regulating drugs</b>  Pharmacology of statins. fibrates, nicotinic acid, resins etc.</p> <p>04: <b>Drugs for anaemia</b>  Pathophysiology of anaemia Pharmacology of hemopoetics  iron, folic acid, vit B<sub>12</sub>  Pharmacology of erythropoietin</p> <p><b>ADDITIONAL CONTENTS</b></p>	<p>Lecture/  Tutorial/  Class  Assignments</p>	<p><b>7 hrs</b></p>	<p>One item Examination (Item 8)</p>

Learning Objectives	Core Contents	Teaching-Learning Strategies	Teaching Hours	* Evaluations
<p><b>ENDOCRINE PHARMACOLOGY</b> At the end of the session the students will be able to:</p> <ul style="list-style-type: none"> <li>▪ understand the physiology of endocrine and metabolic systems</li> <li>• list the pancreatic islet hormones and understand their role in the control of blood glucose; define and classify diabetes; understand the diagnostic criteria and monitoring tests and describe the pharmacology of insulin and oral antidiabetic drugs.</li> <li>• list and describe the physiology of adrenocortical hormones. Identify the synthesis inhibitors &amp; their role in therapy; describe the pharmacology of adrenocorticosteroids to assess their role in therapy as anti-inflammatory and immunosuppressive drugs</li> </ul>	<p><b>Endocrine Pharmacology</b> <b>LECTURES:</b> 01: <b>Endocrine Pancreas and control of blood glucose</b> Islet hormones, control of blood glucose Diabetes mellitus – types, diagnostic criteria, monitoring Insulin &amp; preparations Oral Hypoglycemic agents Hypoglycemic reactions &amp; management 02: <b>Adrenal cortex and drugs used in therapy</b> Adrenocortical hormones: synthesis &amp; blockers; Control of secretion, mechanism of action Pharmacological actions, uses and preparations Adverse effects 03: <b>Reproductive system</b> Hormonal control of female reproductive system Estrogens &amp; anti-estrogens Progesterone &amp; anti-progesterone Hormone replacement therapy Drugs used for contraception 04: <b>The Uterus</b> Drugs that stimulate uterine contraction (oxytocics) Drugs that inhibit uterine contraction 05: <b>The Thyroid</b> Synthesis, storage &amp; secretion of thyroid hormones Thyroid functions &amp; regulations Abnormalities of thyroid function Drugs used in disease of thyroid</p>	<p><b>Lectures/ Practicals/ Tutorials/ Assignments</b></p>	<p><b>9 hrs</b></p>	<p>One item Examination (Item 9)</p>

Learning Objectives	Core Contents	Teaching-Learning Strategies	Teaching Hours	* Evaluations
<p><b>GASTROINTESTINAL PHARMACOLOGY</b></p> <p>Students will be able to:</p> <ul style="list-style-type: none"> <li>• Classify or list the drugs affecting GIT</li> <li>• Identify pharmacological effects of the drugs</li> <li>• Interpret the mechanism of action, kinetics of the drugs and their toxicity</li> <li>• Correlate the gained knowledge to form the basis for rational use of medicines in a given clinical situation</li> </ul>	<p><b>Gastrointestinal Pharmacology</b></p> <p><b>LECTURES</b></p> <p>01: <b>Drugs used in Peptic ulcer</b>  Pathophysiology of peptic ulcer  Therapeutic goal and approach  Antacids, H<sub>2</sub>- blockers, Proton pump inhibitors, gastric cytoprotective agents, Helicobacter pylori eradication regimen Gastroprokinetic drugs and other agents</p> <p>02: <b>Drugs to treat diarrhoea</b>  Epidemiology, Principles of management Fluid and electrolyte replacement Selection of route and preparations  ORS and different IV fluids  Role of Antimicrobial drugs  Antimotility drugs</p> <p>03: <b>Drugs used in helminthiasis</b></p> <p>04: <b>Laxatives</b></p> <p>05: <b>Drugs for Inflammatory Bowel Diseases (IBS) &amp; Irritable Bowel Syndrome (IBS)</b></p>	<p><b>Lecture/ Tutorial/ Class Assignment</b></p>	<p><b>7 hrs</b></p>	<p>One item Examination (Item 10)</p>

