

DOCTOR OF PHARMACY

CRITERION	Course Outcomes (COs)
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CRITERION

- . Course Outcomes (COs) and Program Outcomes (POs)
- . Establish the correlation between the courses and the Program Outcomes (NBA defined Program Outcomes as mentioned in Annexure I)
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On successful completion of this Course, students will be able to:

1.1: Theory Human Anatomy and Physiology

S. NO.	Statements
1.1.1	Gained knowledge of morphology, structure and functions of cell, tissues and organs of the human body.
1.1.2	Able to describe the various homeostatic mechanisms and their imbalances of various systems
1.1.3	Understand about working pattern of various organs.
1.1.4	Identify the various tissues, bones and organs of human body
1.1.5	. Appreciate coordinated working pattern of different organs of each system

1.1: Practical Human Anatomy and Physiology

S. NO.	Statements
1.1.1	Acquired practical knowledge of microscopic anatomy
1.1.2	Able to Perform the hematological tests and also record blood pressure, heart rate, pulse and Respiratory volumes
1.1.3	Identification of various tissues and bones in human body.

1.2: Theory Pharmaceutics

S. NO.	Statements
1.2.1	Helps to know the history of profession of Pharmacy and also about the way of handling of prescription. Provides basics of all types of dosage forms
1.2.2	Provides knowledge on pharmaceutical dose calculations, as well as the preparation of powders and liquid dosage forms
1.2.3	Describe the formulation of monophasic and biphasic dosage forms and its types.
1.2.4	Recognize the crucial role of proper formulation in ensuring effectiveness.
1.2.5	Design and formulate a variety of dosage forms

1.2: Practical Pharmaceutics

S. NO.	Statements
1.2.1	Design and develop various dosage forms, including solids, liquids, and semi-solids
1.2.2	Develop knowledge of selecting suitable containers and closures for different formulations
1.2.3	Proficient in preparing suppositories using molds

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On successful completion of this Course, students will be able to:

1.3: Theory Medicinal Biochemistry

S. NO.	Statements
1.3.1	Develop knowledge of the molecular processes involved in the chemistry of living cells
1.3.2	Understand the role of enzymes in therapeutic and diagnostic applications, and how they influence the development of new medications.
1.3.3	Illustrate the metabolism of nutrient molecules in physiological and pathological conditions
1.3.4	Comprehend the genetic organization of the mammalian genome
1.3.5	Describe the significance of various biochemical tests.

1.3: Practical Biochemistry

S. NO.	Statements
1.3.1	Learn how to handle and operate instruments for performing quantitative estimations.
1.3.2	Evaluate pathological conditions based on the results of various biochemical tests
1.3.3	Execute qualitative tests to detect and assess nutrients in body fluids.

1.4: Theory Pharmaceutical Organic Chemistry

S. NO.	Statements
1.4.1	Carry out qualitative assays for detecting nutrients in body fluids
1.4.2	Develop knowledge of the key physical properties, reaction mechanisms, and synthetic methods associated with different functional groups
1.4.3	Explain the reactivity and stability of compounds and intermediates formed during reactions.
1.4.4	Value the role of reaction intermediates in influencing reaction pathways and product formation.
1.4.5	Perform identification and confirmation of organic compounds using standard methods

1.4: Practical Pharmaceutical Organic Chemistry

S. NO.	Statements
1.4.1	Develop an understanding of safety precautions in the organic chemistry laboratory and methods for constructing molecular models of organic compounds.
1.4.2	Comprehend the steps required to carry out qualitative analysis of unknown organic compounds with diverse functional groups
1.4.3	Competent in preparing solid derivatives from organic compounds and purifying them via a one-step reaction

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On successful completion of this Course, students will be able to:

1.5: Theory Pharmaceutical Inorganic Chemistry

S. NO.	Statements
1.5.1	Familiarize yourself with the sources of impurities in inorganic drugs and pharmaceuticals, along with the analytical methods used for their detection.
1.5.2	Develop a solid understanding of acidity, basicity, buffers, and tonicity and their relevance to pharmaceutical applications.
1.5.3	Synthesize and identify various inorganic drugs based on their classification.
1.5.4	Possesses knowledge of the medicinal and pharmaceutical applications of inorganic compounds
1.5.5	Explains the properties, storage requirements, and applications of radiopharmaceuticals

1.5: Practical Pharmaceutical Inorganic Chemistry

S. NO.	Statements
1.5.1	Develop skills to perform limit test
1.5.2	Ability to perform test for purity and identification of inorganic compounds as per Indian Pharmacopoeia
1.5.3	Knowledge and skills to prepare inorganic salts- Boric acid, Potash alum, and Ferrous sulphate

