



CHEBROLU HANUMAIIAH INSTITUTE OF PHARMACEUTICAL SCIENCES

Chandramoulipuram, Chowdavaram, Guntur – 522019, Andhra Pradesh

(Sponsored by Nagarjuna Education Society)

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COURSE OUTCOMES

DOCTOR OF PHARMACY

FIRST YEAR

PD 1.1: HUMAN ANATOMY AND PHYSIOLOGY (Theory)

- CO 1:** To describe basics elements of the structure and functions of Cell and Elementary tissues.
- CO 2:** To have an in depth knowledge on the anatomy and physiology osseous, haemopoetic and lymphatic systems along with the definitions of their disorders.
- CO 3:** To perceive the cardio, respiratory, gastro and neuro anatomy and physiology including the definitions of their disorders.
- CO 4:** To comprehend anatomy and physiology of urinary system and endocrine glands highlighting the homeostatic mechanisms.
- CO 5:** To learn the structure and functions of reproductive systems along with stages of pregnancy, parturition and various contraceptive devices.
- CO 6:** To appreciate the anatomy and physiology of sense organs of human body and skeletal muscle along with the definitions of their disorders.
- CO 7:** To acquire knowledge on the muscle performance and changes that takes place during exercise condition along with the specific drug effects on athletes.

PD 1.2: PHARMACEUTICS – I (Theory)

- CO 1:** To know about the historical background of pharmacy profession and to understand the elements like importance of pharmaceutical dosage forms, prescription and posology.
- CO 2:** To know about the concept of various pharmacopoeias and its editions.
- CO 3:** To understand the development of various monophasic and biphasic liquid dosage forms.
- CO 4:** To understand formulation techniques and development of powders, granules and galenicals.
- CO 5:** To identify pharmaceutical incompatibilities and to solve pharmaceutical calculations.
- CO 6:** To highlight the importance of various extraction procedures used in pharmaceutical product development.

CO 7: To understand the development of powders, suppositories and surgical aids.

PD 1.3: MEDICINAL BIOCHEMISTRY (Theory)

CO 1: To acquire knowledge on cell composition, cellular transport, high energy compounds, and enzymes with their therapeutic and diagnostic applications related to patient care.

CO 2: To learn about metabolic pathways of glucose and lipids in body and its metabolic disorders.

CO 3: To gain knowledge on energy capture mechanism at cellular level.

CO 4: To become familiar with amino acid metabolism, nucleic acid metabolism, genetic mutations and their metabolic disorders.

CO 5: To become aware of significance of clinical chemistry in laboratory estimations and various types of kidney and liver function tests, and lipid profiles and their clinical correlation.

CO 6: To gather knowledge on immunological techniques employed in diagnosis of diseases.

CO 7: To learn about electrolyte importance in body functioning.

PD 1.4: PHARMACEUTICAL ORGANIC CHEMISTRY (Theory)

CO 1: To understand the fundamental concepts of drugs like organic bonding, acids and bases, isomerism, and nomenclature of different classes of organic compounds

CO 2: To appreciate the free radical chain reactions of alkanes and chemistry of alicyclic compounds

CO 3: To get information on mechanism of nucleophilic aliphatic substitution, elimination, electrophilic and free radicals addition reactions of organic compounds.

CO 4: To understand the concept of carbon-carbon double bond as substituent in organic compounds and the theory of resonance.

CO 5: To know the concept of electrophilic and nucleophilic aromatic substitution, nucleophilic addition, condensation, and rearrangement reactions in organic chemistry

CO 6: To understand different redox reactions.

CO 7: To study the fundamentals of chemistry of different official pharmaceutical organic compounds used in therapy of diseases.

PD 1.5: PHARMACEUTICAL INORGANIC CHEMISTRY (Theory)

CO 1: To understand the concept of errors and their treatment methods, and volumetric analysis, standards and concentrations.

CO 2: To know the basics of acid base, redox, non-aqueous, precipitation and complexometric titrations.

CO 3: To know the concept of gravimetric analysis, and indicators used in titrimetric analysis and their theories.

CO 4: To get information on different limit tests, and preparation and uses of medicinal gases.

CO 5: To get knowledge on fundamentals of the chemistry of antacids, inorganic acidifiers, cathartics, electrolyte replenishers, and trace inorganic elements involved in pharmacotherapy.

CO 6: To study the chemistry of inorganic compounds used as antimicrobials, pharmaceutical aids, dental products, sclerosing agents, expectorants, sedatives, antidotes and respiratory stimulants which help in treatment of various diseases and disorders.

CO 7: To get knowledge on the chemistry of radiopharmaceuticals involved in disease treatment.

PD 1.6: REMEDIAL MATHEMATICS (Theory)

CO 1: To understand the concepts of algebra.

