Program: Doctor of Pharmacy

Duration: 6 years

Program Outcomes (PO):

PO Nos.	Program Objective	Program Outcome
PO1	**Pharmacy Knowledge**	Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.
PO2	**Planning Abilities**	Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
PO3	**Problem analysis**	Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.
PO4	**Modern tool usage**	Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations
PO5	**Leadership skills**	Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and wellbeing.
PO6	**Professional Identity**	Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
PO7	**Pharmaceutical Ethics**	Honor personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.
PO8	**Communication**	Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.
PO9	**The Pharmacist and society**	Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

PO10	**Environment and sustainability**	Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO11	**Life-long learning**	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis

DOCTOR OF PHARMACY (Pharm D)

COURSE OBJECTIVES & OUTCOMES

FIRST YEAR (I/VI)

T1101. HUMAN ANATOMY & PHYSIOLOGY – I (Theory)

OBJECTIVE: This course is designed to impart a fundamental knowledge on the structure and functions of the human body. It also helps in understanding both homeostasis mechanisms and homeostatic imbalances of various body systems. Since a medicament, which is produced by pharmacist, is used to correct the deviations in human body, it enhances the understanding of how the drugs act on the various body systems in correcting the disease state of the organs.

OUTCOMES:

Upon completion of the course student will be able to

1. Understand about the structure of human body from fundamental level.
2. Know about structure of all human organs macroscopic to microscopic level.
3. Get knowledge about the normal functioning of all organs present in human body.
4. Understand about normal functions of all systems present in human being.
5. Understand about coordination between various systems present in human body.
6. Brief knowledge about few common diseases that occur in human being.

T1108. HUMAN ANATOMY & PHYSIOLOGY – I (Practical)

Upon completion of the course student will be able to

1. Demonstrate skills for handling compound microscope and appliances used in haematological experiments
2. Identify the various tissues and organs of different systems of human body.
3. Perform the various experiments related to special senses and nervous system.
4. Determine Blood pressure, Blood group and recording of temperature
5. Determine R.B.C, W.B.C, Differential count of blood
6. Study of various systems with the help of charts, models & specimens
7. Determine ESR, hemoglobin content of the blood, bleeding time and clotting time
8. Study of appliances used in experimental physiology.
9. Record simple muscle curve using gastrocnemius sciatic nerve preparation.
10. Record simple summation curve using gastrocnemius sciatic nerve preparation.
11. Record simple effect of temperature using gastrocnemius sciatic nerve preparation.
12. Record simple effect of load & after load using gastrocnemius sciatic nerve preparation.
13. Record simple fatigue curve using gastrocnemius sciatic nerve preparation.
14. Perform pregnancy diagnosis test.
15. Study of different family planning appliances

T1102. PHARMACEUTICS (Theory)

OBJECTIVE: This course is designed to impart a fundamental knowledge on the art and science of formulating different dosage forms. It prepares the students for most basics of the applied field of pharmacy.

OUTCOMES:

Upon completion of the course student will be able to

1. Know various types of dosage forms and Professional way of handling the prescription
2. Know historical background and profession of pharmacy and career opportunities in pharmacy profession.
3. Know various types of pharmacopeia's, Development of Indian Pharmacopoeia and about the contents of monograph.
4. Understand various Latin terms used in the prescription and how to measure weights in terms of imperial and metric systems and various pharmaceutical calculations.
5. Understand about various types of powders and granules its stability over other dosage forms and about preparation of effervescent powders and granules.
6. Know different types of monophasic liquid dosage forms and its formulation aspects.
7. Know biphasic liquid dosage forms, its formulation aspects and how to overcome stability problems.
8. Gain information on preparation of semisolid dosage forms like suppositories
9. Understand extraction and galenical products – Principles and procedures.
10. Perform various pharmaceutical calculations
11. Know various types of surgical dressings and information about suturing materials.
12. Understand incompatibility and methods of overcoming incompatibility

T1109. PHARMACEUTICS (Practical)

Upon completion of the course student will be able to

1. Classify various conventional dosage forms in professional way and can able to handle the prescription and identify sources of errors in prescription.
2. Gain skill in the operation of common pharmaceutical measuring, weighing and compounding devices. And can able to understand pharmaceutical terminology, abbreviations and symbols commonly used in the prescribing, dispensing, and charting of medications in the pharmacy.
3. Prepare various powders like Eutectic powder, Explosive powder, Dusting powder and Insufflations and can know about the advantage of solid dosage forms over other formulations.
4. Formulate monophasic liquid dosage forms like syrups, elixers, linctuses, solutions.
5. Formulate biphasic liquid dosage forms like emulsions and suspensions.
6. Calculate displacement value and prepare suppositories
7. Identify the type of incompatibility and preparing the formulation overcoming these incompatibilities.

T1103. MEDICINAL BIOCHEMISTRY (Theory)

OBJECTIVE: Biochemistry is the branch of both chemistry and biology. The main goal of biochemistry is to understand the structure and metabolism of various bio molecules like carbohydrates, proteins, lipids and nucleic acids which are very essential for the necessities of life process in the living organisms like energy production and transforming the genetic information.

