Program- Doctor of Pharmacy

I Year Pharm.D

Human Anatomy and Physiology(Theory)

Course Outcomes

After studying this course student will be able to:

1. Describe the structure (gross and histology) and functions of various organs of the human body
2. Discuss the various homeostatic mechanisms and their imbalances of various systems
3. Identify the various tissues and organs of the different systems of the human body
4. Recognize coordinated working pattern of different organs of each systems
5. Recognize the interlinked mechanisms in the maintenance of normal functioning of human body

Human Anatomy and Physiology (Practical)

Course Outcomes

After undergoing this course student will be able to:

1. Illustrate different types of Tissues and explain various Anatomical models
2. Identify the bones of Skeletal system
3. Determine Blood cell count, Hemoglobin, Blood grouping, ESR, Bleeding time and Clotting time
4. Record Blood Pressure, Pulse rate, Body temperature
5. Identify family planning devices and conduct Pregnancy diagnosis test
6. Conduct planned experiments and prepare laboratory report in a standard format

Pharmaceutics (Theory)

Course Outcomes

After studying this course, students will be able to:

1. Describe the evolution of Pharmacy and Pharmacopoeias
2. Discuss the need and identification of different dosage forms
3. Design a suitable formulation/dosage form with the use of appropriate ingredients
4. Discuss the different techniques involved in formulation of a dosage form
5. Analyze the instabilities observed in formulations and suggest suitable remedial measures to overcome the instabilities of dosage form
6. Prepare appropriate labels and recommend storage conditions for dosage forms

Pharmaceutics (Practical)

Course Outcomes

After studying this course, student will be able to:

1. Formulate various solid and liquid dosage forms
2. Demonstrate different techniques involved in formulation
3. Identify and apply the suitable remedial measures to solve instabilities observed in formulations
4. Prepare appropriate labels for dosage forms
5. Conduct planned experiments and prepare laboratory report in a standard format

Medicinal Biochemistry(Theory)

Course Outcomes

After studying this course, student will be able to:

1. Describe the concepts of biological oxidation and bio energetics
2. Explain the metabolism of carbohydrate, proteins and lipids
3. Discuss various concepts of nucleotides and nucleic acids
4. Recognise and discuss the role of catalytic activity of enzymes and importance of isoenzymes in diagnosis of disease
5. Discuss the principles, significance and methods of different biochemical tests
6. Interpret the results of biochemical tests such as lipid profile test, liver and kidney function tests

Medicinal Biochemistry(Practical)

Course Outcomes

After studying this course, student will be able to:

1. Determine the biomolecules by qualitative and quantitative analysis of urine and blood samples
2. Interpret the metabolic disorders based on laboratory values
3. Interpret the lipid profile and liver function tests
4. Determine various electrolytes in serum
5. Operate and handle appropriate standard instruments
6. Conduct planned experiments and prepare laboratory report in a standard format

Pharmaceutical Organic Chemistry(Theory)

Course Outcomes

After studying this course, student will be able to:

1. Explain the physical properties of organic compounds
2. Identify the structures of a given organic compound and give the nomenclature
3. Explain the mechanisms involved in various organic reactions
4. Discuss the reactivity, orientation and stability of organic reactions
5. Identify the products obtained through simple organic reactions
6. Summarize the studies on some important official organic compounds

Pharmaceutical organic chemistry (Practical)

Course Outcomes

After studying this course, student will be able to:

1. Synthesize simple organic compounds by different organic reactions
2. Apply stereo models and explain the structural aspects of organic compounds
3. Detect the extra elements (N,S and X) present in the compounds
4. Identify various classes of organic compounds by systematic qualitative analysis
5. Prepare suitable solid derivatives from organic compounds
6. Conduct planned experiments and prepare laboratory report in a standard format

Pharmaceutical Inorganic Chemistry(Theory)

Course Outcomes

After studying this course, student will be able to:

1. Explain the effects of impurities in pharmaceuticals
2. Discuss the principles and methodology of limit tests for common impurities in pharmaceutical substances
3. Suggest methods to prepare inorganic pharmaceuticals
4. Recommend storage conditions for inorganic pharmaceuticals
5. Estimate the inorganic medicinal substances and interpret their percentage purity
6. Explain basics of radio activity and recognize the role of essential trace elements

Pharmaceutical Inorganic Chemistry(Practicals)