CO 2: To gain knowledge on trigonometry.

CO 3: To learn the calculations related to analytical geometry.

CO 4: To know about fundamentals of differential calculus useful in drug development process.

CO 5: To gain knowledge on integral calculus.

CO 6: To know information on differential equations helpful in drug development process.

CO 7: To learn about laplace transforms.

PD 1.6: REMEDIAL BIOLOGY (Theory)

CO 1: To gain knowledge on the general organization and morphology of plants.

CO 2: To understand the morphology of different flowering parts, fruits and seeds.

CO 3: To learn the physiology of plant and taxonomy of various flowering plants.

CO 4: To know about the fundamental aspects of vertebrates, amphibians and mammals.

CO 5: To acknowledge the basic information of animal cell, tissues and poisonous animals.

SECOND YEAR**PD 2.1: PATHOPHYSIOLOGY (Theory)**

- CO 1:** To understand the pathology of cell injury and adaptations including abnormalities of lipoproteinemia and glycogen storage diseases.
- CO 2:** To know the pathogenesis of inflammation and healing mechanisms, and concept of immunity and various immunological diseases
- CO 3:** To understand the principles of cancer emphasizing on its classification, etiopathogenesis, patterns of spread and histological diagnosis.
- CO 4:** To gain knowledge on pathological abnormalities and types of shock with their mechanisms, staging and management.
- CO 5:** To have a good knowledge on clinical effects of radiation, and various environmental and nutritional diseases.
- CO 6:** To perceive the etiology, pathophysiology, signs and symptoms and complications of various disease states.
- CO 7:** To comprehend the etiopathogenesis and clinical presentations of various infectious diseases.

PD 2.2: PHARMACEUTICAL MICROBIOLOGY (Theory)

- CO 1:** To get information basic elements on morphology, structure, classification, nutrient media for cultivation and replication of Bacteria, Fungi and Viruses, Spirochetes and Rickettsia.
- CO 2:** To know about various elements of identification and growth control of microorganisms along with of sterilization in pharmaceutical industry.
- CO 3:** To gain knowledge on disinfection, antiseptics and sterility testing of products and microbiological assays of various components
- CO 4:** To understand about various laboratory techniques of immunobiological assays.
- CO 5:** To get information of etiology, control and pharmacotherapy of communicable diseases.

PD 2.3: PHARMACOGNOSY & PHYTOPHARMACEUTICALS (Theory)

- CO 1:** To know about the elements of history, scope and development of Pharmacognosy and to acquire knowledge on the classification of crude drugs involved in pharmaceutical care.
- CO 2:** To gain knowledge on various methods involved in the cultivation, collection and processing of crude drug needed for drug development.
- CO 3:** To learn the systemic pharmacognostic study of primary metabolites, fibres and related products useful in drug development.

CO 4: To know about plant cell and its inclusions, microscopic characters of crude drugs that play an effective role in drug development.

CO 5: To detect various adulterants of crude drugs by different quality control testing during drug development process.

PD 2.4: PHARMACOLOGY – I (Theory)

CO 1: To acquire an in depth knowledge on the elements of pharmaceutical care and pharmacology along with pharmacokinetic and pharmacodynamic parameters and the types of toxicities.

CO 2: To understand the pharmacology of drugs acting on autonomic nervous system

CO 3: To understand the concept of drugs act on cardiovascular system

CO 4: To know the drug action of centrally acting drugs

CO 5: To get the knowledge on the pharmacology of respiratory system

CO 6: To appreciate the pharmacological concepts of hormones and its antagonists.

CO 7: To comprehend the concept of autocooids with emphasis on their antagonistic drugs.

PD 2.5: COMMUNITY PHARMACY (Theory)

CO 1: To understand the scope of community pharmacy in the current scenario.

CO 2: To be able to demonstrate all the roles and responsibilities of community pharmacists.

CO 3: To understand about the business and professional practice skills of community pharmacy.

CO 4: To understand and appreciate the concept of rational drug use.

CO 5: To be able to provide pharmaceutical care at community pharmacy.

CO 6: To follow all the legal requirements in running a community pharmacy and to uphold the ethics of community pharmacist.

PD 2.6: PHARMACOTHERAPEUTICS – I (Theory)

CO 1: To understand about pathophysiology and therapeutic approach in cardiovascular disorders.

CO 2: To know the pathophysiology and therapeutic approach in respiratory disorders.

CO 3: To gain knowledge on relevant pathophysiology and therapeutic approach in endocrinological disorders.

CO 4: To acquire information on relevant pathophysiology and therapeutic approach in ophthalmological disorders.

CO 5: To understand and emphasize on rational drug use in pharmacotherapy.

