

## **COURSE OUTCOMES OF PHARM.D PROGRAMME**

**Programme** : I/VI Pharm.D  
**Course Name** : Human Anatomy and Physiology  
**Course code** : 1.1 (Theory)

C1.1.1	To recall the terminologies in the human anatomy and physiology, along with learn the functions of human cell
C1.1.2	To summarize the functions of tissue, bones and joints in the skeleton.
C1.1.3	To explain the functions of formed elements in the blood along with lymph and its role in immunity
C1.1.4	To compare the anatomical features of heart, lungs and GIT and to analyze their physiology.
C1.1.5	To assess the structure and function of brain, spinal cord and cranial nerves and to interpret the physiology of urinary system.
C1.1.6	To elaborate the physiology of endocrine glands, reproductive organs, sensory organs and to discuss the physiology skeletal muscles.

**Programme** : I/VI Pharm.D  
**Course Name** : Human anatomy and Physiology  
**Course code** : 1.1 (Practical)

C1.1.1	To find and relate characteristics of various tissues of human body
C1.1.2	To demonstrate bleeding time, clotting time, blood pressure and blood grouping.
C1.1.3	To identify the number of RBC and WBC using hemocytometer
C1.1.4	To examine the functions of various organ systems in human body
C1.1.5	To interpret the mechanisms of pregnancy diagnosis tests and various family planning appliances
C1.1.6	To construct and record simple curves using frog gastrocnemius sciatic nerve

**Programme** : I/VI Pharm.D  
**Course Name** : Pharmaceutics  
**Course code** : 1.2 (Theory)

C1.2.1	To define the profession of pharmacy and pharmacopoeias.
C1.2.2	To outline the classification of dosage forms, summarize importance of prescription and posology.
C1.2.3	To develop monophasic and biphasic liquid dosage forms.
C1.2.4	To simplify the preparation of suppositories and powders.
C1.2.5	To explain the concepts of surgical aids and galenicals.
C1.2.6	To elaborate the importance of pharmaceutical incompatibilities and solve calculations.

**Programme** : I/VI Pharm.D  
**Course Name** : Pharmaceutics  
**Course code** : 1.2 (Practical)

C1.2.1	To remember the principles used in the preparation of liquid, semisolid and solid dosage forms.
C1.2.2	To illustrate monophasic internal and external liquid dosage forms.
C1.2.3	To experiment with biphasic liquid dosage forms.
C1.2.4	To take part in formulation of powder dosage forms.
C1.2.5	To appraise the formulation of suppositories.
C1.2.6	To solve the prescriptions having the incompatibility problems.

**Programme** : I/VI Pharm.D  
**Course Name** : Medicinal Biochemistry  
**Course code** : 1.3 (Theory)

C1.3.1	To recall the importance of biochemistry, catalytic activity, mechanism of action and applications of enzymes.
C1.3.2	To understand the metabolism of carbohydrates, lipids, electron transport chain and ATP formation.
C1.3.3	To apply the clinical chemistry knowledge in diagnosis and prognosis of diseases.
C1.3.4	To simplify the metabolism and disorders associated with nucleic acids and amino acids.
C1.3.5	To interpret the genetic organization of mammalian genome, study protein synthesis and DNA replication.
C1.3.6	To elaborate the knowledge on immunochemical techniques and their applications.

**Programme** : I/VI Pharm.D  
**Course Name** : Medicinal Biochemistry  
**Course code** : 1.3 (Practical)

C1.3.1	To remember the qualitative analysis of urine and confirmatory test for carbohydrates.
C1.3.2	To understand the quantitative estimation and clinical significance of constituents like glucose, creatinine, calcium and chlorides in urine.
C1.3.3	To experiment with estimation of glucose, creatinine, urea, uric acid in blood and their clinical significance
C1.3.4	To perform the liver function tests and lipid profile tests.
C1.3.5	To determine the enzymatic hydrolysis of starch and influence of factors like pH and temperature on enzyme activity.
C1.3.6	To discuss the preparation of standard buffer solutions and their pH measurements.