OUTCOMES:

Upon completion of the course student will be able to

1. Have cognizance of the cell structure, various transport mechanisms of cell membrane.
2. Know the structure and functions, mechanism of action, applications of enzymes in therapeutic and diagnostic purpose.
3. Acknowledge the most important carbohydrate "glucose" this can be broken down via glycolysis and enters Krebs cycle and oxidative phosphorylation to generate ATP.
4. Apprehend the oxidation of fatty acids and synthesis of cholesterol and various diseases associated with lipid storage.
5. Gather the knowledge of biological oxidation-reduction reactions.
6. Familiar with catabolism of amino acids and various disorders of protein metabolism.
7. Gather the knowledge of protein synthesis and replication of nucleic acids.
8. Get the idea of role of clinical chemistry laboratory.
9. Acquire the knowledge on urine analysis and various kidney function tests.
10. Familiar with of liver pigments and various tests to assess liver functionality.
11. Have intuition on various lipo proteins and its importance.
12. Have an insight of immune chemical techniques.
13. Have familiarity with electrolyte composition in various body fluids and its importance.

T110A. MEDICINAL BIOCHEMISTRY (Practical)

Upon completion of the course student will be able to

1. Qualitatively analyze the normal and abnormal constituents of urine
2. Quantitatively estimate the various constituents present in urine
3. Study the factors affecting enzymatic activity
4. Identify the lipids present in the given sample
5. Quantitatively estimate the various constituents in serum.
6. Do qualitative analysis of carbohydrates and identification tests for proteins

T1104. PHARMACEUTICAL ORGANIC CHEMISTRY (Theory)

OBJECTIVE: This course is designed to impart a very good knowledge about

1. IUPAC/Common system of nomenclature of simple organic compounds belonging to different classes of organic compounds;
2. Some important physical properties of organic compounds;
3. Some named organic reactions with mechanisms
4. Methods of preparation test for purity, principle involved in the assay, important medicinal uses of some important organic compounds.

OUTCOMES:

Upon completion of the course student will be able to

1. Familiar with physical properties and isomerism.
2. Acknowledge brief idea on name, structures, nomenclature of various organic compounds.
3. Have idea on free radicals, its mechanism and relative basicity.
4. Understand the alicyclic compounds, its preparation methods & theories.
5. Familiar with nucleophiles and its substitution reactions (SN1&SN2), kinetics and stereochemistry of the nucleophilic substitution reactions.
6. Have knowledge on alkyl halides, elimination unimolecular & bimolecular reactions via formation of carbocation and its orientation.
7. Have cognizance of electrophiles, free radical addition reactions, peroxide effect.
8. Understand free radical substitution and addition reactions of alkene
9. Familiar with resonance, hyperconjugation, nucleophilic substitution reactions, elimination reactions, formation of conjugated dienes, its orientation and reactivity of addition to free radicals
10. Understand Electrophilic substitution relations, ortho para directing groups, resonance stabilization of benzyl radical.
11. Aware of carboxylic acids, its acidity, effect of substituents on its acidity, nucleophilic acyl substitution reactions.
12. Have detailed emphasis on mechanisms for general naming reactions.
13. Acknowledge mechanism of some named reactions.
14. Know bimolecular displacement reactions, orientation and comparison with aromatic substitution.
15. Have detailed idea to write oxidation & reduction reactions of some organic compounds.
16. Predict synthesis, assay, uses of some pharmaceutically active organic compounds.

T110B. PHARMACEUTICAL ORGANIC CHEMISTRY (Practical)

Upon completion of the course student will be able to

1. Synthesize various pharmaceutically active organic compounds
2. Identify and confirm various organic compounds
3. Use stereo models

T1105. PHARMACEUTICAL INORGANIC CHEMISTRY (Theory)

OBJECTIVE: This course mainly deals with fundamentals of Analytical chemistry and also the study of inorganic pharmaceuticals regarding their monographs and also the course deals with basic knowledge of analysis of various pharmaceuticals.

OUTCOMES:

Upon completion of the course student will be able to

1. Facilitates the fellow pupil to predict the sources of errors and methods to determine impurities in inorganic drugs and pharmaceuticals.
2. Develop the fundamentals of volumetric analytical skills. It constructs the fundamental methodology to prepare different strength of solutions.
3. Acquires knowledge on acids, bases, buffers, methods of adjusting isotonicity.