## Term II

LEARNING OBJECTIVES	Core Contents	Teaching-Learning Strategies	Teaching Hours	* Evaluations
<p><b>PHARMACOLOGY OF DRUGS ACTING ON CNS</b></p> <p>Students will be able to:</p> <ul style="list-style-type: none"> <li>• Classify or list of drugs acting on Central Nervous System</li> <li>• Explain the mechanisms of action, kinetics and toxicity of these drugs</li> <li>• Describe the uses, administration, adverse effects &amp; precautions of drugs used in diseases of CNS</li> </ul>	<p><b>Central Nervous System</b></p> <p><b>LECTURES:</b></p> <p>01: <b>Introduction to CNS Drugs</b> Neurotransmitters of CNS (distribution, ion channel) general characteristics of CNS drugs</p> <p>02: <b>Opioid analgesic</b> Pathophysiology of pain, Pain pathway, endogenous opioids and opioid receptors Opioids: morphine, codeine, pethedine, tramadol, fentanyl used as analgesics compared. Role of morphine in myocardial infarction and pulmonary edema. Other clinical uses of opioids</p> <p>03: <b>Anxiolytics and hypnotics</b> Pathophysiology of sleep Benzodiazepines and other non-BDZ sedative-hypnotics Centrally acting muscle relaxants</p> <p>04: <b>Antidepressant drugs</b> Neurochemical basis of depression TCAs, SSRIs, MAOIs and other atypical antidepressants, Anti-manic drugs</p> <p>05: <b>Antipsychotic drugs</b> Neurochemical basis of psychosis Pharmacology of anti-psychotic drugs:</p> <p>06: <b>Local anaesthetic</b> Drugs, mechanism of action, techniques of local anaesthesia, uses and hazards</p>	<p style="text-align: center;"><b>Lecture/ Tutorial/ Class Assignment</b></p>	<p style="text-align: center;"><b>14 hrs</b></p>	<p style="text-align: center;">Three item Examinations (Item 11, 12, 13)</p>

LEARNING OBJECTIVES	Core Contents	Teaching-Learning Strategies	Teaching Hours	* Evaluations
	<p><b>07: General anaesthetics</b>  Principles of General Anaesthesia  Preanaesthetic medication, Balanced Anaesthesia  Induction &amp; Maintenance: Intravenous anaesthetics  &amp;Inhalation anaesthetics (nitrous oxides, halothane, fluranes)</p> <p><b>08: Skeletal muscle relaxation</b>  Depolarizing and Non depolarizing</p> <p><b>09: Anti-emetics</b>  Pathophysiology of vomiting  Pharmacology of anti-emetic drugs</p> <p><b>10: Antiparkinsonian Drugs</b>  Pathophysiology of Parkinson's diseases  Pharmacology of antiparkinsonian drugs</p> <p><b>11: Antiepileptics/Anticonvulsants</b>  Pathophysiology of epilepsy  Pharmacology of antiepileptic drugs</p>			