**Programme** : I/VI Pharm.D  
**Course Name** : Pharmaceutical Organic Chemistry  
**Course code** : 1.4 (Theory)

C1.4.1	To recall the nomenclature, properties and isomerism in organic compounds
C1.4.2	To explain the preparation, reactions and stability of alkanes and alicyclic compounds
C1.4.3	To study the kinetics, mechanism, stereochemistry of free radical, electrophilic, nucleophilic addition reactions and theory of resonance
C1.4.4	To compare reactivity, orientation and factors influencing aliphatic nucleophilic substitution with aromatic nucleophilic substitution
C1.4.5	To explain the mechanism and applications of selected named reactions
C1.4.6	To discuss the method of preparation, test for purity, assay and medicinal uses of selected organic compounds

**Programme** : I/VI Pharm.D  
**Course Name** : Pharmaceutical Organic Chemistry  
**Course code** : 1.4 (Practical)

C1.4.1	To recall and show the stereo models of organic compounds
C1.4.2	To outline the preliminary tests and detection of elements for qualitative analysis
C1.4.3	To apply the laboratory techniques involved in synthesis of organic compounds
C1.4.4	To analyze the organic compounds and identify the functional groups by systematic qualitative analysis
C1.4.5	To explain the synthesis and characterization of selected organic compounds
C1.4.6	To discuss the appropriate method of purification of organic compounds

**Programme** : I/VI Pharm.D  
**Course Name** : Pharmaceutical Inorganic Chemistry  
**Course code** : 1.5 (Theory)

C1.5.1	To recall the errors in pharmaceutical analysis and principles of volumetric analysis
C1.5.2	To understand acid-base titrations and limit tests for inorganic compounds
C1.5.3	To select the appropriate titrimetric method for analysis of drugs
C1.5.4	To classify and study the method of preparation and assay of selected inorganic compounds
C1.5.5	To explain the importance of inorganic pharmaceuticals in preventing and curing the disease
C1.5.6	To discuss the radioisotopes and applications of radiopharmaceuticals

**Programme** : I/VI Pharm.D  
**Course Name** : Pharmaceutical Inorganic Chemistry  
**Course code** : 1.5 (Practical)

C1.5.1	To recall the glassware and apparatus used in volumetric analysis
C1.5.2	To explain the limit test for impurities in inorganic compounds
C1.5.3	To make use of volumetric methods for performing assays
C1.5.4	To analyze selected inorganic compounds by different titrimetric methods
C1.5.5	To estimate the compounds present in a mixture
C1.5.6	To perform test for identity of selected inorganic compounds

**Programme** : I/VI Pharm.D  
**Course Name** : Remedial Mathematics  
**Course code** : 1.6 (Theory)

C1.6.1	To recall the importance of mathematics in pharmacy
C1.6.2	To outline the various topics in mathematics
C1.6.3	To utilize mathematical equations in doing problems
C1.6.4	To take part in solving problems by applying the concepts
C1.6.5	To appraise the important applications of mathematics
C1.6.6	To solve and convert elementary functions using Laplace transform

**Programme** : I/VI Pharm.D  
**Course Name** : Remedial Biology  
**Course code** : 1.6 (Theory)

C1.6.1	To learn the organization and nomenclature of living things
C1.6.2	To summarize the functions of various types of tissues in plants and animals
C1.6.3	To develop knowledge on structural modifications in plants and importance of pollination in plants
C1.6.4	To analyze various physiological processes in plants and animals
C1.6.5	To determine the various taxonomical characters of different families and micro-organisms
C1.6.6	To elaborate the study of different kinds of phylum's includes Pisces, Reptiles, Amphibians, Aves & Mammals

**Programme** : I/VI Pharm.D  
**Course Name** : Remedial Biology  
**Course code** : 1.6 (Practical)

C1.6.1	To understand the basic experiments in Biology and to list out the parts in cell
C1.6.2	To demonstrate the preparation of permanent slides, section cutting techniques & different staining methods
C1.6.3	To improve knowledge on identification of various animal and plant specimens
C1.6.4	To distinguish the various plant by microscopically examination of roots, stems, fruits, leaf and seeds
C1.6.5	To assess the plant taxonomy based on macroscopic and microscopy findings
C1.6.6	To create experiments on the plant physiology

**Programme** : II/VI Pharm.D  
**Course Name** : Pathophysiology  
**Course code** : 2.1 (Theory)

C2.1.1	To understand the process of cell injury by various etiological agents, morphology of cell injury and cellular adaptations.
C2.1.2	To summarize the events of acute and chronic inflammation and to relate them to the process of wound healing.
C2.1.3	To apply the knowledge of immune tolerance and Human Leucocytic antigen system in understanding the process of organ transplantation, autoimmunity and hypersensitivity reactions.
C2.1.4	To assess the need of balanced diet and the effect of radiation and air pollution on human body.
C2.1.5	To appraise the principles of physical, chemical and biologic carcinogenesis and to evaluate the pathological changes observed in a cancer tissue.
C2.1.6	To adapt the principles of cell injury, inflammation and immune-pathology in understanding pathogenesis of various disease states and their clinical features and complications.

