INTEGRAL UNIVERSITY, LUCKNOW

FACULTY OF PHARMACY

DOCTOR OF PHARMACY (PHARM. D.)

PROGRAM OUTCOMES (PO's)

PO1. **Pharmacy knowledge:** Possess knowledge and comprehension of the core and basic knowledge pertaining to the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; clinical practices.

PO2. **Clinical Pharmacy Practice:** Develop competency in analysing and interpretation skills in medical emergency and provide high quality therapy in all areas of clinical care and monitoring including structure based therapeutic evaluation. appreciate the concept of Rational drug therapy in diverse therapeutic intervention. Provide high quality evidence based patient-centric care with clinician.

PO3. **Problem Analysis:** Develop ability to utilize the principles of scientific enquiry and improves critical thinking in order to identify, formulate and solve the issues related to Patient care.

PO4. **Modern tool Usage:** Learn, select and apply appropriate techniques, and efficient utilization of resources, softwares for overcoming the limitations of conventional practices.

PO5. **Communication skills:** Communicate effectively regarding issues related to patient specific with the pharmacy community and society.

PO6. **Professional Identity:** Act in consultative position with other healthcare team and contribute to the training of pharmacy students and the growth and success of pharmacy profession.

PO7. **Pharmaceutical Ethics:** Honour personal values and apply ethical values in professional and social context. Demonstrate high degree of professional, ethical and legal manners, conforming with all national, state and local rules and regulations related to pharmacy practice.

PO8. **Planning Abilities:** Develop and apply skills for time management and utilization of resources and implement them to complete the task to meet deadlines.

PO9. **Leadership skills:** Inculcate leadership abilities for competent team-centric approaches to improve and facilitate the health and well-being of society.

PO10. Environment and sustainability: Understand the impact of the professional pharmacy solution in societal and environmental perspectives, and demonstrate the knowledge for sustainable development.

PO11. Life-long learning: Recognize the need to engage independent and life long learning to update the practice to keep in pace with the ever-changing technological aspects. Self-assessment along with feedback analysis to identify the grey areas for improvement of diverse skills as a continuous process.

PROGRAM EDUCATIONAL OBJECTIVES (PEO's)

PEO1. To make available a complete pharmaceutical education leading to Pharm. D. Degree.

PEO2. To prepare graduates as health care expert with emphasis on inter-professional health care team-based patient care.

PEO3. To develop the skills in monitoring of the National Health Programmes and schemes, oriented to provide preventive and promotive health care services to the community.

PEO4. To develop a trained clinical pharmacist who functions effectively as a member of health care team organized to deliver the health and family welfare services in existing socio-economic environment.

PEO5. To promote health, wellness and disease prevention by developing the rationale use of drugs.

PEO6. To inculcate leadership abilities as a member of clinical health care team.

PROGRAMME SPECIFIC OUTCOMES (PSO's)

PSO1. Work with medical practitioners in hospitals and clinics to improve pharmacotherapy for better patient compliance.

PSO2. Explore opportunities with pharmaceutical industries and government organizations as medical writer, pharmacovigilance associate and clinical research associate.

PSO3. Educate patients and other communities for safe and rational use of medications.

COURSE OUTCOMES (CO's)

HUMAN ANATOMY & PHYSIOLOGY (PRY101)

CO1: Describe the structure (gross and histology) and functions of various organs of the human body, Elementary tissues of the human body, classification, types of movements of joints and disorders of joints.

CO2: Describe the various homeostatic mechanisms and their imbalances of various systems and appreciate the coordinated working pattern of different organs of the Lymphatic system and Urinary system.

CO3: Appreciate the coordinated working pattern of different organs of the Cardiovascular system and Respiratory system.

CO4: Appreciate the coordinated working pattern of different organs of the Endocrine system and Reproductive system.

CO5: Appreciate coordinated working pattern of different organs of Digestive system and Nervous system.

CO6: Understand the anatomy physiology of sense organs, physiology of muscle contraction and Sports physiology.