1.6RBT/RMT: Theory Remedial Biology/Remedial Mathematics

S. NO.	Statements
1.6.1 RBT	Understand the components of living world.
1.6.2RBT	Knowledge about structural system of plant and animal kingdom
1.6.3RBT	Knowledge about functional system of plant and animal kingdom
1.6.3RBT	Classification and salient features of five kingdoms of life
1.6.3RBT	Acquire information regarding anatomy and physiology of humans
1.6.1RMT	Inculcate mathematical knowledge and understanding in Pharmacy
1.6.2RMT	Pertain mathematical concepts and principles to do calculations in the field of Pharmacy
1.6.3RMT	Understand the theory and its applications
1.6.4RMT	Solve different types of problems as per theoretical ideas
1.6.5RMT	Perform abstract mathematical reasoning

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On successful completion of this Course, students will be able to:	
1.6: Practical Remedial Biology	
S. NO.	Statements
1.6.1	Gained knowledge about use and applications of Microscope
1.6.2	Identification of blood cells and blood group and determination of blood pressure
1.6.2	Understand about plants and animals using models
2.1: Theory Pathophysiology	
S. NO.	Statements
2.1.1	Describe the mechanism of cell injury, inflammation and repair
2.1.2	Summarize the cardio vascular and respiratory system
2.1.3	Categorize the Hematological and GI system diseases
2.1.4	Understand the principle of cancer and bone disorder
2.1.5	Classify the infectious and STDs
2.2 Theory Pharmaceutical microbiology	
S. NO.	Statements
2.2.1	Elaborate the basic knowledge about microbiology and the detailed study regarding culturing techniques and preservation of microorganisms.
2.2.2	Illustrate to identify bacteria and various sterilization process
2.2.3	Describe about classification of fungi and viruses and different types of disinfectant in detail. Learn sterility testing of Pharmaceutical products
2.2.4	Explain the aseptic techniques, microbiological assay of antibiotics, vitamins and aminoacids
2.2.5	Distinguish microbial spoilage products and animal cell cultures.

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On successful completion of this Course, students will be able to:	
2.2: Practical Pharmaceutical microbiology	
S. NO.	Statements
2.2.1	Study of different equipments and processing & understand the concept of Sterilization
2.2.2	Attain knowledge on identification of bacteria by Staining and biochemical methods
2.2.3	Apply microbiological testing tools in pharmaceutical products
2.3: Theory Pharmacognosy And Phytopharmaceuticals	
S. NO.	Statements
2.3.1	Know about Pharmacognosy and basic knowledge
2.3.2	Understand the cultivation & collection
2.3.3	Production of plant & plant metabolites
2.3.4	Understand the about Adulteration of medicines
2.3.5	Ability to find out the primary metabolites
2.3: Practical Pharmacognosy And Phytopharmaceuticals	
S. NO.	Statements
2.3.1	Screening the Phytoconstituents leads to find out the crude drug
2.3.2	Performing the transverse section and identify the crude drug by the microscopical characters.
2.3.3	Analyzing the Phytoconstituents by and chemical test.
2.4: Theory Pharmacology-I	
S. NO.	Statements
2.4.1	Discuss the various routes of drug administration, source of drugs and the terminologies used in pharmacology
2.4.2	Summarise the mechanism of drug action at organ system/sub cellular/ macromolecular levels, Adverse drug reactions, Drug discovery and clinical evaluation of new drugs
2.4.3	Illustrate Pharmacology of drugs acting on Respiratory system, Hormone and hormone antagonist
2.4.4	Explain the Pharmacology of drugs acting on ANS, Cardiovascular system, Autocoids and their antagonist
2.4.5	Describe the pharmacology of Sedatives and hypnotics, Psychotropic drugs, General anesthetics

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On successful completion of this Course, students will be able to:

2.5: Theory Community Pharmacy

S. NO.	Statements
2.5.1	Demonstrate the ability to assess, manage, and provide pharmaceutical care to patients in a community pharmacy setting.
2.5.2	Students should be able to conduct patient counseling, assess drug therapy, identify drug-related problems, and recommend appropriate interventions
2.5.3	Provide evidence-based drug information and ensure safe, effective, and economical medication management for patients.
2.5.4	Understand and apply the legal, ethical, and professional standards relevant to the practice of community pharmacy
2.5.5	Apply clinical knowledge to make informed, patient-centered decisions in the community pharmacy setting

2.6: Theory Pharmacotherapeutics_I

S. NO.	Statements
2.6.1	Students should be able to describe the underlying mechanisms of disease, including the molecular, cellular, and physiological changes that occur in various medical conditions
2.6.2	Apply pharmacological principles to the therapeutic management of disease
2.6.3	Demonstrate a thorough understanding of the pathophysiology of common diseases and disorders
2.6.4	Select and recommend appropriate drug therapy based on the pathophysiology and clinical presentation of the disease.
2.6.5	Design appropriate drug dosing regimens based on individual patient needs and therapeutic goals.

