



# All India Institute of Medical Sciences, Rajkot, Gujarat

## Department of Pharmacology

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### OBJECTIVES

**MBBS student, at the end of the training in Pharmacology, is expected to:**

1. Understand basic principles of Pharmacology including pharmacokinetics and pharmacodynamics principles involved in the use of drugs
2. Understand and identify the various factors that can affect the action of drugs
3. Know the various routes of drug administration with advantages and disadvantages of the various routes and selection of route of administration for the given patient
4. Undertake dosage calculations as appropriate for the patient and be able to select the proper drug and dose for the at risk population i.e. Patients with kidney or liver disease, elderly, pregnant and lactating females, and children.
5. Understand the importance of rational prescribing of drugs and the concept of essential medicines
6. To be able to identify and monitor adverse drug reactions (ADRs) and appreciate the importance of ADR reporting
7. Know the drugs used in systemic illnesses, infections and chemotherapy etc. with main focus on mechanism(s) of action, pharmacokinetics, side-effects, indications and their clinical applications.
8. Understand concepts of drug use as per body system (Systemic pharmacology) – Autonomic nervous system, Autacoids, Respiratory system, Gastrointestinal system, Cardiovascular system, Blood, Chemotherapy, Central nervous system, Endocrine system etc
9. Understand the principles and practice of clinical pharmacy
10. Understand the methods in experimental pharmacology, principles of bioassay and be able to correlate drugs effects with the action of drugs at the receptors.
11. Have knowledge of common drugs and doses used for different ailments
12. Should be able to understand the concepts of Rational Use of Medicines (RUM) and be able to select medicines rationally for a given condition.



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13. Understand parts of prescription, importance of correct prescription in treating a patient and write legible and correct prescription using concepts of essential medicines and rational use of medicines.

### Course content:

**Total teaching hours: 270**

### Pharmacology - Theory

1.	General Pharmacology
	<ul style="list-style-type: none"><li>a) General concepts and definitions in Pharmacology</li><li>b) Routes of administration</li><li>c) Pharmacokinetics: Absorption, distribution, metabolism and excretion &amp; clinical pharmacokinetics</li><li>d) Pharmacodynamics: Modes of drug action, Site of drug action, drug-receptor interactions, basic principles of drug action, types of receptors and clinical significance, factors modifying drug action</li><li>e) Adverse drug reactions and Pharmacovigilance</li><li>f) Essential Medicines and rational use of medicines, evidence based medicine, new drug development process.</li></ul>
2.	Autonomic nervous system (ANS) and peripheral nervous system
	<ul style="list-style-type: none"><li>a) Neurohumoral transmission</li><li>b) Sympathetic nervous system – sympathomimetic drugs, sympatholytic drugs</li><li>c) Parasympathetic – Cholinergic drugs, Anticholinergic drugs, Ganglion stimulants and blockers</li><li>d) Glaucoma</li><li>e) Skeletal muscle relaxants</li><li>f) Local anesthetics</li></ul>



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3.	Respiratory system
	a) Pharmacotherapy of cough b) Pharmacotherapy of bronchial asthma
4.	Autacoids
	a) Histamine and antihistaminics b) Prostaglandins, leukotrienes, thromboxane, PAF, Substance P, bradykinin c) Serotonin and pharmacotherapy of migraine d) NSAIDs e) Drug therapy of rheumatoid arthritis, gout and osteoarthritis
5.	Cardiovascular system (CVS) & kidney
	a) Drugs for hypertension b) Pharmacotherapy of ischemic heart diseases c) Pharmacotherapy of heart failure d) Pharmacotherapy of cardiac arrhythmia e) Diuretics and antidiuretic drugs
6.	Gastrointestinal system (GIT)
	a) Emetic and antiemetic drugs b) Drugs for peptic ulcer c) Drugs for constipation d) Drugs for diarrhea
7.	Blood and hematinic
	a) Iron metabolism and iron preparations b) Folic acid c) Vitamin B12