PHARMACEUTICS (PRY103)

CO1: Have information on the formulation aspect of different dosage forms

CO2: Perform different pharmaceutical calculations involved in formulations

CO3: Formulate different types of dosage forms

CO4: Appreciate the importance of good formulations for effectiveness

CO5: Understand prescription and take necessary steps

MEDICINAL BIOCHEMISTRY (PRY105)

CO1: Students will use chemical laboratory methods for the diagnosis, control, treatment, and prevention of diseases.

CO2: Students will use biochemical facts.

CO3: They can use concept of isoenzymes in diagnosis of diseases.

CO4: They can use knowledge of the metabolic process of biomolecules in health and illness (metabolic disorders).

CO5: They can use the knowledge of biochemical principles for organ function tests of kidney, liver and endocrine, gland.

CO6: They can do the qualitative analysis and determination of biomolecules in the body fluids.

PHARMACEUTICAL ORGANIC CHEMISTRY (PRY107)

CO1: Demonstrate the methods of preparation, physical properties, reactivity, stability and orbital picture of organic compounds

CO2: Explain the aromaticity, Resonance, stability, orbital structure, mechanism of addition and nomenclature of organic compounds

CO3: Explain the nucleophilic / substitution, elimination, with mechanism, orientation of the reaction, order of reactivity, kinetics, stability of compounds, stereochemistry and rearrangements

CO4: Understand the electrophilic and free radical addition, cycloaddition reactions

CO5: Understand the electrophilic aromatic substitution and Nucleophilic addition reactions

CO6: Demonstrate the Methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds and Nucleophilic acyl substitution reactions

PHARMACEUTICAL INORGANIC CHEMISTRY (PRY109)

CO1: To understand different sources of impurities & to develop ideas with the fundamentals of analytical chemistry

CO2: Clarify need and basic principle and applications of different titrations.

CO3: Well acquainted with the principles of limit test and iportant inorganic compounds of antidotes, respiratory stimulants & medicinal gases.

CO4: Understand the medicinal and pharmaceutical importance of inorganic compounds of acidifiers and antacids.

CO5: Familiar with the difference classes of inorganic pharmaceutical compounds and their analysis.

CO6: To highlight domain of radiopharmaceuticals used in diagnostics and therapy & to describe typical therapeutic classes of inorganic compounds.

REMEDIAL BIOLOGY (PRY111)

CO1: Students will be able to learn about basic concept/ Knowledge of animal cell and cell organelles'

CO2: Students will be able to learn about basic concept/ Knowledge of animal tissue and their types.

CO3: Students will be able to learn about internal morphology(Anatomy and Physiology) of frog which can correlate with human anatomy and physiology

CO4: Students will be able to learn about Animal Kingdom and Taxonomy.

CO5: Students will be able to learn about Morphology of plant, Root, Stem, Leaf and its modification

PATHOPHYSIOLOGY (PRY201)

CO1: Understand details of cell Injury, learn about different types of glucose related disease. Grasp the details about cause and pathogenesis of inflammation. Learn about wound healing process

CO2: Learn about hypersensitivity, autoimmune mechanism, Grasp the knowledge about AIDS and Amylodosis. Understand the differences and properties of T & B Cells. Gain knowledge about immune tolerance

CO3: Gain knowledge about the tumor, cancer, the pattern of spread, invasion, and metastasis. Learn about the etiology and pathogenesis of cancer.

CO4: Gain knowledge about types and management of shock. Understand the biological effects of radiation. Learn about different types of pollutions. Gain information about different types of vitamins, obesity, malnutrition etc.

CO5: Learn the pathophysiology of some common diseases, Understand the mechanism behind the disease

CO6: Learn the pathophysiology of some common infectious diseases. Understand the mechanism of common infectious disease

PHARMACEUTICAL MICROBIOLOGY (PRY202)

CO1: To know the history and major divisions of microbes & about nutritional requirement for cultivation of microbes.

CO2: Students can able to know isolation, identification of microbes by different staining techniques.