**Programme** : II/VI Pharm.D  
**Course Name** : Pharmaceutical Microbiology  
**Course code** : 2.2 (Theory)

C2.2.1	To list the branches, scope of microbiology and morphology of microbes.
C2.2.2	To explain the methods of identification, cultivation and preservation of various microorganisms.
C2.2.3	To apply the principles of sterilization in pharmaceutical processing and sterility testing.
C2.2.4	To compare different types of immunological reactions, antigens, vaccines and their role in immunity.
C2.2.5	To evaluate microbiological standards of pharmaceuticals and presence of pathogens.
C2.2.6	To elaborate the characteristics, mode of infection, diagnosis, prophylaxis and treatment of bacterial, fungal and viral infectious agents.

**Programme** : II/VI Pharm.D  
**Course Name** : Pharmaceutical Microbiology  
**Course code** : 2.2 (Practical)

C2.2.1	To recall different techniques of sterilization and equipment used in microbiology laboratory.
C2.2.2	To interpret characteristics of microbes using staining techniques, isolation methods and quantitative estimation.
C2.2.3	To construct standard graphs for estimating antibiotics and vitamins using microbes.
C2.2.4	To test for possible microbial contamination in a given sample.
C2.2.5	To estimate qualitatively and quantitatively the amount of microbes in a sample.
C2.2.6	To choose the correct method for evaluating the microbes by serological and bacteriological methods.

**Programme** : II/VI Pharm.D  
**Course Name** : Pharmacognosy and Phyto pharmaceuticals  
**Course code** : 2.3 (Theory)

C2.3.1	To define and introduce the history, scope and classification of crude drugs
C2.3.2	To explain and relate about the cultivation, collection, processing and storage of crude drugs
C2.3.3	To apply the knowledge of microscopical for studying properties of cell constituents
C2.3.4	To compare and classify the natural pesticides
C2.3.5	To determine and evaluate the importance of carbohydrates, proteins, lipids and fibers along with their pharmacognostic study
C2.3.6	To estimate and predict the types of adulteration of crude drugs

**Programme** : II/VI Pharm.D  
**Course Name** : Pharmacognosy & Phytopharmaceuticals  
**Course code** : 2.3 (Practical)

C2.3.1	To understand collection and preparation of crude drugs and to recall selected crude drugs.
C2.3.2	To understand microscopic study and the methods of quality control for crude drugs with WHO guidelines.
C2.3.3	To perform the transverse section of the crude drugs for identification.
C2.3.4	To identify crude drugs by chemical tests: Tragacanth, Acacia, Agar, Gelatin, Starch, Honey and lipids.
C2.3.5	To evaluate the crude drugs for adulteration by macroscopic features.
C2.3.6	To estimate acid value, saponification value, ester value, iodine value and extractive values of crude drugs.

**Programme** : II/VI Pharm.D  
**Course Name** : Pharmacology - I  
**Course code** : 2.4 (Theory)

C2.4.1	To define the fundamental concepts of pharmacology, pharmacokinetics and to understand the basics of drugs interactions, drug discovery and toxicity studies.
C2.4.2	To classify the role of neurotransmitter in autonomic nervous system and summarize the drugs action on it.
C2.4.3	To organize the pharmacology of the drugs acting on cardiovascular system.
C2.4.4	To analyze the role of neurotransmitter in central nervous system and summarize the drugs action on CNS and respiratory system.
C2.4.5	To appraise the physiological role of hormones and assess the therapeutic effects of its replacement therapy.
C2.4.6	To predict the role of autotoxins in pathological conditions and their importance in treating various diseases.

**Programme** : II/VI Pharm.D  
**Course Name** : Community Pharmacy  
**Course code** : 2.5 (Theory)

C2.5.1	To recollect the parts of prescription and study the concepts of pharmaceutical care.
C2.5.2	To understand the scope of community pharmacy, site selection, space layout, legal requirements and inventory management of community pharmacy.
C2.5.3	To identify the best way of improving medication adherence and to excel in conducting patient counseling.
C2.5.4	To survey the health status of patients in the community by participating on health screening services and to build the ability to manage minor ailments.
C2.5.5	To explain the importance of rational drug therapy, OTC medication counseling and code of ethics to become a competent pharmacist.
C2.5.6	To improve the professional skills about health, balance diet, family planning, health promotion and prevention of communicable diseases in community.