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	<ul style="list-style-type: none"><li>d) Erythropoietin and related drugs</li><li>e) Coagulants-anticoagulants, fibrinolytic, antiplatelet drugs</li><li>f) Lipid lowering agents</li></ul>
8.	Antimicrobial agents
	<ul style="list-style-type: none"><li>a) General principles of chemotherapy and drug resistance</li><li>b) Rational use of antimicrobials</li><li>c) Chemotherapeutic agents: Penicillins, Cephalosporins, sulfonamides, cotrimoxazole, aminoglycosides, fluoroquinolones, macrolides, newer antimicrobial agents, tetracycline, chloramphenicol, Broad spectrum antibiotics</li><li>d) Chemotherapy of urinary tract infections and sexually transmitted diseases</li><li>e) Chemotherapy of malaria, tuberculosis, leprosy</li><li>f) Chemotherapy of amoebiasis and other protozoal diseases</li><li>g) Antihelminthic drugs</li><li>h) Antiviral drugs including drugs for HIV</li><li>i) Antifungal drugs</li><li>j) Cancer chemotherapy and immunomodulatory drugs</li><li>k) Antiseptic, disinfectants and ectoparasiticides</li></ul>
9.	Central Nervous System
	<ul style="list-style-type: none"><li>a) Neurotransmission in CNS</li><li>b) General anesthesia</li><li>c) Ethyl and methyl alcohols</li><li>d) Sedative-hypnotics</li><li>e) Antiepileptic drugs</li><li>f) Antiparkinsonian drugs</li></ul>



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	<ul style="list-style-type: none"><li>g) Psychopharmacology - Drugs for psychosis, depression, mania and anxiety disorders</li><li>h) Opioid analgesics</li><li>i) CNS stimulants and cognition enhancer drugs for alzheimer's disease</li></ul>
10.	Endocrine system
	<ul style="list-style-type: none"><li>a) Anterior pituitary hormones and drugs</li><li>b) Thyroid hormone and antithyroid drugs</li><li>c) Insulin and oral antidiabetic drugs</li><li>d) Corticosteroids</li><li>e) Estrogen, progesterone and contraceptives</li><li>f) Androgens and anabolic steroids</li><li>g) Uterine stimulants and relaxants</li><li>h) Hormones affecting calcium balance</li></ul>
11.	Miscellaneous
	<ul style="list-style-type: none"><li>a) Drugs acting on skin and mucous membranes</li><li>b) Ocular pharmacology</li><li>c) Vaccines, sera &amp; immunoglobulins</li><li>d) Poisoning and chelating agents</li><li>e) Monoclonal antibodies</li><li>f) Prescribing in pregnancy, lactation</li><li>g) Prescribing in paediatric and geriatrics</li><li>h) Drug interactions</li><li>i) Mono-clonal antibodies and newer therapies/advances</li></ul>



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### Pharmacology - Practical

Sr. no.	Topic
1.	Principles of clinical pharmacy
	<ul style="list-style-type: none"><li>a) Understanding and knowledge of various dosage forms used for oral, parenteral and topical route of administration</li><li>b) Dosage calculation and correct administration of drugs by different routes (skill laboratory)</li><li>c) Clinical pharmacokinetics</li></ul>
2.	Experimental Pharmacology
	<ul style="list-style-type: none"><li>a) Basic Principles and instruments for animal experimentations</li><li>b) Computer assisted learning (CAL) for different drug actions on animal models</li><li>c) Interpretation of graphs of animal experiments and its clinical significance</li></ul>
3.	Clinical Pharmacology
	<ul style="list-style-type: none"><li>a) Prescription writing</li><li>b) Communication with patients with ethical considerations</li><li>c) Evaluation of fixed dose combination</li><li>d) Principles of rational prescribing and 'p' drug concept</li><li>e) Prescription writing for different disorders:<ul style="list-style-type: none"><li>a. Respiratory system – Cough, bronchial asthma</li><li>b. Cardiovascular system – Hypertension, Angina, Congestive heart failure, Hyperlipidemia etc</li><li>c. Endocrine system: Diabetes, Thyroid disorders, Contraception, induction of labor etc.</li></ul></li></ul>