<i>Learning Objectives</i>	Core-Content	Teaching-Learning Strategies	Teaching Hours	* Evaluations
<p>Student will be able to</p> <ul style="list-style-type: none"> <li>describe:the role of biogenic amines &amp; prostaglandins in health &amp; diseases</li> <li>explain their mechanism of actions, pharmacological effects, kinetics and toxicity</li> <li>correlate these knowledge to form the basis for rational use of drugs in a given clinical situation</li> </ul>	<p><b>Autacoids and drugs used in inflammation</b>  <b>LECTURES:</b></p> <p>01: <b>Autacoids</b>  Definition and lists of autacoids  <b>Histamine:</b> synthesis, storage &amp; release, pharmacological actions &amp; physiological role  <b>Histamine antagonist:</b> H<sub>1</sub> antagonists: classification, role in allergic conditions &amp; other clinical uses and adverse reactions  H<sub>2</sub>-receptor antagonists: role in peptic ulcer (covered with GIT Pharmacology)</p> <p>02: <b>Ecosanoids</b>  Prostaglandins, Leukotrienes, Platelet Activating Factor (PAF)  Synthetic pathways &amp; antagonists  Physiological roles, pharmacological actions and possible clinical uses of synthetic analogues and antagonists</p> <p>03: <b>NSAIDs/ Non-opioid analgesics</b>  Paracetamol (mechanism of antipyretic and analgesic action, adverse effects)  NSAIDs (mechanism of action, adverse effects and precaution)  Selective COX II inhibitors</p> <p><b>Drugs for Migraine</b></p>	<p>Lecture/  Tutorial/ Class  Assignment</p>	<p>5 hrs</p>	<p>One item Examination (Item 14)</p>
<p><i>students will be able to:</i></p> <ul style="list-style-type: none"> <li><i>list drugs which affect the respiratory system</i></li> <li><i>describe their pharmacological effects</i></li> <li><i>explain mechanism of actions, kinetics and toxicity</i></li> <li><i>correlate these knowledge to form the basis for rational use of drugs in a given clinical situation</i></li> </ul>	<p><b>Respiratory Pharmacology</b></p> <p><b>01. Drug treatment of bronchial asthma</b>  Bronchodilators-β<sub>2</sub> agonists, Aminophylline, Ipratropium and others  Anti-inflammatory drugs – steroids, Leukotriene antagonist  Chromolyn Sodium &amp; related drugs</p> <p>May be covered with ANS Pharmacology</p> <p>ADDITIONAL CONTENTS</p>			

Learning Objectives	Core Contents	Teaching-Learning Strategies	Teaching Hours	* Evaluations
<p><b>CHEMOTHERAPY</b></p> <p>Students will be able to:</p> <ul style="list-style-type: none"> <li>• Classify or list each group/ class of antimicrobial drugs</li> <li>• Understand &amp; explain the mechanism of action, kinetics and toxicity of the antimicrobial drugs</li> <li>• Describe the clinical uses, administration, adverse effects of different antimicrobial drugs used in different clinical situations and the precautions that should be taken before their use</li> <li>• Correlate the gained knowledge to form the basis for rational use of medicines in a given clinical situation</li> </ul>	<p><b>CHEMOTHERAPY LECTURES:</b></p> <p><b>01: Introduction</b> General concept, Mode of action &amp; Classification of antimicrobials Principles of antimicrobial therapy</p> <p><b>02: Drug Resistance</b> Mechanism of development of drug resistance by microbes</p> <p><b>03: <math>\beta</math>-lactam Antibiotics</b> Penicillins Cephalosporins Other <math>\beta</math>-lactam</p> <p><b>04: Protein Synthesis Inhibitors</b> Aminoglycosides Macrolides Tetracyclines Chloramphenicol</p> <p><b>05: Sulfonamides &amp; Cotrimoxazole</b> Sulfonamides combinations, Topical uses Cotrimoxazole</p> <p><b>06: Quinolones &amp; Fluoroquinolones</b></p> <p><b>07: Azoles :</b> Metronidazole and other azoles</p> <p><b>08: Drugs used in Tuberculosis</b></p> <p><b>09: Drugs used in Leprosy &amp; Kala-Azar</b></p> <p><b>10: Drugs used in Malaria:</b> Therapy &amp; Prophylaxis</p> <p><b>11: Drugs used in Fungal Infections</b></p> <p><b>12: Drugs used in Viral Infections</b></p> <p><b>13: Cancer Chemotherapy</b></p>	<p><b>Lecture/ Tutorial/ Class Assignment</b></p>	<p><b>17 hrs</b></p>	<p>Five item Examination (Item 15, 16, 17,18, 19)</p>