4. Associate the concept of standardization by oxidation – reduction methods.
5. Gain knowledge on various non - aqueous solvents and different types of titrations.
6. Develop an idea that standardization can be done for some compounds by precipitation titrations.
7. Familiar with different classes of inorganic pharmaceuticals and their analysis by complexometry.
8. Identification of different anions, cations and various indicators used for analysis of pharmaceuticals.
9. Peculates the basic knowledge in the principles and concept of standardization by gravimetric methods.
10. Acquainted with the principles and procedures of limit tests.
11. Acquire the principles, procedures of analysis and applications of medicinal gases.
12. Know various gastrointestinal agents like acidifiers, antacids, cathartics, antimicrobials and preparation, assay, properties and medicinal uses of some inorganic compounds of these classes.
13. Know properties, preparations, assays and uses of a variety of inorganic compounds.
14. Know expectorants, emetics, haematinics, poison and antidotes, astringents and preparation, assay, properties and medicinal uses of some inorganic compounds of these classes
15. Characterize the medicinal and pharmaceutical importance of various electrolyte replenishers.
16. Attain the knowledge on inorganic compounds those exist as pharmaceutical preparations and pharmaceutical aids.
17. Analyse the importance of inorganic pharmaceuticals in preventing and curing the disease.
18. Develop the ideas with the fundamental of analytical chemistry among the pupil.
19. Know about the preparation, assay, properties and medicinal uses of various electrolytes and dental products.
20. Articulate the principles and procedures of analysis of drugs and also regarding the application of inorganic pharmaceuticals.
21. Enumerate the basics of radioactive compounds and pharmaceutical applications of radioactive substances.

T110C. PHARMACEUTICAL INORGANIC CHEMISTRY (Practical)

Upon completion of the course student will be able to

1. Gain the fundamentals of volumetric analytical skills analytical techniques in lab.
2. Determine various impurities in inorganic drugs and pharmaceuticals.
3. Identify and determine test for purity and preparation of some inorganic compounds.
4. Ascertain the knowledge about assay of pharmaceutical substances.

T1106. REMEDIAL MATHEMATICS (Theory)

OBJECTIVE: This is an introductory course in mathematics. This subject deals with the introduction to Partial fraction, Logarithm, matrices and Determinant, trigonometry, Analytical geometry, Calculus, differential equation and Laplace transform.

OUTCOMES:

Upon completion of the course student will be able to

1. Know Partial fraction, logarithm, matrices and determinant, analytical geometry, calculus, differential equation and Laplace transform
2. Explain the different types of problems by applying theory of Partial fraction, Logarithms, Function, in Pharmacy Limits and continuity, Matrices and Determinant, Calculus
3. Describe the concept of matrix. Definite and indefinite integral and its application in pharmacy
4. Explain the basic concept of graphical representation and diagrammatic representation of data
5. Apply mathematical concepts and principles to perform computations for Pharmaceutical Sciences.
6. Communicate mathematical knowledge and understanding to help in the field of Clinical Pharmacy
7. Create, use and analyse mathematical representations and mathematical relationships.

T1107. REMEDIAL BIOLOGY (Theory)

OBJECTIVE: This is an introductory course in Biology, which gives detailed study of natural sources such as plant and animal origin. This subject has been introduces to the pharmacy course in order to make the student aware of various naturally occurring drugs and its history, sources, classification, distribution and the characters of the plants and animals. This subject gives basic foundation to Pharmacognosy

OUTCOMES:

Upon completion of the course student will be able to

1. Get knowledge on composition of plant cell and its importance.
2. Get knowledge on different cellular composition and its functions of different parts of plant and their modifications.
3. Know classification of plants based on its taxonomical characters.
4. Get knowledge on taxonomical characters of specified families.
5. Get knowledge about structural composition of microorganisms.
6. Get knowledge on structural composition of animal cell and its importance.
7. Know the external and internal characters of different types of vertebrates.
8. Get knowledge about poisonous animals in the environment.

T110D. REMEDIAL BIOLOGY (Practical)

Upon completion of the course student will be able to

1. Get knowledge on instruments used in experimental biology and its operation.
2. Know the principles and procedures involved in staining techniques for the preparation of slide.
3. Grasp knowledge on different cellular composition and its importance in living organisms (Plants & Animal).
4. Get knowledge about morphological features and modified morphological features and its importance of different parts of plant.
5. Know about anatomical features and physiological features with reference to human by simulatory model.
6. Grasp knowledge on different cellular composition of different parts of plant.
7. Know different types of animals for its identification.
8. Know about few plant physiology techniques.

DOCTOR OF PHARMACY (Pharm D)

SECOND YEAR (II/VI)

T2101. PATHOPHYSIOLOGY (Theory)

OBJECTIVE: This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic Pathophysiological mechanisms. Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge of its application in other subject of pharmacy.

OUTCOMES:

Upon completion of the course student will be able to

1. Describe abnormal physiologic processes associated with common disease processes
2. Explore the most common Etiologies and predisposing factors associated with human disease
3. Understand the basis for some laboratory tests and other diagnostic procedures.
4. Understand how the various organ systems are interrelated, and use this understanding to promote a holistic approach towards the evaluation and treatment of patients.
5. Explain age-related differences in physiologic and pathophysiologic processes and their clinical manifestations

T2102. PHARMACEUTICAL MICROBIOLOGY (Theory)

OBJECTIVE: The main objective of this course includes the study of different types of microorganisms, cultivation methods, sterilization techniques, antiseptic, disinfectants, diagnostic tests, microbiological assay and some important diseases caused by microorganisms.