CO3: Knowledge, application, testing and validation of sterilization in pharmaceutical preparation and evaluation of preservatives in pharmaceutical preparations.

CO4: Demonstrate an understanding of key concepts in immunology, immunization program and importance of booster dose and role of bacterial toxins.

CO5: Knowledge on the principles of biochemical tests and Principles and methods of different microbiological assays of antibiotics and vitamins.

CO6: Students can able to understanding of various infections (microbial causes, pathogenesis, and transmission of infection, diagnosis, prevention and treatment.

PHARMACOGNOSY AND PHYTOPHARMACEUTICALS (PRY 204)

CO1: Gain knowledge on biological source, active constituents and uses of crude drugs.

CO2: Understand the basic principles of cultivation, collection and storage of crude drugs.

CO3: Understand the techniques of evaluation of crude drugs as per the WHO guidelines.

CO4: Appreciate the applications of Primary metabolites of the plant and explore its medicinal importance based on its chemical class

CO5: Understand and explore the pharmaceutical applications of Primary metabolites.

CO6: Understand and explore the utilization of plants fibers in surgical dressings and related products

PHARMACOLOGY-I (PRY206)

CO1: Conceptual knowledge of pharmacology basics

CO2: Precise knowledge about pharmacological aspects of drugs mentioned under different categories of syllabus.

CO5: Application of acquired knowledge to the basics of therapeutics.

CO6: Clinical correlation of different drugs.

CO7: Knowledge of Preclinical and Clinical studies.

COMMUNITY PHARMACY (PRY 207)

CO1: Student shall be able to know pharmaceutical care services

CO2: Student shall be able to know the business and professional practice management skills in community pharmacies.

CO3: Student shall be able to do patient counselling & provide health screening services to public in community pharmacy.

CO4: Student shall be able to respond to minor ailments and provide appropriate medication.

CO5: Student shall be able to show empathy and sympathy to patients.

CO6: Student shall be able to appreciate the concept of Rational drug therapy.

PHARMACOLOGY- II (PRY 301)

CO1: Able to understand MOA, drug interaction and uses of blood forming agents on various blood related disorder.

CO2: Explain the pharmacological aspects of drugs falling under Diuretics and classify them according to their application.

CO3: Analyze the importance and suitability of Antimicrobials/Anticancer drugs in clinical application forbetter pharmaco-therapeutics.

CO4: Students can correlate and apply the knowledge of Immunomodulators therapeutically, they can explain about the importance of toxicity studies behind drug discovery.

CO5: Demonstrate about the genome structure , organization and their practical implication in developing new therapeutic strategies like Gene therapy, cloning.

PHARMACEUTICAL ANALYSIS (PRY303)

CO1: Investigate the fundamentals of quality assurance.

CO2: Apprehend the analysis of pharmaceutical substances by chromatographic techniques and electrophoresis.

CO3: Recognize the principle, instrumentation and applications of gas chromatography, HPLC, affinity chromatography and electrophoresis.

CO4: Analyze the essentials of electrometric methods.

CO5: Explore the pharmaceutical substances by absorption and emission techniques.

CO6: Deal with the fundamentals of NMR, ESR, mass spectroscopy, polarimetry, X ray diffraction and thermal techniques.

PHARMACEUTICAL JURISPRUDENCE (PRY305)

CO1: Know and understand the history of pharmacy profession, scope, objective, new drug policy of pharmaceutical legislation. Learn principles and significance of code of pharmaceutical ethics drafted by PCI.

CO2: Know and understand the rules and regulations framed and amendments made under drugs and cosmetics act, 1940. Know about duties and qualification of drug inspector and government analyst. Understand the retail and wholesale of medicines. Learn about different schedules.

CO3: Know and understand the rules and regulations framed and amendments made under pharmacy act 1948. Learn about the registration procedure of pharmacist. Understand the functioning of central and state PCI. Understand the rules and regulations framed and amendments made under drug and magic remedies, Advertisements which are allowed and banned in India related to pharmacy.

