

DEPARTMENT OF PHARMACEUTICS & INDUSTRIAL PHARMACY

Course contents and Learning outcomes

PCT 201: Introductory Pharmaceutics

History of Pharmacy. Development of Pharmaceutical education and practice in Nigeria. Career opportunities for a Pharmacist. Introduction to dispensing. Sources of information for dispensing. Official Compendia and Formularies. Principles of dispensing, prescription, procedures and ethics of dispensing. Pharmaceutical incompatibilities. Computers in Pharmacy. Pharmaceutical Calculations.

Practicals – Introduction to the dispensing laboratories and equipment used in basic dispensing. Pharmaceutical Calculations. Weighing, use of balances, sensitivity of balances. Measurement of liquids.

At the end of the course, students should be able to:

- Understand the stages in the development of Pharmacy profession and education in Nigeria
- Identify official compendia, formularies, and other sources of information for dispensing
- Learn rules and regulations guiding good laboratory practices.
- Calibrate all equipment in the Dispensing laboratory
- Develop Dispensing skills in line with theory learnt.
- Easily identify various types of dosage forms.

PCT 202: Unit Operations

Milling and size reduction. Mixing of solid and liquids. Separation of solids from liquids. Clarification and Filtration. Mass and heat transfer, drying principles and methods. Evaporation and distillation.

At the end of the course, students should be able to:

- Describe the theoretical concepts and principles of various unit operations.
- Apply the knowledge of heat and mass transfer in drying principles and separation of solids from liquids
- Describe the process of heat exchangers, filters, centrifuges, dryers etc. required for the manufacturing of various pharmaceutical formulations at laboratory as well as industrial scale.

PCT 301: Drug Dosage Forms I

Introduction to dosage forms. Definition and presentation of single dosage forms.

Classification and characteristics. Factors affecting dosage form design. Detailed consideration of selected dosage forms. Aromatic waters and mucilages, solutions and syrups, suspensions, mixtures, lotions, divided and bulk powders, capsules.

Practical - Compounding and dispensing of prescriptions covering major dosage forms in the official compendia. Identification of uses of additives in official preparations.

At the end of the course, students should be able to:

- Describe the term 'dosage form'
- know the various classifications of dosage forms
- Know the design and pharmaceutical applications of selected dosage forms
- Identify the usefulness of some aromatic waters, gums and mucilages in dosage formulations
- Compound official and non-official preparations such as solutions, mixtures, suspensions, lotions, bulk and divided powders, with correct labeling instructions
- Dispense prescriptions containing poisons correctly.
- Detect overdose and incompatibilities in prescriptions.

PCT 302: Physical Pharmaceutics I

Surface and interfacial phenomena: surface tension, inter-facial tension, Adsorption and pharmaceutical applications, surface active agents, micelles, solubilization. Rheology: Definition and derivation of Newton's equations: types of flow curves and relevance to pharmacy operations. Instruments of measurement in rheological studies Physical and chemical factors affecting rheological properties of pharmaceutical products of dosage forms. Rheological studies of pharmaceutical preparations. Importance of rheology to Pharmacy. Solubility, factors – solvents and solutes, solubility saturated and super-saturated solutions. Factors affecting solubility and rates of solution.

At the end of the course, students should be able to:

- Define surface and interfacial tension.
- Describe the principles, concepts of surface tension and the methods for their measurement.
- Understand rheological properties of pharmaceutical products and their applications in formulations.

PCT 401: Drug Dosage Forms II

Emulsions: terminology, theoretical concepts, types of emulsions and testing: Viscosity and other physical properties of emulsions. Emulsifying agents, and classification of emulsifying agents, preparation, preservation and stability of emulsions. Hydrophilic-lipophilic balance. Official formulations. Interfacial energy considerations, semi-solid dosage forms: ointment bases and preparation of ointments. Creams, types and methods of preparation. Pastes and jellies. Suppositories, bases, preparation and evaluation. Tableting technology. Definition, types and properties of tablets. Preparation of tablets. Formulation excipients, granulation and compression process. Compression cycle, types of tableting machine. Problems of processing. Quality evaluation. Large scale production and machinery. Coating of tablets.

At the end of the course, students should be able to:

- Understand formulation design principles of selected dosage forms such as tablets, emulsions, suppositories and semi-solid dosage forms such as creams, ointments.

- justify the selection of appropriate equipment for formulation of tablets in large scale operations
- know the processes of evaluation and control of the quality of tablet formulations.