OUTCOMES:

Upon completion of the course student will be able to

1. Acquire the knowledge in detail about the different characteristic of microorganisms such as bacteria, virus, rickettsia, spirochetes and nutritional requirements of the microorganisms
2. Determine the impact of pharmaceutical significance of microorganisms, cultivation and identification of bacteria and role of different scientist involved in the development of microbiology field
3. Gained the basis of bacterial growth curve, different growth pattern like batch culture, continuous culture, synchronous culture, chemostat and turbidostatic methods.
4. Learned in detail about the immunity, different types of immunity, active, passive immunity, phagocytosis, structure of antigen, types of antibodies, exo and endo toxin and booster dose.

5. Understand the different types of sterilization methods to kill the pathogenic microorganisms like moist heat sterilization, dry heat sterilization, radiation, filtration and chemical substances involved for the sterilization of microorganisms.
6. Explain the different diagnostic methods such as widal test, southern blotting, western blotting methods, PCR test and QBC test
7. Understand regarding the diseases and their causative microorganisms and symptoms and treatment methods
8. Trained regarding methods and principals involved in the microbiological assay of antibiotics, vitamins and amino acids

T2107. PHARMACEUTICAL MICROBIOLOGY (Practical)

Upon completion of the course student will be able to

1. Understand different equipments and processing used in experimental microbiology
2. Determine and report the Sterilization of glassware, preparation and sterilization of media, Sub culturing of bacteria and fungus. Nutrient stabs and slants preparations
3. Determine the methods of Simple, Grams staining and acid fast staining
4. Isolate pure culture of micro-organisms by multiple streak plate technique
5. Determine the Microbiological assay of antibiotics by cup plate method, Motility determination by Hanging drop method
6. Know Sterility testing of pharmaceuticals, Biochemical test.
7. Understand enumeration of micro-organisms (Total and Viable) & Determination of minimum inhibitory concentration.
8. Perform microbiological assay of antibiotics by cup plate method, Microbiological assay of vitamins by Turbidimetric method
9. Determine RWC, Diagnostic tests for some common diseases, Widal, malarial parasite.

T2103. PHARMACOGNOSY & PHYTOPHARMACEUTICALS (Theory)

OBJECTIVE:

Upon completion of the course student will be able to

1. Know development of pharmacognosy from ancient to present
2. Know the different classification methods of crude drugs
3. Recognize crude drugs of pharmaceutical and medicinal importance and their microscopic study
4. Understand the Cultivation methods of crude drugs
5. Know the different methods of Adulteration and evaluation of Crude drugs.

OUTCOMES:

T2108. PHARMACOGNOSY & PHYTOPHARMACEUTICALS (Practical)

Upon completion of the course student will be able to

1. Understand well about cell wall constituents and cell inclusions
2. Learn and experience techniques of macroscopical (colour, odour, taste, size, shape) and microscopical identification (T.S.) of crude drugs- alkaloids, glycosides, volatile oils, carbohydrates, resin crude drugs for the detection of identity and purity

3. Learn and experience techniques of Quantitative chemical tests for lipid crude oils and drugs for the detection of identity and purity
4. Learn and experience techniques of Chemical tests for carbohydrates, lipid crude drugs and oils, protein drug gelatin for the detection of identity and purity

T2104. PHARMACOLOGY-I (Theory)

OBJECTIVE: The major objective of this course is to provide orientation on drugs acting on different systems of the body.

OUTCOMES:

Upon completion of the course student will be able to

1. Students would have studied and learned about the importance of Pharmacokinetics i.e., Absorption, distribution, metabolism and excretion during selection of drugs and should have gained knowledge on Plasma drug concentration. Should have been thorough with the concepts of Pharmacodynamics. They would have come across the factors that modify the drug action.
2. Students should have learned about ANS neurotransmitters, and pharmacology of drugs in ANS
3. Students would have known about different cardiovascular disorders, detailed pharmacology of each class of drugs and multiple uses of same category of drugs like CCB's, Diuretics etc
4. Students would have gained knowledge on various CNS neurotransmitters, their agonists, antagonists and the concepts on Psychopharmacology drugs.
5. Students would have studied in detail about respiratory disorders and the pharmacological of different categories of drugs.
6. Students would know the basis of hormonal disorders. To understand synthesis, storage, release and the actions of different hormones in the body. To gain a sound knowledge over the use of drugs to correct either the hypo conditions or hyper conditions and their side effects. To provide a clear idea regarding different Insulin or other hormonal preparations available in the market along with their advantages and disadvantages.

T2105. COMMUNITY PHARMACY (Theory)

OBJECTIVE: In the changing scenario of pharmacy practice in India, Community Pharmacists are expected to offer various pharmaceutical care services. In order to meet this demand, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling, health screening services for improved patient care in the community set up.

OUTCOMES:

Upon completion of the course student will be able to

1. Demonstrate knowledge of the business and professional practice management skills in community pharmacies.
2. Demonstrate the prescription, legality & identification of medication related problems like drug interactions.
3. Identify symptoms of minor ailments and provide appropriate medication.

4. Participate in prevention programs of communicable diseases and exhibit professional ethics by promoting safe and appropriate medication use throughout society.
5. Demonstrate the role of pharmacist in improving the adherence.
6. Explain age-related differences in physiologic and pathophysiologic processes and their clinical manifestations.