**Programme** : II/VI Pharm.D  
**Course Name** : Pharmacotherapeutics-I  
**Course code** : 2.6 (Theory)

C2.6.1	To recall the pathophysiology of cardiovascular disorders and relate their etiology with the therapeutic approach including treatment controversies.
C2.6.2	To outline the concept of essential drugs use and rational drug therapy and summarize the choice of drugs with justification in various disease conditions.
C2.6.3	To identify various types of respiratory and endocrine disorders with respect to clinical features and laboratory investigations, list their complications along with replacement in their management.
C2.6.4	To distinguish between various disease conditions and analyze the results with drug induced disorders.
C2.6.5	To select the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy among pediatric, geriatric, pregnant and lactating women.
C2.6.6	To develop competency to design individual care plan for cardiovascular, respiratory, ocular and hormonal disorders.

**Programme** : II/VI Pharm.D  
**Course Name** : Pharmacotherapeutics-I  
**Course code** : 2.6 (Practical)

C2.6.1	To list the sign and symptoms, laboratory parameters of the cardiovascular diseases.
C2.6.2	To identify the drug interactions and find a solutions to overcome drug interactions in the given prescriptions.
C2.6.3	To plan an individual care plan in the cases with endocrine and thyroid disorders.
C2.6.4	To analyze the prescription for rational drug use.
C2.6.5	To explain the safety of oral contraceptives, hormone replacement therapy and the drugs used on ocular disorder
C2.6.6	To minimize the drug related problems in the prescriptions and to choose a choice of drugs in various diseases.

**Programme** : III/VI Pharm.D  
**Course Name** : Pharmacology-II  
**Course code** : 3.1 (Theory)

C3.1.1	To list the various drugs acting on bloodand blood forming agents
C3.1.2	To classify drugs acting on renal system and explain the mechanism adverseeffects & therapeuticuses of drugs.
C3.1.3	To develop the knowledge on principles of chemotherapy and treatment for various microbial infections.
C3.1.4	To assume the role of immunotherapeutic agents and distinguish acute, sub-acute and chronic animal toxicity studies
C3.1.5	To predict the structure and functions of the components of the cell, role of secondary messengers in cell signaling and determine the structure of chromosome
C3.1.6	To compile the role of genetic material in synthesis of proteins. The appropriateness of gene therapy and recombinant DNA technology.

**Programme** : III/VI Pharm.D  
**Course Name** : Pharmacology-II  
**Course code** : 3.1 (Practical)

C3.1.1	To recall the different laboratory animals, laboratory appliances, physiological salt solutions and anesthetic agents used in experimental pharmacology.
C3.1.2	To demonstrate the different animal handling techniques, routes of administration of drugs to experimental animals.
C3.1.3	To apply knowledge on the various bio-assay and improve techniques to construct DRC by using standard drugs
C3.1.4	To analyse the data obtained from various animal experiments and compare the potency of test compound
C3.1.5	To assess pharmacological action of minor and major tranquillizers with the experimental animal models
C3.1.6	To evaluate the cardiotoxic activity of drugs using isolated frog heart preparations.

**Programme** : III/VI Pharm.D  
**Course Name** : Pharmaceutical Analysis  
**Course code** : 3.2 (Theory)

C3.2.1	To recall the principle and theory of instrumental analytical techniques
C3.2.2	To outline the instrumentation of spectroscopic, chromatographic and thermal techniques
C3.2.3	To apply the knowledge of spectroscopic, chromatographic and thermal methods in analysis of drugs
C3.2.4	To analyze API's and formulation by using elements of interpretation of data
C3.2.5	To explain theory, instrumentation and applications of electrometric methods of analysis
C3.2.6	To maximize knowledge on concepts of validation, calibration, ICH, GLP, ISO9000, TQM and quality variation concepts

**Programme** : III/VI Pharm.D  
**Course Name** : Pharmaceutical Analysis  
**Course code** : 3.2 (Practical)

C3.2.1	To recall the separation and identification of compounds by chromatographic techniques
C3.2.2	To explain the qualitative and quantitative analysis of drugs by spectroscopic techniques
C3.2.3	To experiment with instrumental analysis of selected drugs as per pharmacopoeia
C3.2.4	To compare and characterize compounds by using analytical techniques
C3.2.5	To determine concentration of ions by electrometric analysis
C3.2.6	To discuss the instrumentation, applications of advanced analytical techniques and to interpret spectral data