Learning Objectives	Core Contents	Teaching-Learning Strategies	Teaching Hours	* Evaluations
<p><b>CLINICAL PHARMACOLOGY</b></p> <p>Students will be able to:</p> <ul style="list-style-type: none"> <li>• state the principles of rational prescription</li> <li>• identify means of irrational prescribing and consequences</li> <li>• take measures to prevent irrational prescribing</li> <li>• select essential drugs in common diseases from EDL</li> <li>• select P drug – in some clinical situation</li> <li>• correlate these knowledge to form the basis for rational use of drugs in a given clinical situation</li> </ul>	<p><b>CLINICAL PHARMACOLOGY</b></p> <p><b>LECTURES:</b></p> <p>01: <b>Rational Prescribing</b> General Principles, causes &amp; consequences of irrational prescribing, Measures to prevent irrational prescribing</p> <p>02: <b>Drug Compendia (Information Sources)</b> Pharmacopoeia, Formulary, Treatment guidelines, BP, INN, BNF, BDNf, etc.</p> <p>03: <b>Essential Drug concept</b> Definition, Selection criteria, Essential Drug List Rationale for prescribing from this Drug List</p> <p>04: <b>‘P Drug’ concept</b> Definition, Selection criteria, selection of ‘P Drug’ for some clinical situations</p> <p>05: <b>Drug selection for some special clinical conditions:</b> Pregnancy, different age groups, renal / hepatic failure</p>	<p><b>Lecture/ Tutorial/ Class Assignment</b></p>	<p><b>06 hrs</b></p>	<p>One item Examination (Item 20)</p>



## Pharmacology Practicals

Learning Objectives	Core Contents	Teaching Hours
<p><b>GENERAL PRINCIPLES OF PHARMACOLOGY PRACTICALS:</b></p> <p>Laboratory experiments and demonstrations have been designed to help students to achieve:</p> <ul style="list-style-type: none"> <li>- the ability to relate the principles and concepts to specific clinical situations</li> </ul> <p>At the end of the course, students shall be able to:</p> <ul style="list-style-type: none"> <li>• identify different dosage formulations and their usage</li> <li>• understand, interpret and analyze experimental data relating to drug disposition</li> <li>• perform experiments using isolated animal tissues to understand drug action</li> </ul>	<p><b>GENERAL PRINCIPLES OF PHARMACOLOGY</b></p> <p><b>1. Prescription writing</b> Format, legal &amp; ethical aspects, drug nomenclature, compliance and Exercise on Prescription Writing</p> <p><b>2. Drug Dosage Formulations</b> Source &amp; Routes of drug administration Drug Formulation &amp; Delivery Techniques Exercise on Drug Dosage Formulations</p> <p><b>3. Clinical Pharmacokinetics</b> Study of Time-Plasma Concentration Curves Determination of <math>t_{1/2}</math>, <math>V_d</math>, <math>Cl</math>, <math>K_e</math>, steady-state concentration, Loading &amp; Maintenance dose</p> <p><b>4. Study of Pharmacodynamics</b></p> <p style="padding-left: 20px;"><b>i. Study of Dose Response Relationship</b> Construction of Log Dose-Response Curves</p> <p style="padding-left: 20px;"><b>ii. Study of Drug Antagonism</b> Construction of Log Dose-Response Curves in presence of Antagonists</p> <p><b>5. Adverse drug Reaction</b> – Exercise on ADRs reporting &amp; monitoring</p>	<p>04 hrs</p> <p>04 hrs</p> <p>04 hrs</p> <p>06 hrs</p> <p>02 hrs</p>

Learning Objectives	Core Contents	Teaching Hours
<p><b>AUTONOMIC PHARMACOLOGY PRACTICALS:</b></p> <p>Laboratory experiments and demonstrations have been designed to help students to achieve:</p> <ul style="list-style-type: none"> <li>- the ability to relate the principles and concepts to specific clinical situations</li> </ul> <p>At the end of the session , students shall be able to:</p> <ul style="list-style-type: none"> <li>• understand, interpret and analyze experimental data relating to drug disposition</li> <li>• perform experiments using isolated animal tissues to understand drug action</li> </ul>	<p><b>AUTONOMIC PHARMACOLOGY</b></p> <ol style="list-style-type: none"> <li><b>1. Interpretation of Tracings on Blood Pressure</b> Demonstration of presence of Autonomic receptors</li> <li><b>2. Langendorff’s Preparation: Isolated Mammalian Heart</b> Isolated Rabbit Heart Preparation Study of effect of drugs on isolated heart preparation</li> <li><b>3. Study of Effect of Drugs on Skeletal Neuromuscular Junction</b> Demonstration of presence of Nicotinic receptors &amp; effect of competitive reversible &amp; irreversible neuromuscular blockers on them</li> </ol>	<p>06 hrs</p> <p>04 hrs</p> <p>02 hrs</p>

