

SULTAN-UL-ULOOM COLLEGE OF PHARMACY

(Estd. by Sultan-ul-Uloom Education Society)

Approved by AICTE & Pharmacy Council of India

Affiliated to Jawaharlal Nehru Technological University, Hyderabad

B.Pharm Program Accredited by NBA

Recognized under Section 2(f) & 12(B) of the UGC Act, 1956



Program: Doctor of Pharmacy

Duration: 6 years

COURSE OUTCOMES

First Year Pharm D

COURSE CODE	COURSE NAME	COURSE OUTCOME STATEMENT
PH101	Human Anatomy and Physiology-I (Theory)	CO.1 To describe the structure (gross and histology) and functions of various organs of the human body. CO.2 To describe various homeostatic mechanisms and their imbalances of various systems. CO.3 To describe hematological tests and also record blood pressure, heart rate, pulse and Respiratory volumes. CO.4 To understand coordinated working pattern of different organs of each system and to enhance the understanding of how the drugs act on the various body systems in correcting the disease state of the organs.
PH108	Human Anatomy and Physiology-I (Practical)	CO.1 To identify the various tissues of the different systems of the human body. CO.2 To study and identify different organs in different systems of the human body. CO.3 To perform the hematological tests and also record blood pressure, heart rate, pulse and Respiratory volumes. CO.4 To perform the various experiments related to special senses and nervous system.
PH102	Pharmaceutics (Theory)	CO.1 To understand the formulation of different dosage forms. CO.2 To understand the basics of the applied field of pharmacy. CO.3 To understand different pharmaceutical calculation involved in formulation specifically for children. CO.4 To understand the importance of good formulation and effectiveness.

PH109	Pharmaceutics (Practical)	CO.1 To understand the formulation of different dosage forms like solid, liquid and semisolid dosage forms. CO.2 To understand the packaging of the different formulations. CO.3 To know about the label, storage, application and handling of the dosage forms. CO.4 To understand different types of incompatibilities of different dosage forms.
PH103	Medicinal Biochemistry (Theory)	CO.1 To understand the catalytic activity of enzymes and importance of isoenzymes in diagnosis of diseases. CO.2 To know the metabolic process of CO.3 To understand the genetic organization of mammalian genome; protein synthesis; replication; mutation and repair mechanism. CO.4 To know the biochemical principles of organ function tests of kidney, liver and endocrine gland.
PH110	Medicinal Biochemistry (Practical)	CO.1 To perform qualitative analysis and determination of biomolecules in the body fluids. CO.2 To perform quantitative analysis and determination of electrolytes. CO.3 To estimate SGOT, SGPT, Urea & protein in serum CO.4 To study factors affecting enzyme activity and preparation, pH measurement of standard buffer solution functional groups.
PH104	Pharmaceutical Organic Chemistry (Theory)	CO.1 To be able to write IUPAC/Common names of simple organic compounds belonging to different classes of organic compounds in organic chemistry. CO.2 To achieve understanding of some important physical properties of pharmaceutical organic compounds. CO.3 To acquire the knowledge and understanding of the Free radical/ nucleophilic [alkyl/ acyl/ aryl] / electrophilic substitution, free radical/ nucleophilic / electrophilic addition, elimination, oxidation and reduction reactions with mechanism, orientation of the reaction, along with order of reactivity, stability of compounds etc. CO.4 To gain through knowledge of some named organic reactions with mechanisms.
PH111	Pharmaceutical Organic Chemistry (Practical)	CO.1 To acquire the knowledge and understanding of the basic experimental principles related to basic experimental techniques. CO.2 To know about the synthesis of pharmaceutical organic molecules by mechanism and Principle. CO.3 To identify unknown pharmaceutical organic molecules by systemic qualitative analysis. CO.4 To construction of organic stereo models of simple organic molecules.
PH105	Pharmaceutical Inorganic Chemistry (Theory)	CO.1 To understand applications of inorganic pharmaceuticals. CO.2 To achieve Knowledge about the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals by assay, semiquantitative inorganic analysis methods. CO.3 To appreciate the importance of inorganic pharmaceuti-