Course Outcomes

After studying this course, student will be able to:

1. Identify the impurities in given inorganic compounds by performing limit tests.
2. Analyze the purity of compound quantitatively by performing assays.
3. Use different methods to prepare inorganic pharmaceuticals.
4. Perform identification tests as per Indian Pharmacopoeia.
5. Determine the impurities qualitatively by performing test for purity
6. Conduct planned experiments and prepare laboratory report in a standard format

Remedial Biology-(Theory)

Course Outcomes

After undergoing this course student will be able to:

1. Explain the classification of plants, plant cell and its organelles, types of tissues and their functions
2. Explain physiological aspects of plants
3. Describe taxonomical characters of various families
4. Classify plants based on morphological and microscopical characters
5. Identify a given plant part based on its morphological and microscopical characters
6. Discuss structure and life history of parasites/insects

Remedial Biology(Practical)

Course Outcomes

After studying this course, student will be able to:

1. Identify cell wall constituents and cell inclusions
2. Identify the crude drugs by its morphological characteristics and study the anatomical characters by preparing slides
3. Perform experiments related to plant physiology
4. Identify different parts of frog digestive system
5. Conduct planned experiments and prepare laboratory report in a standard format

Remedial Mathematics-(Theory)

Course Outcomes

After studying this course, student will be able to:

1. Explain the principles of matrix algebra, determinants, Trigonometry, Analytical Geometry, Differential Calculus, Integral Calculus, Differential Equations and Laplace Transforms
2. State and explain the important theorems such as Cayley-Hamilton Theorem, adjoint Cramer's rule and Leibritz Theorem

3. Identify the appropriate standard form for a given differential equation
4. Solve simple and complex mathematical problems associated with on trigonometry and analytical geometry
5. Solve simple mathematical problems associated with on matrix algebra, differential and integral calculus as well as Laplace Transforms
6. Solve complex mathematical problems associated with on matrix algebra, differential equations, differential and integral calculus as well as Laplace Transforms

II Year Pharm.D

Pathophysiology-(Theory)

Course Outcomes

After studying this course, student will be able to:

1. Explain the pathogenesis and morphology of reversible and irreversible cell injury; enumerate various lipoproteins and describe lipoprotein disorders
2. Illustrate events involved in acute and chronic inflammation
3. Recognize the biological significance of various hypersensitivity disorders
4. Discuss the mechanisms involved in autoimmune diseases and allograft rejection
5. Discuss the etiopathogenesis of selected diseases
6. Describe the general biology of cancer, mechanism of shock and effects of radiation exposure

Pharmaceutical Microbiology

Course Outcomes

After studying this course, student will be able to:

1. Identify the key growth parameters required by micro-organisms
2. Explain the principles of sterilization used in the pharmaceutical industry
3. Explain the principles of sterility testing and microbiological quality control of pharmaceuticals
4. Discuss the concepts of immunology and interpolate the same in disease diagnosis
5. Analyze the techniques for microbiological assays

Pharmaceutical Microbiology(Practical)

Course Outcomes

After studying this course, student will be able to:

1. Prepare various culture media for the growth of microorganisms
2. Identify and isolate bacteria

3. Demonstrate aseptic procedures
4. Carry out sterilization and sterility testing of pharmaceuticals
5. Evaluate antimicrobials and determine the MIC of antimicrobial agents
6. Conduct planned experiments and prepare laboratory report in a standard format

Pharmacognosy & Phytopharmaceuticals

Course Outcomes

After studying this course, student will be able to:

1. Define Pharmacognosy and describe its evolution
2. Explain the classification of crude drugs and discuss their primary and secondary metabolites
3. Discuss various parameters related to cultivation, collection, processing and storage of crude drugs
4. Analyse morphological and microscopical characters of crude drugs
5. Discuss the production, evaluation, uses and adulterants of crude drugs
6. Identify the market samples of drugs containing proteins, carbohydrates and lipids

Pharmacognosy & Phytopharmaceuticals(Practicals)

Course Outcomes

After studying this course, student will be able to:

1. Identify cell wall constituents and cell inclusions
2. Identify the crude drugs by its morphological characteristics and study the anatomical characters by preparing slides
3. Perform chemical tests to identify unorganized crude drugs and lipids
4. Prepare herbarium sheets
5. Conduct planned experiments and prepare laboratory report in a standard format