CO 6: To identify patient specific parameters relevant in pharmacotherapy such as age, pregnancy and breast feeding.

THIRD YEAR

PD 3.1: PHARMACOLOGY-II (Theory)

- CO 1: To understand the pharmacology of drugs used for blood associated disorders.
- CO 2: To learn the pharmacology of drugs acting on renal system and chemotherapeutics.
- CO 3: To have a detailed understanding on Immunopharmacology.
- CO 4: To have good knowledge on the types of animal toxicities.
- CO 5: To appreciate the concept of dynamic cell and the genes needed in patient care.

PD 3.2: PHARMACEUTICAL ANALYSIS (Theory)

- CO 1: To have good knowledge on the concepts of quality assurance and validation those are essential during drug development.
- CO 2: To get information on different chromatographic analytical techniques involved in drug development.
- CO 3: To obtain knowledge on different electrometric analytical methods needed during drug development.
- CO 4: To know the concepts and instrumentation involved in spectroscopic analytical methods of various drugs.

PD 3.3: PHARMACOTHERAPEUTICS-II (Theory)

- CO 1: To know the relevant pathophysiology and therapeutic approach in infectious disorders.
- CO 2: To gain information on pathophysiology and therapeutic approach in musculoskeletal disorders.
- CO 3: To get knowledge on relevant pathophysiology and therapeutic approach in renal disorders.
- CO 4: To attain information on relevant pathophysiology and therapeutic approach in oncological disorders.
- CO 5: To understand the relevant pathophysiology and therapeutic approach in dermatological disorders.

PD 3.4: PHARMACEUTICAL JURISPRUDENCE (Theory)

- CO 1: To know about the pharmaceutical legislations, ethics, right to information, medical termination of pregnancy act and intellectual property rights.

- CO 2:** To know the significance of drugs and cosmetics act 1940 and its Rules 1945 in relation to import, manufacture and sale of drugs and cosmetics.
- CO 3:** To understand the labeling and packaging guidelines for drug and cosmetics.
- CO 4:** To gain information on various Indian pharmaceutical acts and laws like pharmacy act, excise duties act and narcotic and psychotropic substances act and rules.
- CO 5:** To attain information on the salient features of drugs and magic remedies act, prevention of cruelty to animals act and drugs price control order.
- CO 6:** To know the importance of essential commodities act, patent act and prescription and non-prescription drugs.

PD 3.5: MEDICINAL CHEMISTRY (Theory)

- CO 1:** To understand the concept of drug design like QSAR, CADD, Combinatorial Chemistry and antisense molecules.
- CO 2:** To get knowledge on the medicinal chemistry of drugs like anti-infective agents, sulphonamides, sulphones, antimalarials and antibiotics.
- CO 3:** To understand the medicinal chemistry of antineoplastic agents.
- CO 4:** To get information on the medicinal chemistry of diuretics and drugs used to treat cardiovascular diseases.
- CO 5:** To understand the medicinal chemistry of endocrine drugs.
- CO 6:** To get information on the medicinal chemistry of diagnostic agents of various diseases.
- CO 7:** To understand the medicinal chemistry of steroidal hormones and adrenocorticoids.

PD 3.6: PHARMACEUTICAL FORMULATIONS (Theory)

- CO 1:** To provide knowledge on various pharmaceutical dosage forms along with formulation, manufacturing and quality control testing of tablets and capsules.
- CO 2:** To understand the concepts, formulation, manufacturing and evaluation of solutions, suspensions and emulsions.
- CO 3:** To get knowledge on the formulation of parenterals and various containers used for parenterals and its official quality control tests.
- CO 4:** To provide information on factors affecting absorption and formulation and evaluation of semi-solid ophthalmic preparations.
- CO 5:** To understand the concepts of development of controlled and novel drug delivery systems.

FOURTH YEAR

PD 4.1: PHARMACOTHERAPEUTICS – III (Theory)

- CO 1: To understand the relevant pathophysiology and therapeutic approach in gastrointestinal disorders.
- CO 2: To get knowledge on relevant pathophysiology and therapeutic approach in haematological disorders.
- CO 3: To know about pathophysiology and therapeutic approach in psychiatric disorders.
- CO 4: To gain information on relevant pathophysiology and therapeutic approach in neurological disorders.
- CO 5: To understand the relevant pathophysiology and therapeutic approach in Neuralgia's and headaches.

PD 4.2: HOSPITAL PHARMACY (Theory)

- CO 1: To know the organization, functions and management of hospital and hospital pharmacy.
- CO 2: To have a detailed knowledge regarding various distribution methods followed in hospital for drugs, pharmaceuticals, narcotics, sterile supplies and radiopharmaceuticals.
- CO 3: To know the professional practice management skills in hospital pharmacies.
- CO 4: To know the manufacturing practices of various formulations like parenterals, powders, granules, tablets, capsules, ointments, liquids creams etc., in a hospital set-up.
- CO 5: To appreciate the stores management and inventory control procedures.