CO4: Understand the rules and regulations framed and amendments made under drug and magic remedies, Advertisements which are allowed and banned in India related to pharmacy. Learn about opium cultivation. Learn about penalties of violating narcotic drugs and psychotropic substances act.

CO5: Know and understand the product available in essential commodities list. Know about procedure for calculation of retail and wholesale of drugs. Understand the act which comes under the cruelty of animals. Learn about different penalties and fine foe violating these acts.

CO6: Know and understand the rules, regulations and process for filing a patent. Know about different types of patent. Understand the various aspects of patent act. Learn about different prescription and non-prescription products.

MEDICINAL CHEMISTRY (PRY306)

CO1: Know the types of biological targets in humans and microorganisms and the structural requirement of drugs interacting with them.

CO2: Identify the mechanisms of antimicrobial resistance

CO3: Explain chemical interactions of endogenous molecules with specific receptors or enzymes.

CO4: Explain the molecular effects of their respective agonists and antagonists.

CO5: Demonstrate the relation of chemistry of drugs with respect to their pharmacological activity

CO6: Predict the drug metabolic pathways, adverse effect and therapeutic value from the structure of drugs.

CO7: Know the Structural Activity Relationship of different class of drugs

CO8: Provide information on the storage of drugs based on the chemical stability.

CO9: Provide structure based therapeutic evaluation.

CO10: Correlate the mechanisms of action, Structure Activity Relationship, Stereochemistry with the therapeutic actions of drugs

CO11: Monitor and resolve adverse drug reactions through study of structures and metabolites

PHARMACEUTICAL FORMULATIONS (PRY308)

CO1: Knowledge of formulation components, manufacturing techniques, and quality control tests in the development of tablet dosages forms.

CO2: Understand the formulation design, manufacturing, quality control tests and stability concerns for capsules.

CO3: Knowledge of formulation requirements and evaluation of monophasic and biphasic liquid dosages forms.

CO4: Know the preformulation and formulation requirements and quality control test in the production of parentral dosages forms.

CO5: Understand the principle, formulation factors, application of semisolid bases and preparation of various types of semisolid dosages forms.

CO6: Understand the concept of Controlled and Novel drug delivery system and knowledge of technologies involved in developing parenteral, trans dermal, buccal, rectal, nasal, implants, and ocular delivery systems.

BIOPHARMACEUTICS & PHARMACOKINETICS (PRY310)

CO1: Explain basic concepts of biopharmaceutics and pharmacokinetics.

CO2: Calculate Pharmacokinetic parameters from the given data.

CO3: Apply principles of pharmacokinetics in the design of new formulations.

CO4: Conduct bioavailability and bioequivalence studies.

PHARMACOTHERAPEUTICS– I (PRY401)

CO1: To understand Pharmacotherapeutics & students may also impart knowledge and skills for contribution to quality & use of medicines..

CO2: Students will be developing Patient case based assessment skills.

CO3: Students will be able to describe the quality use of medicines issues surrounding the therapeutic agents in the treatment of these diseases.

CO4: Students will have developed clinical skills in the therapeutic management of these conditions.

CO5: Continue to develop skills to provide patient –centered care to diverse patients using the evidence based medicine. and also 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).

PHARMACOTHERAPEUTICS – II (PRY403)

CO1: Students analyze the Pharmacotherapy of infectious disease states and explain the rationale for drug therapy and management/controversies.

CO2: Students understand the Pharmacotherapy of musculoskeletal disease and explain the rationale for drug therapy and management/controversies.

CO3: Students able to know the Pharmacotherapy of renal disease and explain the rationale for drug therapy and management/controversies.

CO4: Students have ability to explore the Pharmacotherapy of cancer and explain the rationale for drug therapy and management/controversies.

CO5: Students have ability to effectively communicate the Pharmacotherapy of skin disease and explain the rationale for drug therapy and management/controversies.