		cals in preventing and curing the disease. CO.4 To have been introduced to a variety of inorganic drug classes.
PH112	Pharmaceutical Inorganic Chemistry (Practical)	CO.1 To acquire the knowledge and understanding of the basic lab experimental techniques in Pharmaceutical Inorganic Chemistry. CO.2 To become well acquainted with the principles, procedures to make test, standard and reactions of limit tests of inorganic impurities. CO.3 To know about assay of drugs by different volumetric titration methods. CO.4 To gain knowledge of tests for identity, preparations and test for purity for inorganic pharmaceuticals.
PH106	Remedial Mathematics (Theory)	CO.1 Apply mathematical concepts and principles to perform computations for Pharmaceutical Sciences. CO.2 Create, use and analyze mathematical representations and mathematical relationships. CO.3 Communicate mathematical knowledge and understanding to help in the field of Clinical Pharmacy. CO.4 Perform abstract mathematical reasoning
PH107	Remedial Biology (Theory)	the main aim of this course is to make aware the students to understand and learn about CO.1 Knowledge on composition of plant cell and its importance. CO.2 Knowledge on different cellular composition and its functions of different parts of plant and their modifications. CO.3 Know classification of plants based on its taxonomical characters. CO.4 Knowledge on taxonomical characters of specified families. CO.5 Knowledge about structural composition of microorganisms. CO.6 Knowledge on structural composition of animal cell and its importance. CO.6 Know the external and internal characters of different types of vertebrates. CO.7 Knowledge about poisonous animals in the environment.
PH113	Remedial Biology (Practical)	CO.1 Get knowledge on instruments used in experimental biology and its operation. CO.2 Know the principles and procedures involved in staining techniques for the preparation of slide. CO.3 Grasp knowledge on different cellular composition and its importance in living organisms (Plants & Animal). CO.4 Get knowledge about morphological features and modified morphological features and its importance of different parts of plant. CO.5 Know about anatomical features and physiological features with reference to human by simulator model. CO.6 Grasp knowledge on different cellular composition of different parts of plant. CO.7 Know different types of animals for its identification. CO.8 Know about few plant physiology techniques

Pharm D Second Year

COURSE CODE	COURSE NAME	COURSE OUTCOME STATEMENT
PH201	Pathophysiology (Theory)	CO.1 Describe the etiology of theselected diseases estates. CO.2 Describe the Pathogenesis of the selected diseased states. CO.3 Name the signs and symptoms ofthe diseases. CO.4 Mention the complications ofthe diseases.
PH202	Pharmaceutical Microbiology (Theory)	CO.1 To understand the anatomy, identification, growth factors andsterilization of microorganisms. CO.2 To know the mode of transmission of disease-causing microbes, symptoms of disease, and treatment CO.3 To do estimation of RNA and DNA and there by identifying the source CO.4 To do cultivation and identification of the microor- ganisms and their diagnostic test in the lab.
PH207	Pharmaceutical Microbiology (Practical)	CO.1 To study the apparatus used in microbiology & preparation, sterilization ofglassware's and media CO.2 To study different staining techniques, motility char- acters, enumeration of microorganism, method of isolation of pure culture and biochemical testing for identification of microorganism CO.3 To perform culture sensitivity testing, sterility testing for powder & liquidand determination of MIC CO.4 To perform microbiological assay of antibiotics, vit- amins and determination of RWC, Widal, Malaria parasite
PH203	Pharmacognosy and Phytopharmaceuticals (Theory)	CO.1 To know history, scope, sources, classification and quality control methodsof natural origin, meaning and sig- nificance of Pharmacognostic parameters and Pharmacog- nostic scheme of study of crude drugs. CO.2 To understand techniques of cultivation, collection, storage of crude drugs, morphology and anatomy of plant parts and know primary and secondary metabolites of crude drugs. CO.3 To know the source, properties, methods of extrac- tion, active constituents, uses of crude drugs, pharmaceuti- cal and industrial applications of carbohydrates, natural fibres, lipids and proteins and their derived products. CO.4 To understand adulteration and methods of adultera- tion of crude drugs.
PH208	Pharmacognosyand Phytopharmaceuticals (Practical)	CO.1 To understand cell wall constituents and cell inclu- sions CO.2 To understand morphology, microscopy and powder characteristics of crude drugs. CO.3 To be able to determine the quality of lipids CO.4 To be able to identify unorganized drugs by chemical methods