T2106. PHARMACOTHERAPEUTICS-I (Theory)

OBJECTIVE: This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.

OUTCOMES:

Upon completion of the course student will be able to

1. Know the pathophysiology and management of cardiovascular, Respiratory and Endocrine diseases.
2. Understand the therapeutic approach to the management of these diseases.
3. Know the importance of preparation of individualized therapeutic plans based on diagnosis.
4. Develop clinical skills in the therapeutic management of these conditions.
5. Know the controversies in drug therapy.
6. Provide patient – centred care to diverse patients using the evidence-based medicine.

T2109. PHARMACOTHERAPEUTICS-I (Practical)

Upon completion of the course student will be able to

1. Identify drug interactions and rationalize the prescription
2. Discuss the therapeutic approach to management of selected diseases
3. Prepare individualized therapeutic plans based on diagnosis
4. Perform patient counselling
5. Conduct planned experiments and prepare laboratory report in a standard format

DOCTOR OF PHARMACY (Pharm D)

THIRD YEAR(III/VI)

T3101. PHARMACOLOGY-II (Theory)

OBJECTIVE: The major objectives include study on renal, hemopoetic disorders, cancers, various infections, so as to give solid knowledge to select specific drugs based on pathological conditions of the patient and to improve practical skills of a student.

OUTCOMES:

Upon completion of the course student will be able to

1. Understand the pathophysiology of disease of Hematopoietic system and drugs acting on it.
2. Cognizance underlying mechanism on renal system.
3. Acknowledge better understanding in pharmacology of chemotherapeutic agents.
4. Have basic knowledge of immunopharmacology.
5. Describe principles of bioassay, various types of toxicity studies and their procedure.
6. Appreciate the knowledge on learning in depth knowledge on cell, macromolecules, cell signalling, DNA replication, cell cycle, gene and its structure

T3107. PHARMACOLOGY-II (Practical)

Upon completion of the course student will be able to

1. Study of commonly used instruments in experimental pharmacology. Introduction to CPCSEA guidelines and OECD guidelines.
2. Know Introduction to animal physiology with their biochemical reference values in various animal species.
3. Study of various routes of drug administration, anesthetics agents used to anesthetize laboratory animals and techniques of Euthanasia
4. Study of physiological salt solutions, drug solution and use in various animal experiments.
5. Study of methods for collection of blood, body fluids and urine from experimental animals.
6. Determine the potency of a substance on isolated tissues.
7. Explain the effect of drugs either alone or in combination on isolated frog's rectus abdominus muscle and frog's heart
8. Know introduction to principles of bioassay, its types including advantages and disadvantages
9. Explain and perform matching point, bracketing and interpolation bioassay to find unknown concentration of Acetylcholine.
10. Demonstrate and discuss recording of effects of CNS acting drugs in rats/mice using Actophotometer and anti-epileptic activity using Convulsiometer with the help of software.

11. Demonstrate recording of effects of skeletal muscle relaxant drugs in rats/mice using Rota-rod apparatus and Analgesic activity using Eddy's Hot Plate with the help of software.

T3102. PHARMACEUTICAL ANALYSIS (Theory)

OBJECTIVE: This course deals with the various aspects of quality control and quality assurance aspects of pharmaceutical industries. This subject is designed to impart a fundamental knowledge on the principles and instrumentation of spectroscopic and chromatographic techniques.

OUTCOMES:

Upon completion of the course student will be able to

1. Understand the concepts of QC/QA, GLP, ICH Guidelines and their importance in pharmaceutical industry.
2. Develop the practical skills using instrumental techniques and gain knowledge on instrumental techniques for analysis of pharmaceuticals.
3. Acquire knowledge on basic principles of electrochemical analytical techniques.
4. Gain knowledge on the basic principles of spectroscopy, develop the practical skills using instrumental techniques, understand the knowledge about assay of pharmaceutical substances.

T3108. PHARMACEUTICAL ANALYSIS (Practical)

Upon completion of the course student will be able to

1. Perform paper and thin layer chromatographic experiments and gain the knowledge on interpretation of data obtained after the experiment to conclude the results.
2. Handle different instruments like spectrophotometers, flame photometer, HPLC and GC to analyse the pharmaceutical compounds.
3. Have ability to develop basic practical skills using instrumental techniques.
4. Ascertain the knowledge about assay of pharmaceutical substances.

T3103. PHARMACOTHERAPEUTICS II (Theory)

OBJECTIVE: This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.

OUTCOMES:

Upon completion of the course student will be able to

1. Understand the pathophysiology and management of Cancer, Renal, Infectious and Skin diseases.
2. Develop Patient case based Assessment Skills.
3. Choose and justify appropriate drug and treatment duration to a given patient with regard to current recommendations and patient-related factors such as other diseases, age, organ functions and other drug treatment.
4. Calculate creatinine clearance using the Cockroft - Gaults equation and by results and patient factors evaluate renal function and the need for adjustment of drug therapy

5. Apply Knowledge and clinical skills to care of patients
6. Provide patient – centred care to diverse patients using the evidence based medicine.