**Programme** : III/VI Pharm.D  
**Course Name** : Pharmacotherapeutics-II  
**Course code** : 3.3 (Theory)

C3.3.1	To remember and recall the pathophysiology of selected diseases and rationale for drug therapy.
C3.3.2	To identify various therapeutic approaches for the management of selected diseases.
C3.3.3	To apply the concepts of various drug therapies and identify the controversies in drug therapy.
C3.3.4	To assess the drug therapy by preparing individual therapeutic plan based on diagnosis.
C3.3.5	To evaluate the patient specific parameters relevant in initiating drug therapy and monitoring therapy.
C3.3.6	To create a pharmaceutical care plan, design a list of patient counselling points on the specific illness.

**Programme** : III/VI Pharm.D  
**Course Name** : Pharmacotherapeutics-II  
**Course code** : 3.3 (Practical)

C3.3.1	To remember and recall the pathophysiology and management of cardiovascular, respiratory ,endocrine diseases and viral infections
C3.3.2	To identify various drug interactions and rationalize the prescription.
C3.3.3	To plan the quality use of medicines surrounding the therapeutic agents in the treatment of selected diseases
C3.3.4	To analyze the clinical skills in the therapeutic management of selected disease conditions
C3.3.5	To prioritize the treatment strategies for better patient outcome and discuss the controversies in treatment
C3.3.6	To improve the skills on patient – centred approach to improve treatment satisfaction and perform patient counselling

**Programme** : III/VI Pharm.D  
**Course Name** : Pharmaceutical Jurisprudence  
**Course code** : 3.4 (Theory)

C3.4.1	To recall the concepts of pharmaceutical legislations in India and code of pharmaceutical ethics
C3.4.2	To outline the schedules and provisions given under Drugs and Cosmetics act 1940 and its rules 1945
C3.4.3	To apply the provisions of Pharmacy act 1948 and procedure for registration of pharmacist
C3.4.4	To list out the provisions under medicinal and toilet preparations act, narcotic drugs and psychotropic substances act and rules, drugs and magic remedies act and rules
C3.4.5	To understand the importance of Essential commodities act and National drug policy
C3.4.6	To discuss the salient features of Prevention of cruelty to animals act 1960 and Patents and design act 1970

**Programme** : III/VI Pharm.D  
**Course Name** : Medicinal Chemistry  
**Course code** : 3.5 (Theory)

C3.5.1	To recall the various classes of medicinal compounds
C3.5.2	To outline the drugs used as chemotherapeutic agents
C3.5.3	To identify the structural features of drugs required for activity and study their mechanism of action
C3.5.4	To plan for the synthesis of selected category of drugs and their clinical uses
C3.5.5	To explain the importance of diagnostic agents and concept of anti-sense molecules
C3.5.6	To discuss the QSAR studies, combinatorial chemistry and CADD techniques used in rational drug design

**Programme** : III/VI Pharm.D  
**Course Name** : Medicinal Chemistry  
**Course code** : 3.5 (Practical)

C3.5.1	To recall the basic requirements for synthesis of medicinal compounds
C3.5.2	To explain the principle and techniques involved in synthesis of drugs
C3.5.3	To apply the various methods for quantitative analysis of drugs
C3.5.4	To analyze medicinal compounds and study their pharmacopoeial monographs
C3.5.5	To determine the percentage purity of marketed formulations
C3.5.6	To estimate the physicochemical parameters for QSAR analysis

**Programme** : III/VI Pharm.D  
**Course Name** : Pharmaceutical Formulations  
**Course code** : 3.6 (Theory)

C3.6.1	To recall the basic concepts of pharmaceutical dosage forms.
C3.6.2	To explain formulation, coating and evaluation of tablets.
C3.6.3	To develop and examine capsule dosage forms.
C3.6.4	To simplify the formulation, evaluation and stability considerations of liquid orals. the preparation and quality control of parenteral preparations.
C3.6.5	To appraise parenteral, ophthalmic, semisolids products and packaging material.
C3.6.6	To design various sustained and controlled drug delivery systems.

**Programme** : III/VI Pharm.D  
**Course Name** : Pharmaceutical Formulations  
**Course code** : 3.6 (Practical)

C3.6.1	To recall the preparation and evaluation of compressed tablets.
C3.6.2	To illustrate the basic requirements for formulation and evaluation of capsules.
C3.6.3	To develop parenteral formulations.
C3.6.4	To take part in formulation of liquid orals.
C3.6.5	To justify the use of excipients and formulate of semisolid dosage forms.
C3.6.6	To develop various cosmetic preparations.