Learning Objectives	Core Contents	Teaching Hours
<p><b>CLINICAL PHARMACOLOGY PRACTICALS:</b></p> <p>Exercises have been designed to help students to understand the principles and concepts related to rational prescription.</p> <p>At the end of the session, students shall be able to:</p> <ul style="list-style-type: none"> <li>• evaluate drug information sources</li> <li>• understand the principles of rational prescription &amp; essential drug concept</li> <li>• select P drug</li> <li>• interpret and analyse the prescription supplied</li> </ul>	<p><b>CLINICAL PHARMACOLOGY</b></p> <ol style="list-style-type: none"> <li><b>1. Drug Information Sources</b> Acomparative study of the ‘Prescribing binformation of Drugs’ as provided by the Manufacturers’ Product Literatures and the authentic Drug Compendia ( British National Formulary/ Bangladesh National Formulary)</li> <li><b>2. Essential Drug Concept</b> Exercise on selection Essential Drugs</li> <li><b>3. ‘P Drug’ Concept</b> Exercise on selection ‘P Drugs for different clinical situations &amp; preparation of student formulary</li> <li><b>4. Prescription Audit</b> Exercise on ‘Prescription Audit’ using INRUD indicators</li> </ol>	<p>04 hrs</p> <p>04 hrs</p> <p>06 hrs</p> <p>04 hrs</p>

## Pharmacology Tutorials

Learning Objectives		Contents	Teaching Hours
Students will be able to: <ul style="list-style-type: none"> <li>• list each group/class of drugs</li> <li>• explain the mechanisms of action and Describe the uses, administration, kinetics, adverse effects &amp; precautions of used in different clinical conditions</li> <li>• state the principles of rational prescription</li> <li>• correlate these knowledge to form the basis for rational use of drugs in a given clinical situation</li> </ul>	<b>TERM I</b>	<ul style="list-style-type: none"> <li>• <b>General Pharmacology:</b> Pharmacokinetics and Pharmacodynamics</li> <li>• <b>Autonomic Pharmacology:</b> <ul style="list-style-type: none"> <li>• Review of Cholinergic–Anticholinergic drugs</li> <li>• Review of Adrenergic–Antiadrenergic drug</li> <li>• Drugs acting on Renal &amp; CVS</li> <li>• Review on Endocrine drug</li> <li>• Drugs for Bronchial asthma, PUD, Anemia</li> </ul> </li> </ul>	<b>20 hours</b>
	<b>Term II</b>	<ul style="list-style-type: none"> <li>• Drugs used in Anxiety, sleep disorder</li> <li>• Drugs used in depression, epilepsy and parkinsonism</li> <li>• Autacoids &amp; NSAIDs</li> <li>• Chemotherapy for specific infections: Shigellosis, Enteric fever, ARI, UTIs, malaria, tuberculosis, fungal infections</li> <li>• RUM: Principles of Rational prescribing &amp; means to resist pressure for irrational prescribing, Essential Drug Concept</li> </ul>	<b>10 hours</b>
	<b>Clinical case studies &amp; presentation – 5 clinical Cases</b>		<b>20 hours</b>

**Department of Pharmacology & Therapeutics**  
**Clinical Pharmacology Case Report**

Student's Name :

Class Roll # :

Remark of the Batch Teacher :

Professor of Pharmacology & Therapeutics

**Patient's Particulars**

**Personal history**

Patient's name:

Age:

Education:

Occupation:

Socio-economic Status:

Ward/Bed:

Date of Admission:

Date of discharge:

**History of past illness** (including Drug History)

**Description of present illness** (History & Clinical Findings)

**Investigation done with results:**

**Provisional diagnosis:**

**Treatment given:**

**Drug therapy given**

(mention the exact brand name written in the treatment sheet and their corresponding generic name):

**Result & Outcome of the treatment:**

**Make a Summary of the Case Report** (Stating personal history, complaints, clinical findings, reports of investigations done, diagnosis made, treatment given & outcome of the treatment)

**A. Discussion about therapeutic problem & drug therapy given**

- 1. Define the therapeutic problem(s) of the case you have reported.**
- 2. Did the drug(s)/treatment given address all the therapeutic problem?**

Yes/No

**Relate the treatment/drugs given to specific therapeutic problem.**

If no, explain why?