PH204	Pharmacology-I (Theory)	CO.1 Understand the pharmacological aspects of drugs falling under the above-mentioned chapters. CO.2 Handle and carry out the animal experiments. CO.3 Appreciate the importance of pharmacology subject as basis of therapeutics. CO.4 Correlate and apply the knowledge therapeutically.
PH205	Community Pharmacy (Theory)	CO.1 Students will provide patient centered care to diverse patients using the best available evidence and in consideration of patients' circumstances to devise, modify, implement, document and monitor pharmacotherapy care plans, either independently or as part of healthcare team CO.2 Students will demonstrate knowledge of the business and professional practice management skills in community pharmacies. CO.3 Students will educate patients through counseling & provide health screening services to public CO.4 Students will identify symptoms of minor ailments and provide appropriate medication CO.5 Students will participate in prevention programs of communicable diseases 6. Students will exhibit professional ethics by promoting safe and appropriate medication use throughout society
PH206	Pharmacotherapeutics – I (Theory)	CO.1 The Pathophysiology of selected disease states and the rationale for drug therapy. And therapeutic approach to management of these diseases. CO.2 The controversies in drug therapy; The importance of preparation of individualized therapeutic plans based on diagnosis; Needs to identify the patient- specific parameters relevant in initiating drug therapy and monitoring therapy (including alternatives, time-course of clinical and laboratory indices of therapeutic response and adverse effects). CO.3 Describe the Pathophysiology of selected disease states and explain the rationale for drug therapy. CO.4 Summarize the therapeutic approach to management of these diseases including reference to the latest available evidence; discuss the controversies in drug therapy.
PH209	Pharmacotherapeutics – I (Practical)	CO.1 Discuss the controversies in drug therapy. CO.2 Discuss the preparation of individualized therapeutic plans based on diagnosis. CO.3 Identify the patient-specific parameters relevant in initiating drug therapy. CO.4 Monitoring of drug therapy (including alternatives, time- course of clinical and laboratory indices of therapeutic response and adverse effects).

Pharm D Third Year

COURSE CODE	COURSE NAME	COURSE OUTCOME STATEMENT
PH301	Pharmacology II (Theory)	CO.1 To understand the pharmacological aspects of drugs acting on blood and blood forming agents and pharmacology of drugs acting on renal system CO.2 To study pharmacology of chemotherapeutic agents, vitamins and essential minerals CO.3 To study immune system, pharmacology of autotoxins and hormones and to study principles of animal toxicology CO.4 To study the dynamic cell & genome structure and function
PH307	Pharmacology II (Practical)	CO.1 To study various routes of drug administration, use of anesthetics in laboratory animals and their handling CO.2 To learn the composition of physiological salt solutions and basic instruments used in experimental pharmacology CO.3 To perform isolated experiments using various isolated preparation and the effect of different drugs on the concentration response curves CO.4 To study the preclinical screening of various drugs
PH302	Pharmaceutical Analysis (Theory)	CO.1 To understand validation of analytical instruments & methods as per ICH/ USP guidelines, concept of quality assurance and quality control techniques. CO.2 To understand principles, instrumentation and application of various chromatographic techniques employed for the analysis of APIs and formulation. CO.3 To understand principle, instrumentation and application of various Electrometric methods. CO.4 To Understand principle, instrumentation and application of UV- Vis, Atomic Absorption and Emission Spectroscopy, Flame Photometry, NMR, Mass spectroscopy, Fluorimetry, Thermal, X ray diffraction techniques.
PH308	Pharmaceutical Analysis (Practical)	CO.1 To perform separation and identification of samples using paper, thin layer chromatographic technique. CO.2 To analyze the samples using UV visible spectrophotometer, study the effect of pH, solvent effect, derivatization on UV spectra. CO.3 To perform potentiometric, conductometric titrations, colorimetry, fluorimetry, nephelometry, flame photometric determination. CO.4 To study and demonstrate IR spectroscopy, HPLC, HPTLC, polarimeter etc.
PH304	Pharmacotherapeutics – II (Theory)	CO.1 To know the pathophysiology of selected disease states and the rationale for drug therapy CO.2 To understand the therapeutic approach for management of different diseases CO.3 To know the importance of preparation of individualized therapeutic plans based on diagnosis & controversies in drug therapy