**Programme** : IV/VI Pharm.D  
**Course Name** : Pharmacotherapeutics-III  
**Course code** : 4.1 (Theory)

C4.1.1	To remember the etiopathogenesis and clinical presentation of gastrointestinal and haematological diseases.
C4.1.2	To summarize the diagnosis and therapeutic approaches of gastrointestinal and haematological diseases.
C4.1.3	To identify the causes, pathogenesis and clinical manifestations of neurological and psychiatric diseases.
C4.1.4	To simplify understanding on diagnosis, desired outcomes and management of neurological and psychiatric diseases
C4.1.5	To explain the physiology of pain pathway and management of pain, neuralgia and headaches.
C4.1.6	To develop skills on evidence-based practice in diseases management to become a competent pharmacist.

**Programme** : IV/VI Pharm.D  
**Course Name** : Pharmacotherapeutics-III  
**Course code** : 4.1 (Practical)

C4.1.1	To understand the therapeutic approaches and treatment alternatives in the management of gastrointestinal diseases.
C4.1.2	To relate the concept of pharmaceutical care to identify therapeutic problems in haematological diseases.
C4.1.3	To apply the knowledge to develop therapeutic decision-making skills in gastrointestinal and haematological diseases.
C4.1.4	To take part in drug related problem identification and problem-solving skills in neurological diseases.
C4.1.5	To prioritize the rational pharmacotherapeutic alternatives in the management of psychiatric diseases.
C4.1.6	To develop skills on drug of choice and patient education in management of diseases.

**Programme** : IV/VI Pharm.D  
**Course Name** : Hospital Pharmacy  
**Course code** : 4.2 (Theory)

C4.2.1	To define the structure, organization and functions of hospital and hospital pharmacist
C4.2.2	To understand and involve in the preparation and implementation of budget, inventory control various drug policies
C4.2.3	To make use of various hospital drug policies to develop hospital pharmacy news letters
C4.2.4	To list out various drug distribution methods for inpatients and outpatients including narcotic and controlled drugs.
C4.2.5	To prioritize the procurement, manufacturing and storage process of various formulations and handling of radio pharmaceuticals
C4.2.6	To develop programmes for professional upraising continuously and to build inter professional relations in the hospitals.

**Programme** : IV/VI Pharm.D  
**Course Name** : Hospital Pharmacy  
**Course code** : 4.2 (Practical)

C4.2.1	To understand various drug distribution systems in hospital.
C4.2.2	To extend the professional practice management skills in hospital pharmacy.
C4.2.3	To utilize various methods for the preparation and labelling of pharmaceutical products such as powders and intravenous solutions
C4.2.4	To recommend the solutions to overcome the drug interaction and adverse drug reactions.
C4.2.5	To appreciate various store management and inventory control.
C4.2.6	To solve drug related problems through prescription analysis and individualized dose.

**Programme** : IV/VI Pharm.D  
**Course Name** : Clinical Pharmacy  
**Course code** : 4.3 (Theory)

C4.3.1	To understand and explain the daily activities of clinical pharmacist and to monitor the patient drug therapy through medication chart review and clinical review.
C4.3.2	To obtain medication history interview and counsel the patients on various diseases and lifestyle modifications and by applying communication skills.
C4.3.3	To provide response to a drug and poison information queries using modified systemic approach and to gain ability to establish a drug and poison information center.
C4.3.4	To interpret selected laboratory results of specific disease states mentioned and to report ADRs and understand the process of pharmacovigilance.
C4.3.5	To identify and resolve drug related problems and medication errors.
C4.3.6	To critically evaluate biomedical literature in order to get an unbiased clinical evidence to develop individualized pharmaceutical care plan.

**Programme** : IV/VI Pharm.D  
**Course Name** : Clinical Pharmacy  
**Course code** : 4.3 (Practical)

C4.3.1	To create awareness in patients by counselling them on various diseases and drugs using clinical knowledge and communication skills.
C4.3.2	To conduct comprehensive and meticulous medication history interview for the preparation of individualized pharmaceutical care plan.
C4.3.3	To interpret laboratory results of specific disease states mentioned and correlating with patient drug therapy while monitoring disease progression.
C4.3.4	To provide response to a drug and poison information queries using modified systemic approach by critically appraising the biomedical literature.
C4.3.5	To report and assess causality of adverse drug reactions to establish a causal relation between an ADR and a drug.