Pharmacology I

Course Outcomes

After studying this course, student will be able to:

1. Discuss pharmacokinetics and pharmacodynamics of a drug
2. Recognize the factors modifying drug action
3. Identify drug interactions and detect adverse drug reactions
4. Classify and explain the pharmacology of drugs acting on various systems

5. Apply the basics of pre-clinical and clinical evaluations in the development of new drugs

Community Pharmacy

Course Outcomes

After studying this course, student will be able to:

1. Discuss the roles and responsibilities of community pharmacist
2. Outline the layout and infrastructure requirements for community pharmacy
3. Recognise the need of inventory control and discuss the various methods
4. Discuss the factors affecting medication adherence
5. Perform general patient counseling
6. Apply health screening services in community pharmacy

Pharmacotherapeutics I (Theory)

Course Outcomes

After studying this course, student will be able to:

1. Explain the etiopathogenesis of selected diseases
2. Explain the general prescribing guidelines and rational use of drugs
3. Discuss the therapeutic approach in the management of selected diseases and controversies in drug therapy
4. Prepare individualized therapeutic plans based on diagnosis
5. Recognise the role of pharmacist in essential and rational drug use

Pharmacotherapeutics I (Practicals)

Course Outcomes

After studying this 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 counseling
5. Conduct planned experiments and prepare laboratory report in a standard format

Pharmacology II (Theory)

Course Learning Outcomes

After studying this course, student will be able to:

1. Discuss the pharmacological aspects of drugs acting on blood and renal System
2. Discuss the pharmacological aspects of chemotherapeutic agents used in various diseases
3. Explain the pharmacology of immunosuppresants and principles of animal

toxicology

4. Illustrate the chromosome structure and DNA replication
5. Recognise the fundamentals and importance of cell biology in cell signaling pathways
6. Analyse the principles and processes of Recombinant DNA technology

Pharmacology II (Practical)

Course Learning Outcomes

After studying this course, student will be able to:

1. Demonstrate intraperitoneal and intramuscular routesof administration of drugs in animals and describe different anaesthetics used in laboratory animals
2. Identify and select laboratory appliances used in experimental pharmacology
3. Recommend the physiological salt solution for different isolated tissue preparations
4. Perform a bioassay procedure and create a Dose Response Curve
5. Demonstrate the screening of a drug for CNS activity
6. Conduct planned experiments and prepare laboratory report in a standard format

Pharmaceutical Analysis (Theory)

Course Outcomes

After studying this course, student will be able to:

1. Explain the importance of modern instrumentation in pharmaceutical analysis
2. Describe the fundamental principles and applications of UV-visible, IR, NMR, Mass spectroscopy
3. Describe the fundamental principles and applications of Flame photometry, , X-ray diffraction, atomic emission and atomic absorption spectroscopy
4. Interpret various spectra such as IR, NMR and Mass to identity the given compound
5. Identify appropriate instrumentation for the analysis of various compounds
6. Discuss the concepts of total quality management, quality validation methods and quality review

Pharmaceutical Analysis(Practical)

Course Outcomes

After studying this course, student will be able to:

1. Operate and handle instruments such as UV-visible and IR spectrophotometer to

obtain the spectra of a given sample

2. Interpret spectra of UV-visible, IR, NMR and Mass to identity the given compound
3. Correlate spectral data with chemical structure
4. Estimate the quantity of a drug in a given mixture or solution
5. Conduct planned experiments and prepare laboratory report in a standard format

III Year Pharm.D

Pharmacotherapeutics II (Theory)

Course Outcomes

After studying this course, student will be able to:

1. Explain the etiopathogenesis of selected infectious diseases, musculoskeletal and renal disorders
2. Discuss the principles of cancer therapy and dermatological disorders
3. Identify the patient-specific parameters relevant in initiating and monitoring drug therapy and adverse effects
4. Discuss the therapeutic approach in the management of selected diseases and controversies in drug therapy
5. Prepare individualized therapeutic plans based on diagnosis
6. Recognise the role of pharmacist in essential and rational drug use

Pharmacotherapeutics - II(Practical)

Course Outcomes

After studying this 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 counseling
5. Conduct planned experiments and prepare laboratory report in a standard format

Pharmaceutical Jurisprudence(Theory)

Course Outcomes

After studying this course, student will be able to:

1. Explain the evolution of pharmacy as a profession in India and emergence of regulatory bodies
2. Discuss the importance of code of pharmaceutical ethics
3. Recognize the provisions of various acts pertaining to drugs and cosmetics
4. Explain the latest amendments with respect to New Drug policy, DPCO and Patent and design act
5. Discuss the concepts of price fixation of pharmaceutical products

6. Outline the concepts of Narcotic and Psychotropic Substances Act, Pharmacy Act and Excise duties Act

Medicinal Chemistry(Theory)

Course Outcomes

After studying this course, student will be able to:

1. Discuss the relationship between the structures of medicinal compounds with their biological activity
2. Explain the concept of rational drug design including combinatorial chemistry and computer aided drug design
3. Identify the structures of a given medicinal compound and give the nomenclature
4. Synthesise a drug molecule using available synthetic and new path ways
5. Explain the mode of action, mode of resistance, therapeutic uses and side effects of drugs

Medicinal Chemistry(Practical)

Course Outcomes

After studying this course, student will be able to:

1. Synthesis compounds of medicinal interest
2. Conduct monograph analysis of the pharmaceutical compounds
3. Determine the amount of drug present in an unknown solution
4. Estimate the purity of drugs by performing assays
5. Determine partition coefficient and dissociation constant of a given compound
6. Conduct planned experiments and prepare laboratory report in a standard format

Pharmaceutical Formulations(Theory)

Course Outcomes

After studying this course, student will be able to:

1. Explain the significance of formulation, preparation and evaluation of various pharmaceutical dosage forms
2. Discuss formulation additives for various dosage forms
3. Explain suitable measures for stability of the dosage forms
4. Describe the manufacturing methods of solid, semisolid, parenteral and ophthalmic products
5. Evaluate different dosage forms with appropriate quality control test for a given drug
6. Recommend suitable packaging material for a dosage form of a given drug

Pharmaceutical Formulations - Practical

Course Outcomes

After studying this course, student will be able to:

1. Prepare formulations of different dosage forms as per the batch formula
2. Operate different equipments and instruments used in preparation of dosage forms
3. Select suitable packaging container for a dosage form
4. Evaluate different dosage forms by performing quality control tests
5. Prepare and evaluate cosmetics such as lipstick, cold cream and shampoo
6. Conduct planned experiments and prepare laboratory report in a standard format

IV Year Pharm.D

Pharmacotherapeutics -III(Theory)

Course Outcomes

After studying this course, student will be able to:

1. Explain the etiopathogenesis of selected gastrointestinal, haematological, neurological and psychiatric diseases
2. Discuss the principles of evidence based therapy and pain management
3. Identify the patient-specific parameters relevant in initiating and monitoring drug therapy and adverse effects
4. Discuss the therapeutic approach in the management of selected diseases and controversies in drug therapy
5. Prepare individualized therapeutic plans based on diagnosis
6. Recognise the role of pharmacist in essential and rational drug use

Pharmacotherapeutics III

Course Outcomes

After studying this 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. Conduct patient counseling
5. Conduct planned experiments and prepare laboratory report in a standard format

Hospital Pharmacy

Course Outcomes

After studying this course, student will be able to:

1. Discuss the roles and responsibilities of hospital pharmacist, hospital drug policies and guidelines for hospital pharmacy
2. Discuss various drug distribution methods in a hospital pharmacy
3. Apply various methods of inventory control

4. Formulate parenteral preparations
5. Contribute to a newsletter for providing continuous education and awareness
6. Explain about handling and packaging of radiopharmaceuticals

Hospital Pharmacy

Course Outcomes

After studying this 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

Clinical Pharmacy (Theory)

Course Outcomes

After studying this 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 counseling
4. Identify, monitor, assess, manage, prevent, document and report suspected adverse drug reactions
5. Provide drug and poison information through critical analysi
6. Recognise the potential sources of medication errors and act for its prevention

Clinical Pharmacy(Practical)

Course Outcomes

After studying this course, student will be able to:

1. Assess prescriptions for drug interaction and answer drug information query
2. Perform patient counseling 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

Biostatistics and research methodology(Theory)

Course Outcomes

After studying this course, student will be able to:

1. Recognise the importance of biostatistics in pharmacy

2. Explain the importance of research methods in the design of pharmacoepidemiological study
3. Discuss the methods of collection of data and its analysis and interpretation
4. Identify appropriate statistical methods for data analysis
5. Discuss and evaluate various software for statistical analysis of data
6. Explain the various methods of testing hypothesis