T3109. PHARMACOTHERAPEUTICS II (Practical)

Upon completion of the course student will be able to

1. Identify drug interactions and rationalize the prescription
2. Discuss the therapeutic approach to management of selected diseases
3. Prepare individualized therapeutic plans based on diagnosis
4. Perform patient counselling
5. Conduct planned experiments and prepare laboratory report in a standard forma

T3104. PHARMACEUTICAL JURISPRUDENCE (Theory)

OBJECTIVE: This course exposes the student to several important legislations related to the profession of pharmacy in India. The Drugs and Cosmetics Act, along with its amendments are the core of this course. Other acts, which are covered, include the Pharmacy Act, dangerous drugs, medicinal and toilet preparation Act etc. Besides this the new drug policy, professional ethics, DPCO, patent and design Act will be discussed.

OUTCOMES:

Upon completion of the course student will be able to

1. Understand the various concepts of the pharmaceutical legislation in India.
2. Gain knowledge on Principles and Significance of professional ethics and about moral principles to be followed in the society
3. Learn the various laws governing the manufacturing, sale, research & usage of drugs. Understand significance of Schedule M and Schedule Y related Manufacturing & clinical trials. understand the labeling requirements and packaging guidelines for drugs and cosmetics.
4. Know Laws as prescribed by the Pharmacy Council of India and information regarding duties of drug inspector and pharmacy Act.
5. Gain knowledge on manufacture of Ayurvedic, Homeopathic preparations, construction of bonded and non- bonded laboratory and duties to be paid for manufacturing of alcoholic preparations and export of alcoholic preparations in bond and outside bond.
6. Identify potential fraud and abuse legal issues of narcotic &psychotropic substances.
7. Study the Sailent Features of Drugs and magic remedies Act and its rules and gain information on prohibited and exempted advertisements.
8. Understand about the regulations pertaining to drug price control order and describe about the sale price of bulk drugs and retail price of formulations.

T3105. MEDICINAL CHEMISTRY (Theory)

OBJECTIVE: To gain the knowledge in the medicinal chemistry of various classes of drugs, structures, mechanism of actions, understand the SAR and perform drugs and intermediate synthesis and analysis.

OUTCOMES:

Upon completion of the course student will be able to

1. Understand the concept of advanced techniques in the drug discovery, CADD, QSAR and combinatorial chemistry.
2. Gain knowledge in the medicinal chemistry of Anti-infective agents.
3. Acquire knowledge about sulphonamides, classification, structures, SAR, therapeutic uses and synthesis.
4. Acquire knowledge in the classification, structures, SAR, therapeutic uses and synthesis of anti-malarial, and antibacterial.
5. Acquire knowledge in the classification, structures, SAR, therapeutic uses and synthesis of antibiotics.
6. Gain knowledge in the medicinal chemistry of antineoplastic agents.
7. Understand the etiology of various cardiac diseases and identify targets to treat them and gain knowledge on medicinal chemistry of drugs acting on cardiovascular system
8. Acquire knowledge about Hypoglycemic agents.
9. Gain knowledge in the medicinal chemistry of ant thyroid drugs.
10. Gain knowledge in the medicinal chemistry of antidiabetics.
11. Understand the importance of various diagnostic aids.
12. Gain knowledge in the medicinal chemistry of steroidal harmones, their analogues.

T3110. MEDICINAL CHEMISTRY (Practical)

Upon completion of the course student will be able to

1. Carry out the synthesis of various organic intermediates containing heterocyclic rings, drugs.
2. Analyse the purity of API and intermediates.
3. Ascertain the knowledge on the methodology to perform QSAR

T3106. PHARMACEUTICAL FORMULATIONS (Theory)

OBJECTIVE: The objective of pharmaceutical formulations is to acquire knowledge on formulation and evaluation of solid, liquid and novel drug delivery systems, which serves as an important pre requisite for dosage form design.

OUTCOMES:

Upon completion of the course student will be able to

1. Familiarize oneself with the types of various dosage forms.
2. Grasp the formulation and quality control test and evaluation of uncoated as well as coated tablets.
3. Become expert in production and filling of hard & soft gelatine capsules. Quality control test for Same
4. Gain an understanding of the formulation and evaluation of semisolid preparation such as ointment, gel etc.
5. Know inside out in the formulation concepts of pharmaceutical suspensions and emulsions and their stability problems.
6. Acquire working knowledge and understanding the production facilities of Parenteral

7. Become proficient in the various controlled and novel drug delivery systems and its importance

T3111. PHARMACEUTICAL FORMULATIONS (Practical)

Upon completion of the course student will be able to

1. Prepare and evaluate various solid and liquid dosage forms and demonstration of tablet coating
2. Prepare parental formulations
3. Formulate and evaluate semisolid dosage forms
4. Prepare various cosmetic preparations

DOCTOR OF PHARMACY (Pharm D)

FOURTH YEAR(IV/VI)

T4101. PHARMACOTHERAPEUTICS-III (Theory)

OBJECTIVE: This course is designed to impart knowledge and skills necessary for contribution to quality use of medicines. Chapters dealt cover briefly pathophysiology and mostly therapeutics of various diseases. This will enable the student to understand the pathophysiology of common diseases and their management.