**Programme** : IV/VI Pharm.D  
**Course Name** : Biostatistics and Research Methodology  
**Course code** : 4.4 (Theory)

C4.4.1	To define the concepts of research methodology and sample size determination with report writing.
C4.4.2	To discuss different types of clinical study designs involved in medical research like case studies, observational studies and interventional studies.
C4.4.3	To apply the concepts of biostatistics and data graphics along with clinical soft wares like SPSS, SAS to support the research design.
C4.4.4	To learn to utilize the computer applications and their advantages in both hospital, community pharmacy.
C4.4.5	To simplify the understanding of statistical methods in epidemiology and be conscious about its relative, attributable risks
C4.3.6	To critically evaluate biomedical literature in order to get an unbiased clinical evidence to develop individualized pharmaceutical care plan.

**Programme** : IV/VI Pharm.D  
**Course Name** : Biopharmaceutics & Pharmacokinetics  
**Course code** : 4.5 (Theory)

C4.5.1	To recall basic concepts of absorption, distribution, metabolism and excretion of drugs.
C4.5.2	To understand the mechanisms, interpret various factors affecting drug absorption, distribution, metabolism and excretion of drugs.
C4.5.3	To apply the pharmacokinetic models for the determination of pharmacokinetic parameters.
C4.5.4	To examine multiple dosage regimens based on pharmacokinetic parameters for maximizing therapeutic effectiveness and patient compliance.
C4.5.5	To evaluate various pharmacokinetic parameters for the drugs exhibiting saturation kinetics.
C4.5.6	To design the bioavailability testing protocol of a drug and compare the bioequivalence between marketed products.

**Programme** : IV/VI Pharm.D  
**Course Name** : Biopharmaceutics & Pharmacokinetics  
**Course code** : 4.5 (Practical)

C4.5.1	To recall the concepts in biopharmaceutics, basic pharmacokinetic parameters and their significance.
C4.5.2	To interpret the effect of surfactant, diluents, lubricant and polymorphism on rate of drug dissolution.
C4.5.3	To solve bioavailability parameters of drugs by using plasma data and methods to improve bioavailability.
C4.5.4	To analyze absorption rate constant, $K_E$ , biological half-life, mean residence time and mean absorption time for the given data.
C4.5.5	To estimate the extent of protein binding by equilibrium dialysis or dynamic dialysis methods.
C4.5.6	To predict the pharmacokinetic parameters for the given data as per one compartment and two compartment models.

**Programme** : IV/VI Pharm.D  
**Course Name** : Clinical Toxicology  
**Course code** : 4.6 (Theory)

C4.6.1	To understand the general principles involved in the management of poisoning with toxicokinetics parameters.
C4.6.2	To identify the role of antidotes, supportive care, gut decontamination and elimination enhancement in poisoning.
C4.6.3	To distinguish the clinical symptoms and to plan various managements of pesticides, drugs acting on CNS, hydrocarbons, caustics and radiation poisoning.
C4.6.4	To categorize the toxic symptoms and management of venomous snake bites, toxicity of plants and contaminated foods and heavy metals.
C4.6.5	To compare the characteristics and specific standard treatment guideline for the treatment of various toxins.
C4.6.6	To propose several preventive approaches to reduce unintended poisoning.

**Programme** : IV/VI Pharm.D  
**Course Name** : Pharmacotherapeutics I & II  
**Course code** : 4.7 (Theory)

C4.7.1	To remember and recall the pathophysiology of selected diseases and rationale for drug therapy.
C4.7.2	To identify various therapeutic approaches for the management of selected diseases.
C4.7.3	To apply the concepts of various drug therapies and identify the controversies in drug therapy.
C4.7.4	To distinguish between various disease conditions and analyze the results with drug induced disorders.
C4.7.5	To select the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy among pediatric, geriatric, pregnant and lactating women.
C4.7.6	To develop competency to design individual care plan for cardiovascular, respiratory, ocular and hormonal disorders.

**Programme** : IV/VI Pharm.D  
**Course Name** : Pharmacotherapeutics I & II  
**Course code** : 4.7 (Practical)

C4.7.1	To remember and recall the pathophysiology and management of cardiovascular, respiratory, endocrine diseases and viral infections
C4.7.2	To identify various drug interactions and rationalize the prescription.
C4.7.3	To plan the quality use of medicines surrounding the therapeutic agents in the treatment of selected diseases
C4.7.4	To analyze the clinical skills in the therapeutic management of selected disease conditions
C4.7.5	To prioritize the treatment strategies for better patient outcome and discuss the controversies in treatment
C4.7.6	To improve the skills on patient – centred approach to improve treatment satisfaction and perform patient counselling.