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	<ul style="list-style-type: none"><li>d. Chemotherapy: Respiratory tract infections, typhoid fever, cholera, urinary tract infections, Tuberculosis, Malaria, leprosy, fungal infections, viral infections etc</li><li>e. Central nervous system: preanesthetic medication, epilepsy, osteoarthritis, gout, rheumatoid arthritis, methanol poisoning, pain management, psychopharmacology –anxiety disorders, schizophrenia etc</li><li>f. Gastrointestinal system: peptic ulcer, nausea and vomiting, Diarrhea, constipation etc requiring treatment by medical graduate.</li><li>f) Evaluation of drug promotional literature</li><li>g) Evaluation of prescriptions - prescription audit</li><li>h) Sources of drug information</li><li>i) Reporting and analysis of adverse drug reactions</li></ul>
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### TEACHING AND LEARNING METHODOLOGY

The pharmacology teaching shall be done with the goal of making the student understand the concept of rational use of drugs.

*Theory:* General Pharmacology and systemic pharmacology:

It shall be taught by way of lectures, small group discussions and interactive sessions. Each session will be planned to deliver maximum relevant information to the student. The clinical aspects as well as rationality for the use of a given drug shall be discussed with the students. In addition, seminars on some important topics will be planned in which the use of a given drug shall be discussed by a clinical expert in the field. Tutorials will be conducted on a given topic and active discussion sessions will be facilitated.



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*Practical:* Clinical Pharmacy, Experimental Pharmacology, Clinical Pharmacology

Practical sessions will be conducted using group discussions, demonstrations, case base scenarios, objective structured practical examination stations (OSPE). The given practical exercise shall be discussed and demonstrated beforehand to the students. In addition, the students will learn prescription writing and prescription criticism and discuss exercise on drug interactions and shall also be shown various spots. The spots shall include various chemicals, drugs and instruments used in pharmacology. Prescriptions writing exercises will be explained using clinical case scenario and problem based learning. Students will also learn the importance and usage of various graphs using computer assisted learning. The effects of drugs on various tissues and how to interpret a drug action through graphs will also be learned by students. Various techniques of drug administration will be taught hands-on using the models.

### **TEXT-BOOK RECOMMENDED**

1. Goodman & Gilman's - The Pharmacological Basis of Therapeutics
2. Basic & Clinical Pharmacology by Bertram G, Katzung
3. Clinical Pharmacology by DR Lawrence, PN Bennett & MJ Brown
4. Essentials of Medical Pharmacology by K.D. Tripathi
5. Pharmacology and Pharmacotherapeutics by RS Satoskar, SD Bhandarkar, SS Ainapure
6. Fundamental of Experimental Pharmacology by MN Ghosh

### **EXAMINATION PATTERN: As Per Institutional Guidelines**

**Internal Assessment:** Assessments in theory and practical

### **Professional Examination**

Theory examination

- Paper I
- Paper II





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### Practical Examination

**Theory Papers:** Question paper is comprised of various types of MCQ (Single response, Multiple true-false, Matching, Reason Assertion, and multiple Completion), short Answer Questions (SAQ), Short-notes and Long answer questions (LAQ)

**Practical:** Practical examination include spotting, clinical pharmacy and dosage forms, Interpretation of graphs and experimental pharmacology, prescription writing and criticism of prescription, evaluation of Fixed dose combinations, ADR reporting, P-drug, sources of drug information, evaluation of drug promotional literature and patient communication including AETCOM evaluation. Exam pattern will include Spotting, Objective structured practical examination stations (OSPE), communication station, viva voce etc.