HOSPITAL PHARMACY (PRY405)

CO1: Know various drug distribution methods

CO2: Know the professional practice management skills in hospital pharmacies

CO3: Provide unbiased drug information to the doctors

CO4: Know the manufacturing practices of various formulations in hospital set up

CO5: Appreciate the stores management and inventory control including practice based research methods

CLINICAL PHARMACY (PRY407)

CO1: Monitor drug therapy of patient through medication chart review and clinical review;

CO2: Obtain medication history interview and counsel the patients.

CO3: Identify and resolve drug related problems.

CO4: Detect, assess and monitor adverse drug reaction.

CO5: Interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states; and

CO6: Retrieve, analyze, interpret and formulate drug or medicine information.

BIOSTATISTICS AND RESEARCH METHODOLOGY (PRY409)

CO1: Know the various statistical methods to solve different types of problems

CO2: Operate various statistical software packages

CO3: Appreciate the importance of Computer in hospital and Community Pharmacy

CO4: Appreciate the statistical technique in solving the pharmaceutical problems

CO5: Develop the ability to apply the methods while working on a research project work

CLINICAL TOXICOLOGY (PRY410)

CO1: Developing general working knowledge of the principles and practice of clinical toxicology

CO2: Demonstrating an understanding of the health implications of toxic exposures and commonly involved chemicals for toxicity

CO3: Demonstrating and applying an understanding of general toxicology principles and clinical management practice

CO4: Demonstrating and applying an understanding of the history, assessment, and therapy considerations associated with the management of a toxic exposure

CO5: Demonstrating and apply an understanding of the characteristics of and treatment guidelines for specific toxic substances

CLINICAL RESEARCH (PRY501)

CO1: Student understands the possibly effective treatments or medicine available only to those participating in the trial.

CO2: Student analyzed and focused the health care for a particular disease or health condition.

CO3: Student understands the society and other people with your disease or health condition by contributing to medical research.

CO4: Student creates new treatment for a disease before it is available to everyone. And play a more active role in your own health care.

CO5: Student understands and provides the better treatment for their health problems in the future. And information about support groups and resources.

PHARMACOEPIDEMIOLOGY & PHARMACOECONOMICS (PRY502)

CO1: Students can understand and answering the demanding questions asked of pharmacotherapy in pharmacoepidemiology and pharmacoeconomics.

CO2: Pharmacoepidemiology can help assess patterns and appropriateness of drug utilisation, provide explanations for poor compliance, quantify the frequency and severity of side effects, and aid in the design and evaluation of interventions to improve drug use and outcomes.

CO3: Pharmacoeconomics can help determine whether a new costlier product offers sufficient clinical advantage over its predecessors to justify the increased cost.

CO4: Pharmacoepidemiology and pharmacoeconomics represent the next logical step in the evolution of medication assessment; their judicious deployment can help ensure both access to new medicines and innovation.

CO5: Identify the applications of pharmacoepidemiology and pharmacoeconomics in clinical settings.

CLINICAL PHARMACOKINETICS & PHARMACOTHERAPEUTICS DRUG MONITORING (PRY503)

CO1: Understand the basics of pharmacokinetic parameters and their application

CO2: Develop nomograms for elderly and pediatric patients for effective therapy

CO3: Know dosage adjustments in different diseases

CO4: Individualize dosage regimen and therapeutic drug drug monitoring

PHARMACOTHERAPEUTICS-III (PRY504)

CO1: Students understand the pathophysiology & diagnosis of GIT & liver disorder and their management/controversies including 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).

CO2: Students have ability to explore the pathophysiology & diagnosis of hematological disorder and their management/controversies.

CO3: Students have ability to effectively communicate the pharmacotherapy of CNS disorder and their management/controversies.

CO4: Students analyzed the pathophysiology & diagnosis of Psychiatric disorder and their management/controversies including patient-specific parameters relevant in initiating drug therapy and monitoring therapy.

CO5: Students analyze the Pharmacotherapeutics of pain management and also able to elucidate the Evidence Based Medicine.

CO6: Students able to elucidate the Evidence Based Medicine.