		CO.4 To understand & identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy.
PH303	Pharmacotherapeutics – II (Practical)	CO.1 To understand therapeutic goals of the drugs used in different diseases. CO.2 To check & analyze drug interactions, adverse drug reactions CO.3 To understand dose and frequency of the medications CO.4 To understand the time-course of clinical and laboratory indices of therapeutic response and adverse effects.
PH306	Pharmaceutical Jurisprudence (Theory)	CO.1 To appreciate study Pharmaceutical Legislation, relevance and significance of jurisprudence to Pharmaceutical Sciences. CO.2 To know fundamentals of legislation to regulate import manufacture, distribution and sales of drug and cosmetics. CO.3 To know the various parameters in the Drug and Cosmetic Act and rules, Drug policy, Drug Price Control Order, CO.4 To understand the concepts of Narcotic Drugs and Psychotropic substances, Pharmacy Act and Excise duties Act
PH305	Medicinal Chemistry (Theory)	CO.1 Understand modern concept of rational drug design. CO.2 Learn development of the anti-infective drugs including structure activity relationship, mechanism of action, synthesis, chemical nomenclature, brand names and side effects of important compounds. CO.3 Understand classification, mechanism of action, structure activity relationship, synthesis, nomenclature and side effects of the drugs acting as antineoplastic agents CO.4 Understand classification, mechanism of action, structure activity relationship, synthesis, nomenclature and side effects of the drugs acting as Cardiovascular agents, Hypoglycemic agents, Diuretics, Steroidal Hormones and Adrenocorticoids etc
PH310	Medicinal Chemistry (Practical)	CO.1 Learn assays of important drugs from the course CO.2 Learn synthesis of medically important compounds / drug intermediates with recrystallization, TLC techniques. CO.3 Understand monograph analysis of important drugs. CO.4 Determine partition coefficients, dissociation constants and molar refractivity of compounds for QSAR analysis.
PH306	Pharmaceutical Formulation (Theory)	CO.1 To understand the principle involved in formulation of various pharmaceutical dosage forms CO.2 To prepare various pharmaceutical formulation CO.3 To perform evaluation of pharmaceutical dosage forms CO.4 To understand and appreciate the concept of bioavailability and bioequivalence, their role in clinical situations
PH311	Pharmaceutical Formulation (Practical)	CO.1 To inculcate various formulation skills. CO.2 To understand mechanisms behind CO.3 To evaluate various quality control analysis of developed formulations. CO.4 To understand clinical implications of the various dosage forms.

Pharm D Fourth Year

COURSE CODE	COURSE NAME	COURSE OUTCOME STATEMENT
PD401	Pharmacotherapeutics-III (Theory)	CO.1 To understand the etiopathogenesis of selected disease states CO.2 To understand the rationale for drug therapy of the selected disease. CO.3 To understand the importance of individualized therapeutic plans based on diagnosis and controversies in drug therapy CO.4 To learn the general prescribing guidelines for special population
PD407	Pharmacotherapeutics - II (Practical)	CO.1 To take part in hospital ward round and clinical discussion CO.2 To assess and justify the changes made in drug therapy in allotted patients. CO.3 To identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy CO.4 To discuss the case presentation of the allotted case after discharge
PD402	Hospital Pharmacy (Theory)	CO.1 Able to know various drug distribution methods. CO.2 To know the professional practice management skills in hospital pharmacies & appreciate the stores management and inventory control. CO.3 To provide unbiased drug information to the doctors & appreciate the practice-based research methods. CO.4 To know the manufacturing practices of various formulations in hospital set up.
PD408	Hospital Pharmacy (Practical)	CO.1 To analyse prescriptions for drug interaction CO.2 Formulate and prepare parenteral formulations and powders CO.3 Perform inventory analysis CO.4 Answer drug information queries through literature search CO.5 Conduct planned experiments and prepare laboratory report in a standard format
PD403	Clinical Pharmacy (Theory)	CO.1 Describe general principles involved in the management of poisoning CO.2 Differentiate the clinical symptoms and management of various acute poisonings CO.3 Distinguish the clinical symptoms and management of chronic poisoning by heavy metals CO.4 Devise public and health care professionals in the management of emergency cases CO.5 Evaluate, minimize and prevent the substance abuse cases in local population

PD409	Clinical Pharmacy (Practical)	CO.1 Assess prescriptions for drug interaction and answer drug information query CO.2 Perform patient counselling on medication and conduct medication history interview CO.3 Analyse and interpret the data obtained through laboratory tests CO.4 Conduct planned experiments and prepare laboratory report in a standard format
PD404	Biostatistics & Research Methodology (Theory)	CO.1 Recognise the importance of biostatistics in pharmacy CO.2 Understand the research methodology in the design of pharmacoepidemiological study CO.3 Discuss the methods of collection of data and its analysis and Interpretation CO.4 Discuss and evaluate various softwares for statistical analysis of data
PD405	Biopharmaceutics & Pharmacokinetics (Theory)	CO.1 To Know the Cause, Etiopathogenesis, Risk factors, Clinical presentation and diagnostic methods of the selected disease states. CO.2 Knowledge about the pathophysiology of the selected disease states and the rationale for the drug therapy and approaches to manage the disease. CO.3 To Identify the patient specific parameters relevant in initiating drug therapy, and monitoring therapy (Including alternatives, Time course of clinical and laboratory indices of therapeutic responses and adverse effects) CO.4 To know the importance of preparation of individualized therapeutic plan
PD410	Biopharmaceutics & Pharmacokinetics (Practical)	CO.1 Enhance dissolution characteristics of slightly soluble drugs by co-solvency, solid dispersion and use of surfactant CO.2 Compare dissolution studies of two different marketed products of same drug. CO.3 Perform Protein binding studies of a drug and Calculation of bioavailability CO.4 Calculate the Pharmacokinetic parameters like K_a , K_e , $t_{1/2}$, C_{max} , AUC, AUMC, MRT etc. from blood profile data. CO.5 Calculate bioavailability from urinary excretion data for two drugs. CO.6 Determine metabolic pathways for different drugs based on elimination kinetics data CO.7 Perform absorption studies in animal inverted intestine using various drugs.
PD406	Clinical Toxicology (Theory)	CO.1 Able to Answer drug information questions. CO.2 Able to perform patient medication counselling. CO.3 Able to solve case studies related to laboratory investigations. CO.4 Able to conduct patient medication history interview.