2.6 Practical Pharmacotherapeutics-I

S. NO.	Statements
2.6.1	Use evidence-based guidelines, clinical studies, and drug information resources to inform drug therapy decisions.
2.6.2	Recognize and manage adverse drug reactions (ADRs) in patients receiving pharmacotherapy.
2.6.3	Detect and manage potential drug interactions and their clinical implications

3.1 Theory Pharmacology-II

S. NO.	Statements
3.1.1	Understand the pharmacology of antimicrobial agents, including antibiotics, antivirals, antifungals, and antiparasitics, and apply this knowledge in managing infections.
3.2.2	Apply pharmacological principles to the therapeutic management of Malaria, Cancer
3.3.3	Illustrate Pharmacology of drugs acting on Renal system
3.3.4	Illustrate the pharmacology of blood and blood forming agents
3.3.5	Students will learn how to detect and manage common and severe ADRs, including allergic reactions, idiosyncratic reactions, and dose-dependent toxicity.

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On successful completion of this Course, students will be able to:	
3.1: Practical Pharmacology-II	
S. NO.	Statements
3.1.1	Explain the application and need of experimental pharmacology
3.1.2	Demonstrate the DRC of acetylcholine using isolated chicken ileum.
3.1.3	Determine the acute oral toxicity and calculation in application experimental pharmacology.
3.2 Theory Pharmaceutical Analysis	
S. NO.	Statements
3.2.1	Demonstrate a strong understanding of various analytical techniques used in the pharmaceutical industry
3.2.2	Students will gain knowledge of different analytical techniques, including spectroscopy and chromatography
3.2.3	Apply analytical techniques in the assessment of the quality and purity of pharmaceutical products.
3.2.4	Understand the identification and quantification of pharmaceutical impurities
3.2.5	Students will learn the principles of stability testing in pharmaceuticals, including accelerated stability studies and real-time stability testing.
3.2: Practical Pharmaceutical Analysis	
S. NO.	Statements
3.2.1	Perform different chromatographic techniques
3.2.2	Perform different titrations and electrochemical methods
3.2.3	Understand how to evaluate the experimental results and arrive at inference
3.3: Theory Pharmacotherapeutics -II	
S. NO.	Statements
3.3.1	Recognize and manage adverse drug reactions (ADRs) in patients receiving pharmacotherapy
3.3.2	Students will learn how to access and critically evaluate the latest clinical evidence, practice guidelines, and drug monographs.
3.3.3	Apply clinical problem-solving skills and critical thinking in therapeutic decision-making.
3.3.4	Design appropriate drug dosing regimens based on individual patient needs and therapeutic goals.
3.3.5	Recognize and manage drug-drug, drug-food, and drug-disease interactions

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On successful completion of this Course, students will be able to:

3.3: Practical Pharmacotherapeutics

S. NO.	Statements
3.3.1	Recognize and manage adverse drug reactions (ADRs) in patients receiving pharmacotherapy.
3.3.2	Develop effective communication skills for counseling and educating patients about their drug therapy.
3.3.3	Accurately document and report clinical findings, therapeutic decisions, and patient responses to therapy.

3.4: Theory Pharmaceutical Jurisprudence

S. NO.	Statements
3.4.1	Acquire knowledge on schedule rules, laws and regulations related to drugs and cosmetics
3.4.2	Describe the regulatory authorities and agencies governing the manufacture and sale of Pharmaceuticals.
3.4.3	Insight on various Indian Pharmaceutical Acts and Laws
3.4.4	Understand rules and provisions for advertisement of drug, drug price and Prevention of Cruelty to animals
3.4.5	Explain pharmaceutical legislation & the intellectual property rights and regulatory guidelines

3.5: Theory Medicinal Chemistry

S. NO.	Statements
3.5.1	To learn about the drug's metabolism, side effects, and therapeutic value of drugs
3.5.2	To know the significance of SAR of drugs.
3.5.3	To acquire knowledge on combinatorial chemistry of drugs
3.5.4	To gain knowledge of the pharmacological activity of medicines in relation to their chemistry
3.5.5	To write the synthesis of selected drugs