PCT 402: Physical Pharmaceutics II

Dispersed systems – properties of materials used in the formulation of dispersed systems-polymers, surfactants and other adjuncts: colloidal dispersion types, optical electrical properties, stability, pharmaceutical uses.

Suspension: course, dispersions pharmaceutical dispersion, flocculation, deflocculation, salting out, interfacial rheological properties. Formulation and pharmaceutical application of suspensions.

Gels: properties, effect of temperature electrolytes, syneresis, elasticity, rigidity in gels, diffusion in gels, pharmaceutical application of gels.

Pharmaceutical solutions: measurement of solubility, theory of solubility in mixed solvent systems, pharmaceutically acceptable solvents. Choice and influence of solvent on the activity components, precipitation, salts of drugs, toxicity and adjustments of toxicity in injectables.

At the end of the course, students should be able to:

- Know the types and properties of dispersed systems.
- Understand the applications of dispersed systems, suspensions, colloids and gels
- Apply the knowledge of solubility, buffers, isotonicity modifiers in the design and stability of selected formulations.

PCT 403: Dispensing Practicals

Compounding and dispensing of prescriptions covering all common dosage forms. Laws relevant to dispensing of drugs and poisons. Use of selected equipment as aids in dispensing. Scientific selection of additives for formulation of dosage forms. Practical aspects of minor formulations.

At the end of the course, students should be able to:

- Carry out pharmaceutical calculations proficiently.
- Compound official and non-official formulations of different dosage forms for internal and external use.
- Dispense official and non-official formulations
- Interpret prescriptions.
- Identify poisons in formulations
- Detect overdose and incompatibilities in prescriptions.
- Interpret the official books and scientific literature to provide information on drug labels to patients, caregivers and health professionals.

PCT 501: Formulation Process

Aerosols: aerosols as dosage forms, advantages and disadvantages, components of an aerosol package. Principles and types of aerosol systems, formulation and packaging aerosols, propellant types. Stability and testing of aerosol formulation and packaging. Microencapsulation: fundamental concepts, materials, stability and release properties of coating materials. Processes-equipment and methods of microencapsulation, comparative evaluation of microcapsules. Packaging science, evaluation and standardization of packaging materials, problems of packaging. Stability of pharmaceutical preparations,

definitions, particle size analysis, equivalent spherical diameters of particle size measurement, surface area in pharmaceutical formulation and impact on therapeutic inefficacy.

Practicals: Measurement of particle size of powders and their flow properties. Production of small scale batches of pharmaceuticals in pharmaceutical technology and manufacturing laboratories. Specialized equipment will be used in the preparation of granules, tablets, ointments and liquid products. Evaluation of the finished products employing pharmacopoeia or other official standards.

At the end of the course, students should be able to:

- Understand methods and applications of microencapsulation.
- Select appropriate packaging and labels for various drug products.
- Understand the measurement parameters required to optimize pharmaceutical particles.
- Measure flow properties and size of pharmaceutical powders.
- Prepare granules of tablet formulations into tablets and other pharmaceutical formulations employing official standards.
- Evaluate the formulations for their properties using pharmacopoeia standards.

PCT 502: Industrial Pharmacy

Fundamentals of Industrial Pharmacy practices. Good manufacturing practice. Bulk raw material handling techniques. Storage and Warehousing. Fundamentals of infrastructural facilities-air conditioning hygrometry and humidity control, pre-formulation, pilot scale production. Production management, quality control, plant design.

Practicals: Formulation and large scale production of selected dosage forms. Visits to large scale drug manufacturing companies.

At the end of the course, students should be able to:

- Understand the concept of Quality Assurance, Quality Control and Good Manufacturing Practice.
- Understand Heating Ventilation Air Conditioning (HVAC) systems as one of the most critical utilities in the pharmaceutical industry during manufacture.
- Know the principles of production management and plant design

PCT 503: Production and Quality Control of Cosmetics

Introduction, raw materials for special requirements. Formulation, production and warehousing of cosmetic products-creams, toothpastes, lipsticks and lotions. Special additive and preservation. Quality control of cosmetic preparations.

Practicals: Formulation and preparation of selected cosmetic products and tests for stability.

At the end of the course, students should be able to:

Know the historical background of cosmetic use in man, the types, sources and requirements of raw materials used in cosmetic preparations

- Understand the application of cosmetic preparations that contain medicinal properties which have beneficial topical actions and provide protection against degenerative skin conditions
- Know the methods of preparation and quality control of selected cosmetic formulations.