PD407	Pharmacotherapeutics - II (Practical)	CO.1 To take part in hospital ward round and clinical discussion CO.2 To assess and justify the changes made in drug therapy in allotted patients. CO.3 To identify the patient-specific parameters relevant in initiating drug therapy, and monitoring therapy CO.4 To discuss the case presentation of the allotted case after discharge
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Pharm D Fifth Year

COURSE CODE	COURSE NAME	COURSE OUTCOME STATEMENT
PD501	Clinical research (Theory)	CO.1 To Understand new drug development process CO.2 To Understand clinical studies scenario in Indian and other countries CO.3 To Understand the regulatory and ethical requirement in clinical trials CO.4 To Know the role and responsibilities of clinical trial personnel CO.5 To Know the designing of clinical trial documents CO.6 To Manage the clinical trial coordination process CO.7 To Know safety monitoring and reporting in clinical trials
PD502	Pharmacoepidemiology & Pharmacoeconomics (Theory)	CO.1 To Compare and contrast different study designs. CO.2 To Distinguish methods of data collection and recording. CO.3 To Understand issues involved in selecting sample and recruiting participants. CO.4 To Discuss threats to validity and issues of interpretations CO.5 To Discuss applications of pharmacoepidemiological concepts and methods to pharmacy practice. CO.6 To Explain measures of disease occurrence and association. CO.7 To Demonstrate knowledge and understanding of statistical theory. CO.8 To Select and apply appropriate statistical techniques for managing common types of medical data. CO.9 To Interpret correctly the results of statistical analyses.
PD503	Clinical Pharmacokinetics & Pharmacotherapeutic drug monitoring (Theory)	CO.1 To Apply PK-PD principles in cases using patient data to optimize pharmacotherapy and drug dosing for maximal efficacy and minimal toxicity. CO.2 To 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). CO.3 To recognize, characterize and manage cases with clinically significant PK-PD drug interactions.

		CO.4 To demonstrate appropriate therapeutic drug management (TDM) in cases with medications for which concentrations can be measured or predicted from available PK research data.
PD504	Clerkship	CO.1 To discuss the role of Pharmacist in clinical pharmacy services CO.2 To demonstrate the skills of a clinical Pharmacist CO.3 To discuss the available therapeutic options in the management of diseases CO.4 To Prepare a pharmaceutical care plan for a given case CO.5 To detect, Interpret and report medication errors and drug interactions
PD505	Project Work	CO.1 To address a problem related to Pharmacy practice in hospital, community service or clinical set up with a wider perspective and generality CO.2 To address a problem related to Pharmacy practice in hospital, community service or clinical set up with a wider perspective and generality CO.3 To define the problem to be addressed and translate it into a statement of aim, objectives, scope and plan for the project CO.4 To carry out and report an information survey and take account of findings in executing project CO.5 To 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 CO.6 To 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 CO.7 To present a coherent, logically argued, fully referenced report and engage in a professional manner in a viva-voce discussion about the project drug

Pharm D Sixth Year

COURSE NAME	COURSE OUTCOME STATEMENT
Internship	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. 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. To promote health improvement, wellness and prevention in cooperation with patients, communities, at risk population, and other members of inter professional team of health care providers. To demonstrate skills in monitoring of the national health programs and schemes oriented to provide preventive and promotive health care services to the community. To develop leadership qualities to function effectively as a member of the health care team organized to deliver the health and family welfare services in existing socio- economic, political and cultural environment. To communicate effectively with patients and the community.