- 3. For each drug given, was their other alternatives?**
- 4. Considering the drug(s) given & the alternatives, whether the choice was MOST appropriate**  
(consider drug's effectiveness (benefit), Risk & Cost, Route of Administration, Dosage, Frequency & Duration of Therapy and Patient's Factors like age, Pregnancy & Diseases).

**B. Comments on Prescription**

- 1. Was the route of administration, dosage, frequency & duration of therapy properly mentioned?**
- 2. Was the patient warned about possible adverse effects of each drug & how to avoid them?**

**C. Report on Averse Effects**

Was there any reported adverse effects in this case?

If yes, what are the clinical manifestations & how they have been managed?

**D. Final Comments:**

**E. Drug Discussion**

**Brief information about the drug(s) used in the therapy** (including Generic name/  
International Non-proprietary name, Pharmacological effects, Mechanism of action, Metabolism  
and Elimination, Important drug-drug and drug-food interactions)

**Signature of the student**

# Department of Pharmacology & Therapeutics

## Students' In-Course Evaluation Card

Name of Student:

Year:

Roll No.:

Batch:

Session:

Address:

SSC Exam Year:

GPA:

HSC Exam Year:

GPA:

Admission in Medical College:

First Professional Examination Passed in \_\_\_\_\_ at first/second/third chance

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### For Official Use Only

	TERM I		TERM II		FINAL	
	Held	Attended	Held	Attended	Held	Attended
Lecture						
Practical						
Tutorial						
Seminar						

Head of the Department

Department of Pharmacology & Therapeutics

\_\_\_\_\_ Medical College

## Students' In-Course Evaluation Card

### TERM I

SL No	Title and contents	Marks	Initial of teacher
	<b>TERM I</b>		
01.	Introduction to Pharmacology Sources of Drug and Dosage Formulation Routes of Drug Administration		
02.	Pharmakokinetics Absorption, Distribution, Biotransformation and Excretion		
03.	Pharmacodynamics Mechanism of Drug Action, Adverse Drug Events		
04.	Cholinergic agonists and antagonists		
05.	Adrenergic agonists and antagonists		
06.	Diuretics and Drugs used in Hypertension		
07.	Antianginal, anticoagulant, thrombolytic, lipid lowering agents Drugs used in heart failure		
08.	Hemopoietics		
09.	Drugs used in Diabetes Mellitus Hormonal Contraceptives Thyroid hormones and Anti-thyroid Drugs		
10.	Gastrointestinal Pharmacology		
	<b>FIRST TERM EXAMINATION</b>		

### Students' In-Course Evaluation Card (contd.)

### TERM II

11.	Drugs used in anxiety and sleep disorder Benzodiazepines and Non-Benzodiazepines		
12.	Antipsychotics, Antidepressants and Anticonvulsants		
13.	Analgesics, Anesthetics and Drug dependence		
14.	Autacoids, Anti-inflammatory drugs (NSAIDs) and Steroidal agents		
15.	General aspects of chemotherapy Development of Drug resistant Microbiological profile of common infections		
16.	$\beta$ lactams Sulphonamides, Cotrimoxazole, Quinolones and Azoles		
17.	Tetracyclines, Chloramphenicol, Aminoglycosides and Macrolides		
18.	Drugs used in Tuberculosis, Leprosy, Malaria, Kala-azar, Amebiasis, Filariasis and Helminthiasis		
19.	Antifungal, Antiviral, Anti-scabies, Anti-neoplastic		
20.	Clinical Pharmacology & Rational prescribing		
	<b>SECOND TERM EXAMINATION</b>		