Biopharmaceutics and Pharmacokinetics(Theory)

Course Outcomes

After studying this course, student will be able to:

1. Discuss biopharmaceutics, pharmacokinetics, pharmacodynamics with their applications
2. Explain the mechanisms and factors affecting ADME processes
3. Discuss the significance of pharmacokinetics in the design and evaluation of dosage forms
4. Differentiate between bioavailability and bioequivalence along with their measurement
5. Identify and select the right pharmacokinetic model for drugs administered by different routes

Biopharmaceutics and Pharmacokinetics(Practical)

Course Outcomes

After studying this course, student will be able to:

1. Compare the *in-vitro* drug release profile of different marketed products
2. Perform the solubility enhancement techniques for improvement of drug release of poorly water soluble drugs
3. Estimate the bioavailability (absolute and relative) and bioequivalence from the given clinical data
4. Calculate the drug content in blood sample using Area Under Curve approach
5. Calculate and interpret various pharmacokinetic parameters from the given clinical data
6. Conduct planned experiments and prepare laboratory report in a standard format

Clinical Toxicology(Theory)

Course Outcomes

After studying this course, student will be able to:

1. Describe the mechanism of action of common poisons and antidotes
2. Detect and differentiate acute and chronic poisoning by clinical symptoms
3. Select appropriate laboratory tests to identify and determine the severity of poisoning
4. Detect signs and symptoms of drug abuse and suggest suitable remedial measures
5. Recommend the standard procedures to deal with cases of poisoning

V Year Pharm.D

Clinical Research (Theory)

Course Outcomes

After studying this course, student will be able to:

1. Discuss the Pharmacological and Toxicological considerations in process of development of new drugs
2. Discuss the principles and phases in clinical trial of drug
3. Explain the guidelines for ethics and safe monitoring in clinical trial of a drug
4. Design the documents of clinical trial
5. Distinguish the guidelines of national and international regulatory bodies for clinical trial
6. Recognise differing roles and obligations of the Investigator, Sponsor and Institutional Review Board

Pharmacoepidemiology and Pharmacoeconomics(Theory)

Course Outcomes

After studying this course, student will be able to:

1. Discuss the scope, need, origin and evaluation of Pharmacoepidemiology
2. Explain the importance of Measurement of outcomes in Pharmacoepidemiology
3. Recommend suitable method for measuring the outcome of Pharmacoepidemiology for a disease
4. Suggest an appropriate Pharmacoepidemiological method for a given drug and address the risks associated with Pharmacoepidemiological study
5. Discuss the basic principles, role and relevance of Pharmacoeconomics in the development of a new drug
6. Identify and justify an appropriate evaluation method for Pharmacoeconomics study of a disease

Clinical Pharmacokinetics and Pharmacotherapeutic Drug Monitoring

Course Outcomes

After studying this course, student will be able to:

1. Discuss the pharmacokinetic principles to individualize drug therapy in patient care situ ations
2. Determine dose ,dosing intervals and dosage adjustments of a drug for a given patient
3. Apply the principles of pharmacokinetics to analyse and predict drug interactions
4. Prepare protocol for TDM of drugs for selected diseases
5. Discuss the concept of genetic polymorphism in metabolism, transport and target of a drug

CLERKSHIP

Course Outcomes

After studying this 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

PROJECT WORK

Course Outcomes

After studying this 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. Define the problem to be addressed and translate it into a statement of aim, objectives, scope and plan for the project
3. Carry out and report an information survey and take account of findings in executing project
4. 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
5. 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
6. Present a coherent, logically argued, fully referenced report and engage in a professional manner in a viva-voce discussion about the project

VI Year Pharm.D

INTERNSHIP

Course Outcomes

After studying this course, student will be able to:

1. Explain the pathophysiology of disease states and the rationale for drug therapy
2. Discuss the available therapeutic options to provide patient care in co-operation with patients, prescribers, and other members of an interprofessional health care team
3. Identify, manage and use resources of the health care system, in cooperation with patients, prescribers, other health care providers
4. Analyse the therapeutic approaches to promote health improvement, wellness, and disease prevention
5. Demonstrate skills in monitoring of the National Health Programmes and schemes
6. Develop leadership qualities to function effectively as a member of the health care team
7. Communicate effectively with patients and the community