OUTCOMES:

Upon completion of the course student will be able to

1. Understand the pathophysiology and pharmacotherapy of several common disease states
2. Know the Principles of Pharmacotherapy in Particular Patients Groups.
3. Apply knowledge and clinical skills to problem solving in unfamiliar situations.
4. Obtain and interpret information from literature and apply this information in a clinical situation
5. Present information on the therapeutic use of drugs to fellow students and staff in a clear and professional manner.
6. Undertake medication reviews

T4107. PHARMACOTHERAPEUTICS-III (Practical)

Upon completion of the course student will be able to

1. Identify drug interactions and rationalize the prescription
2. Discuss the therapeutic approach to management of selected diseases
3. Prepare individualized therapeutic plans based on diagnosis
4. Perform patient counselling
5. Conduct planned experiments and prepare laboratory report in a standard forma

T4102. HOSPITAL PHARMACY (Theory)

OBJECTIVE: In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug dispensing, manufacturing of parenteral preparations, drug information, patient counselling, and therapeutic drug monitoring for improved patient care.

OUTCOMES:

Upon completion of the course student will be able to

1. Know various drug distribution methods.
2. Know the professional practice management skills in hospital pharmacies.
3. Provide unbiased drug information to the doctors.
4. Know the manufacturing practices of various formulations in hospital set up.
5. Appreciate the practice-based research methods.
6. Appreciate the Practice Based Research Methods, stores management and inventory control.

T4108. HOSPITAL PHARMACY (Practical)

Upon completion of the course student will be able to

1. Analyse prescriptions for drug interaction
2. Formulate and prepare parenteral formulations and powders
3. Perform inventory analysis
4. Answer drug information queries through literature search
5. Conduct planned experiments and prepare laboratory report in a standard format

T4103. CLINICAL PHARMACY (Theory)

OBJECTIVE:

1. Monitor drug therapy of patient through medication chart review and clinical review.
2. Obtain medication history interview and counsel the patients.
3. Identify and resolve drug related problems.
4. Detect, assess and monitor adverse drug reaction.

OUTCOMES:

Upon completion of the course student will be able to

1. Explain the roles and responsibilities of clinical pharmacist
2. Analyse and interpret the laboratory test results for clinical diagnosis
3. Conduct interview to elicit medication history and perform patient counselling
4. Identify, monitor, assess, manage, prevent, document and report suspected adverse drug reactions
5. Provide drug and poison information through critical analysis
6. Recognise the potential sources of medication errors and act for its prevention

T4109. CLINICAL PHARMACY (Practical)

Upon completion of the course student will be able to

1. Assess prescriptions for drug interaction and answer drug information query
2. Perform patient counselling on medication and conduct medication history interview
3. Analyse and interpret the data obtained through laboratory tests
4. Conduct planned experiments and prepare laboratory report in a standard format

T4104. BIOSTATISTICS & RESEARCH METHODOLOGY (Theory)

Upon completion of the course student will be able to

1. Know basic research methods which are used in clinical study design that relates to experimental and observational studies, collecting data, study and analyze. Observe Errors relating experimentation
2. Observe relation between components also measure and study linearly. We can observe one component influence with multiple factors.
3. Understand Testing the hypothesis, how far population parameter significant based on estimator with the help of parametric tests. Non parametric tests can also observed
4. Understand analysis of variance helps in study total variation observational data
5. Know application of analysis in field or lab experimental to design. Factorial experiments.
6. Know research objects about reliability and validity experimental and clinical study.

T4105. BIOPHARMACEUTICS &PHARMACOKINETICS (Theory)

Upon completion of the course student will be able to

1. Know basic concepts and factors influencing absorption, distribution and elimination of drugs.
2. Understand various pharmacokinetic models used in calculating various pharmacokinetic parameters
3. Study the pharmacokinetic parameters of drugs administered through intravenous bolus and infusion routes that follows one compartment open model
4. Determine the pharmacokinetic parameters of drugs administered through intravenous bolus and infusion routes that follows two compartment open model.
5. Understand the concept of multiple dosage regimen and determine pharmacokinetic parameters of drugs administered through intravenous bolus, infusion and oral routes.
6. Understand the non-linear pharmacokinetic model and its parameters of drugs.
7. Determine pharmacokinetic parameters by using non-compartmental model
8. Understand basic concepts, estimation and factors influencing bioavailability and bioequivalence of drugs.

T4110. BIOPHARMACEUTICS &PHARMACOKINETICS (Practical)

Upon completion of the course student will be able to

1. Enhance dissolution characteristics of slightly soluble drugs by co-solvency, solid dispersion and use of surfactant
2. Compare dissolution studies of two different marketed products of same drug.
3. Perform Protein binding studies of a drug and Calculation of bioavailability
4. Calculate the Pharmacokinetic parameters like Ka, Ke, t1/2, Cmax, AUC, AUMC, MRT etc. from blood profile data.
5. Calculate bioavailability from urinary excretion data for two drugs.
6. Determine metabolic pathways for different drugs based on elimination kinetics data
7. Perform absorption studies in animal inverted intestine using various drugs.