PD 4.3: CLINICAL PHARMACY (Theory)

- CO 1: To gain knowledge and demonstrate various aspects of clinical pharmacy services those are provided at hospitals.
- CO 2: To be able to review patient medication chart along with the conduction of medication history interview and patient counselling.
- CO 3: To play a key role in the identification, assessment and reporting of adverse drug reactions.
- CO 4: To identify and resolve drug related problems and medication errors.
- CO 5: To gain expertise in drug and poison information along with critical evaluation of biomedical literature.
- CO 6: To be able to interpret clinical laboratory investigations used for evaluation of various disease conditions.

PD 4.4: BIOSTATISTICS AND RESEARCH METHODOLOGY (Theory)

- CO 1:** To highlight the importance of research in the current clinical scenario and statistics as an integral part of research.
- CO 2:** To understand different types of clinical study designs in carrying out research along with their respective methodologies.
- CO 3:** To understand and interpret various types of data that is generated during the research along with its interpretation using different statistical methods.
- CO 4:** To introduce the concepts of hypothesis testing and elaborate on various statistical tests used for testing the hypothesis and their interpretation.
- CO 5:** To understand various statistical methods used in epidemiological studies of clinical research.
- CO 6:** To highlight the importance of computer application in hospital and community pharmacy.

PD 4.5: BIOPHARMACEUTICS AND PHARMACOKINETICS (Theory)

- CO 1:** To impart knowledge on basic concepts of Biopharmaceutics like drug absorption, distribution, protein binding, elimination.
- CO 2:** To attain knowledge on pharmacokinetic models and pharmacokinetic parameters to describe the kinetics of drug ADME.
- CO 3:** To understand the concepts of non linear pharmacokinetics.
- CO 4:** To get knowledge on the concepts of non compartmental pharmacokinetics.
- CO 5:** To understand the concepts of drug elimination, bioavailability and bioequivalence.

PD 4.6: CLINICAL TOXICOLOGY (Theory)

- CO 1:** To understand the various aspects of toxicity management and general principles behind them along with its toxicokinetics.
- CO 2:** To know the clinical symptoms and management of acute poisoning with agents like pesticides, NSAIDS, CNS drugs, alcohol, hydrocarbons etc.
- CO 3:** To appreciate the clinical symptoms and management of food poisoning and chronic poisoning with heavy metals.
- CO 4:** To differentiate the families of venomous snakes, arthropods and to perceive the clinical presentations, first aid measures and management of snake bite, arthropod bite and bee stings.
- CO 5:** To differentiate between various types of non-edible mushrooms and mycotoxins and to perceive the clinical presentations of its toxicity with special emphasis on its management.
- CO 6:** To acknowledge the signs and symptoms of substance abuse and treatment of dependence.

FIFTH YEAR**PD 5.1: CLINICAL RESEARCH (Theory)**

CO 1: To understand various aspects pertaining to drug discovery and drug development process.

CO 2: To obtain information on various phases of clinical trials along with the governing guidelines and regulatory bodies.

CO 3: To understand and emphasize on various personnel involved in the conduction of clinical trials along with their roles and responsibilities.

CO 4: To know completely about the ethical guidelines to be practiced during the conduction of clinical trials and its respective committees.

CO 5: To understand about patient safety and also clinical data management of clinical trials.

PD 5.2: PHARMACOEPIDEMIOLOGY AND PHARMACOECONOMICS (Theory)

CO 1: To understand the definitions, evolution and need for pharmacoepidemiology and pharmacoconomics.

CO 2: To understand the various methods for measurement of outcomes and risks in Pharmacoepidemiology.

CO 3: To know various pharmacoepidemiologic methods.

CO 4: To know and practice various pharmaco-economic methods like cost-minimization analysis, cost-benefit analysis, cost-effectiveness analysis, cost-utility analysis.

CO 5: To know the applications of pharmacoepidemiology and pharmacoconomics.

PD 5.3: CLINICAL PHARMACOKINETICS AND PHARMACOTHERAPEUTIC DRUG MONITORING (Theory)

CO 1: To get basic information on clinical pharmacokinetics and design of a dosage regimen and application of concepts of pharmacokinetics to individualize the drug dosage regimen.

CO 2: To assess and manage the drug interactions with clinically significant PK-PD drug interactions.

CO 3: To get knowledge on design and implementation of therapeutic drug monitoring services for various drugs.

CO 4: To attain information on adjustment of the dosage regimen for patients with renal / hepatic impairments

CO 5: To understand the concept regarding population pharmacokinetics and pharmacogenetics.