

Systemic Pharmacology I (Theory)

BP405T

A Textbook for B. Pharm Semester IV

*As per the new Pharmacy Council of India (PCI) Syllabus 2026 (NEP
2020)*

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ISBN: 978-81-689048-3-5



July, 2026.

Published by: Wiseleaf Scientific Ventures Pvt. Ltd.

Address: Wework - Berger Delhi One Floor 19, C-001/A2, Sector 16b, Noida, Uttar Pradesh, 201301, India

Preface

Systemic Pharmacology I, the subject of this book, is the point at which the pharmacy student first sees how a drug produces its effect in a living system. It is taught in the fourth semester of the B.Pharm programme as paper BP405T, and it carries the student from the chemical transmission of the nerve impulse to the drugs of the heart, the blood, the kidney, the autacoids, the airways, and the immune system. The subject is large, but it is held together by a single idea: that a drug acts by mimicking or blocking an endogenous mediator at a defined receptor or site, and that the receptor and the site predict both the wanted effect and the unwanted one.

This book is written to teach that idea rather than to list its instances. Each drug class is approached through its mediator, its receptor, the site at which it acts, the effect that follows, and the adverse effect that follows just as inevitably. Mechanisms are derived rather than asserted, the breadth of each class is covered rather than a single example, and every chapter closes with the kind of self-assessment the university examination demands. The compendial and regulatory frame is Indian throughout, with the Indian Pharmacopoeia as the reference standard and Indian practice in the choice of agents and examples.

The book follows the prescribed syllabus unit by unit. The figures are original and were drawn to be read in print; the tables collect the comparisons that examinations turn on; and the cross-references bind the chapters into a single argument, so that the action potential drawn for the heart in one chapter serves the antiarrhythmic drugs in the next. It is hoped that the student who reads it will leave not with a memorised list but with a way of reasoning that makes the next drug, and the next, intelligible.

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Course Objectives

The objectives of this course are to:

1. Develop a comprehensive understanding of neurohumoral transmission, neurotransmitters, and the organization and function of the autonomic nervous system.
2. Provide knowledge of the classification, mechanisms of action, and pharmacological effects of various classes of drugs.
3. Explain the pharmacology of drugs acting on the peripheral nervous system, cardiovascular system, and urinary system.
4. Describe the physiological roles of autacoids and the pharmacology of drugs used in the management of pulmonary diseases and related disorders.
5. Familiarize students with the pharmacology of drugs acting on the immune system, hematopoietic system, and blood, and relate pharmacological principles to clinical conditions through case-based learning.

Course Outcomes

Upon successful completion of this course, the students will be able to:

1. Explain the classification of neurotransmitters and describe neurohumoral transmission, including the organization, function, and pharmacological modulation of the autonomic nervous system.
2. Classify and explain the mechanisms of action, pharmacological effects, and therapeutic uses of drugs used in cardiovascular disorders such as heart failure, arrhythmias, hypertension, angina, and lipid disorders.
3. Describe the pharmacology and therapeutic uses of drugs acting on blood and kidney, including anticoagulants, antiplatelet agents, hematinics, and diuretics.
4. Explain the physiological roles of autacoids and analyze the pharmacology of drugs that modulate autacoid pathways, including antihistamines, antimigraine agents, NSAIDs, and antirheumatic drugs.
5. Evaluate the mechanisms of action, therapeutic uses, and adverse effects of drugs acting on the respiratory and immune systems.

Syllabus

Unit	Topics	No. of lectures
I	Pharmacology of drugs acting on the peripheral nervous system a) Organization and functions of PNS. b) Neurohumoral transmission, co-transmission. Neurotransmitters and their receptors, including non-adrenergic and non-cholinergic (NANC) neurotransmitters. c) Parasympathomimetic and Parasympatholytic drugs. d) Sympathomimetic and sympatholytic drugs. e) Skeletal muscle relaxants (peripheral and central). f) Drugs used in the treatment of myasthenia gravis and glaucoma	10 Hours
II	Pharmacology of drugs acting on the cardiovascular system a) Introduction to cardiovascular hemodynamic and cardiac electrophysiology. b) Drugs used in congestive cardiac failure. c) Anti-arrhythmic drugs. d) Anti-anginal and newer anti-ischemic drugs. e) Anti-hypertensive drugs. f) Shock, types of shocks and drugs used in their management. g) Stroke, types of strokes and drugs used in their management	10 Hours
III	Pharmacology of drugs acting on blood and kidney 1. Pharmacology of drugs acting on blood a) Anti-platelet agents b) Coagulants and anticoagulants. c) Fibrinolytics and Plasma expanders. d) Haematinics. e) Anti-hyperlipidaemic drugs. 2. Pharmacology of drugs acting on kidney a) Diuretics. b) Anti-diuretics.	10 Hours
IV	Pharmacology of autacoids and related drugs	9 Hours

	a) Introduction to autacoids and their classification. Therapeutic significance of important agonists and antagonists of prostaglandins, thromboxane, leukotrienes, angiotensin, bradykinin and substance P. b) Histamine and antihistamines. c) 5-HT, its agonists and antagonists, drugs used in migraine. d) Non-steroidal anti-inflammatory drugs, antipyretics and analgesics. e) Anti-gout and Antirheumatic drugs including Disease Modifying Antirheumatic Drugs (DMARDs).	
V	i) Pharmacology of Drugs acting on respiratory system a) Drugs used in the treatment of bronchial asthma and COPD. b) Definitions, classification and therapeutic uses of nasal decongestants, mucolytics, expectorants and antitussives. c) Respiratory stimulants. ii) Pharmacology of Drugs acting on immune system Mechanism of action, adverse effects and therapeutic uses of important classes of immune stimulants and immunosuppressants.	6 Hours

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Chapter 1. The Peripheral Nervous System: Organization and Neurohumoral Transmission

Learning outcomes

After studying this chapter the student will be able to:

- 1. Describe the anatomical and functional organization of the peripheral nervous system and distinguish the somatic from the autonomic division.*
- 2. Compare the sympathetic and parasympathetic divisions in their anatomy, transmitters, and effects on major organs.*
- 3. Explain the sequence of events in neurohumoral (chemical) transmission at a junction, and contrast it with electrical conduction.*
- 4. Outline cholinergic and adrenergic transmission and the synthesis, storage, release, and termination of acetylcholine and noradrenaline.*
- 5. Classify cholinergic and adrenergic receptors by subtype, location, and signal-transduction mechanism.*
- 6. Explain co-transmission and identify the principal non-adrenergic, non-cholinergic (NANC) transmitters.*

1.1 Introduction

The nervous system is divided anatomically into the central nervous system (CNS), which is the brain and spinal cord, and the peripheral nervous system (PNS), which is all neural tissue that lies outside them. The PNS is the body's wiring: it carries sensory information inward to the CNS and motor commands outward to muscles and glands. Almost every drug in this unit acts not on the nerve fibre itself but on the chemical junction where one neuron communicates with the next cell. Understanding that junction is therefore the foundation of autonomic pharmacology, and it is the reason this chapter is placed first.