3.5: Practical Medicinal Chemistry

S. NO.	Statements
3.5.1	To synthesize different medically important compounds and purify them.
3.5.2	To perform the monographic analysis of selected drugs as per pharmacopoeia.
3.5.3	Perform assay of drugs as per pharmacopoeial standards

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On successful completion of this Course, students will be able to:	
3.6:Theory Pharmaceutical Formulations	
S. NO.	Statements
3.6.1	Explain concepts and applications of pre formulation study of drug substances
3.6.2	Describe classification, excipients, formulation and evaluation of tablet and tablet coating with its processing problems
3.6.3	Describe classification, excipients, formulation, evaluation and packaging of capsules
3.3.4	Gain knowledge about sterile dosage forms like parenteral ophthalmic and aerosols
3.6.5	To understand the concept of controlled and novel drug delivery systems.
3.6:Practical Pharmaceutical Formulations	
S. NO.	Statements
3.6.1	Able to perform preformulation, preparation and evaluation of tablets and capsules
3.6.2	Able to conduct preparation and evaluation and packaging of parenteral and cosmetic preparations with its labeling requirements
3.6.3	Able to perform formulation, preparation and labeling requirements of creams.
4.1:Theory Pharmacotherapeutics-III	
S. NO.	Statements
4.1.1	Demonstrate a thorough understanding of the pathophysiology of common diseases and disorders
4.1.2	Students should learn how drugs interact with the body and how this knowledge can be applied to develop appropriate therapeutic strategies for various diseases.
4.1.3	Design appropriate drug dosing regimens based on individual patient needs and therapeutic goals.
4.1.4	Identify potential adverse drug reactions (ADRs) and manage them effectively
4.1.5	Develop patient-centered therapeutic regimens that take into account individual patient needs, preferences, and values
4.1:Practical Pharmacotherapeutics-III	
S. NO.	Statements
4.1.1	Provide effective patient education and counseling on medication use, adherence, and lifestyle changes.
4.1.2	Apply clinical problem-solving skills and critical thinking in therapeutic decision-making.
4.1.3	Apply clinical problem-solving skills and critical thinking in therapeutic decision-making.

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On successful completion of this Course, students will be able to:	
4.2: Theory Hospital Pharmacy	
S. NO.	Statements
4.2.1	Understand the function of the Pharmacy and Therapeutics (P&T) Committee and the process of formulary management in hospitals.
4.2.2	Demonstrate an understanding of the role and responsibilities of the hospital pharmacy in patient care
4.2.3	Apply strategies for preventing and reporting medication errors in the hospital setting.
4.2.4	Students will learn how to detect, report, and manage adverse drug reactions (ADRs) and drug interactions
4.2.5	Understand the principles and practices of sterile and non-sterile compounding in the hospital pharmacy
4.2: Practical Hospital Pharmacy	
S. NO.	Statements
4.2.1	Assessment of drug interactions in the given prescriptions
4.2.2	Manufacture of parenteral formulations, powders.
4.2.3	Perform Inventory Control
4.3: Theory Clinical Pharmacy	
S. NO.	Statements
4.3.1	Identify and manage drug-drug interactions and adverse drug reactions (ADRs) in clinical practice
4.3.2	Understand the clinical pharmacology and drug therapy considerations in special populations,
4.3.3	To gain knowledge about the daily activities of clinical pharmacist like ward round participation, medication history, patient counselling etc
4.3.4	Understand the principles of pharmacovigilance and contribute to risk management in clinical practice.
4.3.5	To perform and analyse clinical laboratory tests
4.3: Practical Clinical Pharmacy	
S. NO.	Statements
4.3.1	Provide patient-centered care and perform effective medication counseling
4.3.2	Identify and manage drug-drug interactions and adverse drug reactions (ADRs) in clinical practice
4.3.3	Students will practice the proper methods of documenting clinical interventions, medication reviews, and patient counseling

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On successful completion of this Course, students will be able to:

4.4: Theory Biostatistics And Research Methodology

S. NO.	Statements
4.4.1	Able to understand the Introduction, Types, protocols and Significance of research in Pharmaceutical Sciences
4.4.2	Able to understand the methods and types of for data collection for the fulfilment of research
4.4.3	Basic concepts of epidemiological methods including types standard measures, study designs and errors in Epidemiological studies.
4.4.4	Understanding the concepts of biostatistics
4.4.5	Gain knowledge about Research question and Hypothesis and able to understand thesis writing skills