## Summative Assessment of Pharmacology & Therapeutics

### Assessment Systems and Mark Distribution

Components	Marks	Total Marks
Formative assessment		10
<b>WRITTEN EXAMINATION</b> MCQ SAQ	20 70	90
<b>PRACTICAL EXAMINATION</b> Traditional Practical Examination OSPE	60 40	100
<b>ORAL EXAMINATION (Structured)</b> 2 Boards	50+50	100
<b>Grand Total</b>		<b>300</b>

115

- There will be separate Answer Script for MCQ
- Pass marks 60 % in each of theoretical, oral and practical

# Summary of the Pharmacology Academic Program

	<b>Term I</b>	<b>Term II</b>	<b>Total Teaching hours</b>
Lectures/Revision	58 hours	42 hours	100 hours
Practicals & Demonstrations	32 hours	18 hours	50 hours
Tutorials	20 hours	10 hours	30 hours
Clinical case report Assignment with presentation		20 hours	20 hours
<b>Total</b>	<b>100 hours</b>	<b>100 hours</b>	<b>200 hours</b>

## Time allocation for Examination:

<b>Time for delivering 200 hrs teaching</b>	<b>Formative Examination &amp; holidays</b>	<b>Summative Examination</b>		<b>Total Time</b>
		Preparatory leave	Exam time	
7 months	2 months	1 month	2 months	12 months

## PHARMACOLOGY COURSE ORGANIZATION

TERM I																					TERM II																				
REGULAR																					REGULAR																				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21-26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47-52
<b>Total hours for lecture</b>										= 58 hours											<b>Total hours for lecture</b>							= 42 hours													
General Principles of Pharmacology										= 15 hours											Central nervous System							= 14 hours													
Autonomic Nervous System										= 12 hours											Autacoids and Dugs used in Inflammation							= 05 hours													
Renal and Cardiovascular Pharmacology										= 08 hours											Chemotherapy							= 17 hours													
Haemopoietic Pharmacology										= 07 hours											Clinical Pharmacology							= 06 hours													
Gastrointestinal Pharmacology										= 07 hours																															
Endocrine pharmacology										= 09 hours																															
<b>Total hours for Practicals</b>										= 32 hours											<b>Total hours for Practicals</b>							= 18 hours													
Prescription writing										= 04 hours											Drug information Sources							= 04 hours													
Dosage Formulations & Drug delivery techniques										= 04 hours											Prescription Audit							= 04 hours													
Pharmacokinetic Study										= 04 hours											Essential Drug List							= 04 hours													
Pharmacodynamic Study										= 06 hours											Exercise on selection of "P" drugs							= 06 hours													
Study of the cardiovascular effects of drugs										= 02 hours																															
Study of autonomic receptor function										= 06 hours																															
Study of drugs on Skeletal N-M junction										= 04 hours																															
Exercise on ADR reporting form fillup										= 02 hours																															

TERM I cont.		TERM II cont.	
<b>Total hours for Tutorials</b>	= 20 hours	<b>Total hours for Tutorials</b>	= 10 hours
<b>General Pharmacology:</b>		• Drugs used in Anxiety, sleep disorder,	= 01 hours
Pharmacokinetics and	= 02 hours	• Drugs used in depression, epilepsy and	= 01 hours
Pharmacodynamics	= 02 hours	parkinsonism	
<b>Autonomic Pharmacology:</b>		• Autacoid & NSAIDs	= 02 hours
• Review of Cholinergic &	= 02 hours	• Chemotherapy for specific infections:	
Anticholinergic drugs		Shigellosis, Enteric fever, ARIs, UTIs,	= 04 hours
• Review of Adrenergic &	= 02 hours	malaria, tuberculosis, fungal infections	
Antiadrenergic drug	= 04 hours	• RUM: Principles of Rational prescribing &	= 02 hours
• Drugs acting on Renal & CVS		means to resist pressure for irrational	
• Review on Endocrine drug	= 04 hours	prescribing Essential Drug Concept	
• Drugs for Bronchial asthma,	= 04 hours		
PUD, Anemia			