T4106. CLINICAL TOXICOLOGY (Theory)

Upon completion of the course student will be able to

1. Demonstrate an understanding of the roles of various health care personnel in the prevention and management of poisonings
2. Demonstrate an understanding of the health and economic implications of toxic exposures
3. Demonstrate and apply an understanding of general toxicology principles and clinical management practice
4. Demonstrate and apply an understanding of the history, assessment, and therapy considerations associated with the management of a toxic exposure
5. Demonstrate and apply an understanding of the characteristics of and treatment guidelines for specific toxic substances
6. Propose several preventive approaches to reduce unintentional poisonings
7. Enable the pharmacist to function as contributing health care team member when faced with a toxic exposure experience, including emergencies.

DOCTOR OF PHARMACY (Pharm D)

FIFTH YEAR (V/VI)

T5101. CLINICAL RESEARCH (Theory)

Upon completion of the course student will be able to

1. Understand new drug development process
2. Understand clinical studies scenario in Indian and other countries
3. Understand the regulatory and ethical requirement in clinical trails
4. Know the role and responsibilities of clinical trial personnel
5. Know the designing of clinical trial documents
6. Manage the clinical trial coordination process
7. Know safety monitoring and reporting in clinical trails

T5102. PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMICS (Theory)

Upon completion of the course student will be able to

1. Compare and contrasts different study designs.
2. Distinguish methods of data collection and recording.
3. Understand issues involved in selecting sample and recruiting participants.
4. Discuss threats to validity and issues of interpretations
5. Discuss applications of pharmacoepidemiological concepts and methods to pharmacy practice.
6. Explain measures of disease occurrence and association.
7. Demonstrate knowledge and understanding of statistical theory.
8. Select and apply appropriate statistical techniques for managing common types of medical data.
9. Interpret correctly the results of statistical analyses

T5103. CLINICAL PHARMACOKINETICS & PHARMACOTHERAPEUTIC DRUG MONITORING (Theory)

Upon completion of the course student will be able to

1. Apply PK-PD principles in cases using patient data to optimize pharmacotherapy and drug dosing for maximal efficacy and minimal toxicity.
2. Recognise, document and manage drug dosing in cases involving significant patient pharmacokinetic variability due to physiology or disease (eg age, obesity, pregnancy, malabsorption, organ dysfunction, critical illness, therapeutic target site).

3. Recognize, characterize and manage cases with clinically significant PK-PD drug interactions.
4. Demonstrate appropriate therapeutic drug management (TDM) in cases with medications for which concentrations can be measured or predicted from available PK research data

T5104. CLERKSHIP

Upon completion of the course student will be able to

1. Discuss the role of Pharmacist in clinical pharmacy services
2. Demonstrate the skills of a clinical Pharmacist
3. Discuss the available therapeutic options in the management of diseases
4. Prepare a pharmaceutical care plan for a given case
5. Detect, Interpret and report medication errors and drug interactions

T5105. Project Work

Upon completion of the course student will be able to

1. Address a problem related to Pharmacy practice in hospital, community service or clinical set up with a wider perspective and generality
2. Address a problem related to Pharmacy practice in hospital, community service or clinical set up with a wider perspective and generality
3. Define the problem to be addressed and translate it into a statement of aim, objectives, scope and plan for the project
4. Carry out and report an information survey and take account of findings in executing project
5. Evaluate, select and apply relevant theories and techniques from the full range of courses studied using conceptual models and frameworks to enhance depth of understanding
6. Select appropriate methodology for investigative work, taking into account the pros and cons of the alternatives available and develop solution proposals based on reasoned judgement
7. Present a coherent, logically argued, fully referenced report and engage in a professional manner in a viva-voce discussion about the project dru

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SIXTH YEAR (VI/VI)

Internship

Upon completion of the course student will be able to

1. To provide patient care in cooperation with patients, prescribers and other members of an inter-professional health care team based health care team based upon sound therapeutic principles and evidence based data, taking into account relevant legal, ethical, social cultural, economic and professional issues, emerging technologies and evolving biomedical, pharmaceutical, social or behavioral or administrative and clinical sciences that may impact therapeutic outcomes.
2. To manage and use resources of the health care system in cooperation with patients, prescribers, other health care providers, administrative and supportive personnel to promote health, to provide, assess and coordinate safe, accurate and time sensitive medication distribution and to improve therapeutic outcome of medication use.
3. To promote health improvement, wellness and prevention in co-operation with patients, communities, at risk population, and other members of inter professional team of health care providers.
4. To demonstrate skills in monitoring of the national health programmes and schemes oriented to provide preventive and promotive health care services to the community.
5. To develop leadership qualities to function effectively as a member of the health care team organised to deliver the health and family welfare services in existing socio- economic, political and cultural environment.
6. To communicate effectively with patients and the community.