4.5: Theory Biopharmaceutics And Pharmacokinetics

S. NO.	Statements
4.5.1	Understanding the concepts of absorption and distribution of drugs and their relevance in efficacy of dosage forms
4.5.2	Illuminate relevance and significance of biotransformation, drug elimination (renal non renal)
4.5.3	Understanding concepts of dissolution and in-vitro, in-vivo correlation and the concepts of bioavailability and bioequivalence studies
4.5.4	Learning various compartmental and non-compartmental analysis methods
4.5.5	Understanding the concepts of nonlinear pharmacokinetics

4.5: Practical Biopharmaceutics And Pharmacokinetics

S. NO.	Statements
4.5.1	Interpret plasma concentration profiles for drugs to determine their pharmacokinetic properties and therapeutic outcomes
4.5.2	Understand the relationship between biopharmaceutical properties and the formulation of drug products
4.5.3	Calculate pharmacokinetic parameters using different models (non-compartmental, compartmental).

4.6: Theory Clinical Toxicology

S. NO.	Statements
4.6.1	Identify and classify various toxic agents and their respective toxicological effects.
4.6.2	Understand the mechanisms of toxicity and how specific toxins cause organ-specific damage
4.6.3	Interpret toxicological tests and laboratory data to assist in the diagnosis and management of poisoning cases
4.6.4	Perform a thorough assessment of toxic exposure and determine the clinical significance of the poisoning.
4.6.5	pharmacological principles to the treatment of poisoning and overdose using both pharmacological and non-pharmacological interventions.

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On successful completion of this Course, students will be able to:	
5.1: Theory Clinical Research	
S. NO.	Statements
5.1.1	Demonstrate a thorough understanding of the fundamental principles of clinical research, including study design, methodology, and data analysis
5.1.2	Understand the regulatory framework governing clinical research, including Good Clinical Practice (GCP), International Conference on Harmonisation (ICH) guidelines, and FDA regulations.
5.1.3	Apply appropriate statistical methods to analyze clinical research data and interpret results.
5.1.4	Understand the role of clinical research in the drug development process, including the phases of clinical trials (Phase I-IV) and the regulatory approval process
5.1.5	Apply patient-centered approaches to clinical research, emphasizing the importance of patient outcomes and quality of life.
5.2: Theory Pharmacoepidemiology And Pharmacoeconomics	
S. NO.	Statements
5.2.1	Apply appropriate epidemiological study designs to evaluate the effects of drug therapy on populations
5.2.2	Conduct drug utilization studies to evaluate the patterns of drug use, prescribing behaviors, and medication adherence
5.2.3	Apply pharmacoeconomic principles to evaluate the cost-effectiveness, cost-utility, and cost-benefit of drug therapies in various clinical settings
5.2.4	Apply pharmacoepidemiology and pharmacoeconomics findings to improve clinical decision-making and optimize patient care
5.2.5	Critically appraise and interpret the pharmacoepidemiology and pharmacoeconomics literature to assess the relevance and quality of research studies
5.3: Theory Clinical Pharmacokinetics And therapeutic Drug Monitoring	
S. NO.	Statements
5.3.1	Understand the importance of Therapeutic Drug Monitoring (TDM) in clinical practice for the optimization of drug therapy and prevention of toxicity.
5.3.2	Calculate and interpret key pharmacokinetic parameters, including half-life, clearance, volume of distribution (Vd), area under the curve (AUC), and elimination rate constant (k)
5.3.3	Identify and manage drug-drug interactions that influence pharmacokinetic parameters and affect drug therapy
5.3.4	Design and optimize dosing regimens based on pharmacokinetic data, therapeutic goals, and patient characteristics
5.3.5	Individualize drug therapy using pharmacokinetic and TDM data to achieve the desired clinical outcomes

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On successful completion of this Course, students will be able to:	
5.4: Practical Clerkship	
S. NO.	Statements
5.4.1	Develop and demonstrate the ability to assess patient medication therapy and make informed, evidence-based therapeutic decisions to optimize patient outcomes
5.4.2	Work effectively within an interdisciplinary healthcare team to optimize patient care and contribute to patient treatment plans
5.4.3	Provide effective patient counseling on medication use, side effects, dosage instructions, and lifestyle modifications to improve patient outcomes
5.5: Project work	
S. NO.	Statements
5.5.1	Acquire knowledge to perform literature review
5.5.2	Designing of research protocol
5.5.3	Analysis and Interpretation of research data using appropriate statistical tools
5.5.4	Carryout the works as per designed protocol and arriving at conclusion
5.5.5	Developed skills in group discussion and group activities