**Programme** : V/VI Pharm.D  
**Course Name** : Clinical Research  
**Course code** : 5.1 (Theory)

C5.1.1	To study the regulations involved in drug discovery and drug development process.
C5.1.2	To understand the regulatory guidelines and ethics of clinical trials.
C5.1.3	To plan and construct pre-clinical trials and clinical trial activities.
C5.1.4	To distinguish the roles and responsibilities of trial related personnel and designing of clinical trial documents.
C5.1.5	To compare the regulatory aspect of clinical trials in India with other countries (USA and Europe).
C5.1.6	To adapt and improve the skills in data management, safety monitoring and reporting to regulatory authorities.

**Programme** : V/VI Pharm.D  
**Course Name** : Pharmacoepidemiology and Pharmacoeconomics  
**Course code** : 5.2 (Theory)

C5.2.1	To remember and recall the origin and need; measurement of outcomes in pharmacoepidemiology and pharmacoeconomics.
C5.2.2	To understand the various concepts of risks in pharmacoepidemiology.
C5.2.3	To apply the concepts of pharmacoepidemiological methods in conducting various research studies with the help of case studies and available software's.
C5.2.4	To distinguish the selected special applications of pharmacoepidemiology.
C5.2.5	To evaluate the outcome by using various Pharmacoeconomic methods.
C5.2.6	To solve various case studies by applying the concepts of pharmacoepidemiology and Pharmacoeconomics in designing a good outcome.

**Programme** : V/VI Pharm.D  
**Course Name** : Clinical Pharmacokinetics & Pharmacotherapeutic Drug Monitoring  
**Course code** : 5.3 (Theory)

C5.3.1	To understand the basics of pharmacokinetics.
C5.3.2	To demonstrate nomograms and tabulations and their applications in designing dosage regimens in special populations.
C5.3.3	To apply the principles of pharmacokinetics in identifying the drug interactions.
C5.3.4	To analyze GFR, creatinine clearance, extracorporeal removal of drugs and pharmacokinetic considerations in dosing renal and hepatic diseases.
C5.3.5	To discuss bayesian theory, adaptive methods and pharmacogenetics in developing drug dosage regimens.
C5.3.6	To develop the skills on individualization of drug dosage regimen in special population by considering TDM indications.

**Programme** : V/VI Pharm.D  
**Course Name** : Clerkship  
**Course code** : 5.4 (Practical)

C5.4.1	To elicit the patient's chief complaints, history of present illness, past medical history, social, family and occupational histories, complete review of systems for case study analysis.
C5.4.2	To interpret the laboratory investigations in terms of the related pathophysiology.
C5.4.3	To build effective and empathetical skills in counseling the patients on their medications and life style modifications.
C5.4.4	To examine and demonstrate a new patient's case in a focused manner, chronologically developing the present illness, summarizing the pertinent positive and negative findings as well as the differential diagnosis and plans for further testing and treatment.
C5.4.5	To estimate factors that frequently alter the effects of medications, including drug interactions and compliance problems.
C5.4.6	To develop an ability to compile an assessment and plan for an individual patient organized by problem, discussing the likely diagnosis and plan of treatment.

**Programme** : V/VI Pharm.D

**Course Name** : Project

**Course code** : 5.5 (Practical)

C5.5.1	To identify the societal issues related to health and pharmaceuticals and to report the aims and objectives of the project.
C5.5.2	To review and compare the literature on selected topic/problem/issue.
C5.5.3	To construct research plan and execute it accordingly.
C5.5.4	To compile and analyze the data applying the knowledge of suitable statistical method to draw conclusion.
C5.5.5	To measure short-term and long-term outcomes of a specific research to draw conclusion.
C5.5.6	To propose new solutions and develop recommendations or guidelines to improve societal health outcomes.

**Programme** : VI/VI Pharm.D

**Course Name** : Internship

**Course code** : Practical

C6.0.1	To relate the clinical knowledge in ward rounds for case analysis.
C6.0.2	To interpret the results of the laboratory tests in terms of the related pathophysiology.
C6.0.3	To interview the patient to provide better patient care by critical analysis.
C6.0.4	To analyse each case to identify the drug related problems and overcome the burden on patients.
C6.0.5	To take a part of health care team to bring better patient outcomes and drug information services.
C6.0.6	To build an ability to choose critical area where interventions required for better pharmaceutical care.