

**PHARMACEUTICS-VIB (Pharmaceutical Quality Management) [Theory]**

**PHARM 619**

**Cr. Hr. 03**

1. **BIOLOGICAL ASSAYS:** Biological methods, Standard preparations and units of activity, Bioassay of antibiotics, Bioassay of insulin injection, Assay of prepared digitalis and Assay of Vitamin D.
2. **ALCOHOL DETERMINATION:** Alcoholometric methods, Problem during distillation of alcohol, Method for liquids containing less than 30% or more than 30% alcohol and special treatment before distillation.
3. **ALKALOIDAL DRUG ASSAY:** Weighing for assay, Extraction of drugs, Maceration, Percolation, Continuous extraction, Purification of Alkaloids and determination of alkaloids.
4. **QUALITY ASSURANCE OF VACCINES:** Introduction, Quality measures for stability of vaccines, potency testing, and post market surveillance of vaccines.
5. **MISCELLANEOUS DETERMINATIONS AND TESTS:** Determination of weight/ml, Water/Moisture content, Loss on Drying, Evaluation of Ointments, Ash contents and Alkalinity of Glass.
6. **STATISTICAL INTERPRETATION OF QUALITY CONTROL CHARTS DURING MANUFACTURING PROCESSES:**

**PHARMACEUTICS-VIB (Pharmaceutical Quality Management) [Practical]**

**PHARM 619**

**Cr. Hr. 01**

**NOTE:** Practical of the subject shall be designed from time to time on the basis of the above mentioned theoretical topics and availability of the facilities, e.g. Determination of alcohol contents in the Pharmaceutical preparations and Pyrogen test. Sterility test, Determination of Ash contents, Determination of Moisture contents, Determination of total solids, Determination of viscosity of syrups, gels etc. (Note: A minimum of 10 practicals will be performed).

**FINAL PROFESSIONAL**

**FIRST SEMESTER**

**PHARMACEUTICS-VIIA (Pharmaceutical Technology) [Theory]**

**PHARM 710**

**Cr. Hr. 03**

1. **PRINCIPLES OF PHARMACEUTICAL FORMULATION AND DOSAGE FORM DESIGN:** Need for dosage form; Preformulation Studies; Product Formulation.
2. **ADVANCED GRANULATION TECHNOLOGY (DESIGN & PRACTICE):** Spray Drying Granulation Technology; Roller Compaction Technology; Extrusion/Spheronization as a Granulation Technique; Single Pot Processing.

**Granulation Technology:** Rapid Release Granulation Technique; Particle Coating by Centrifugation Granulation Technology.

3. **POLYMERS USED IN DRUG DELIVERY SYSTEMS:**

4. **NOVEL DRUG DELIVERY SYSTEM (DDS):**

Sustained/ Controlled Release Drug Delivery System

i) Microencapsulation technique

- Coacervation
- Solvent evaporation
- Interfacial polymerization
- Spray drying

ii) Developmental aspects of Matrix and Reservoir Systems

**PHARMACEUTICS-VIIA (Pharmaceutical Technology) [Practical]**

**PHARM 710**

**Cr. Hr. 01**

**NOTE:** Practical of the subject shall be designed from time to time on the basis of the above mentioned theoretical topics and availability of the requirements, e.g. Various techniques to develop the formulation, Granulation technology, Study of drug delivery systems, In-vitro Quality Control of various dosage forms. Particle size analysis using various methods, Stability studies of Pharmaceuticals. Preparation and Coating of particles. (Note: A minimum of 10 practicals will be performed).

**PHARMACY PRACTICE-VIA (Advanced Clinical Pharmacy-II) [Theory]**

**PHARM 711**

**Cr. Hr. 03**

1. **RATIONAL USE OF DRUGS:** Rational Prescribing, Rational Dispensing, Problems of Irrational Drug Use, Learning about drug use problem, Sampling to study drug use, Indicators of drug use.
2. **INTRODUCTION TO ESSENTIAL DRUGS:** Criteria for selection, Usage and Advantages. Development of EDL.
3. **DISEASE MANAGEMENT:**
  - Unit V: Central nervous system unit (Stroke, epilepsy, Psychosis)
  - Unit VI: Infectious diseases ( Meningitis, tuberculosis, dermatological infections, Rabies, Urinary track infection, Malaria fever, typhoid fever, fungal infections of skin, Dengue Fever, Common Cold, Pharyngitis & Tonsillitis, Conjunctivitis)
  - Unit VII: Endocrinology Unit (Diabetes Mellitus, Hyper/Hypo thyroidism, pituitary gland non-malignant disorders)
4. **DRUG UTILIZATION EVALUATION & DRUG UTILIZATION REVIEW (DUE/DUR):** Development of protocol of use of few very low therapeutic index drug groups like Steroids, Vancomycin and Cimetidine.
5. **CLINICAL PHARMACOKINETICS:** Therapeutic Drug Monitoring of Digoxin, Theophylline, Gentamycin, Lithium, Phenytoin, Cabamazepine, Phenobarbitone, Valproic Acid, Cyclosporins and Vancomycin.

**PHARMACY PRACTICE-VIA (Advanced Clinical Pharmacy-II) [Practical]**

**PHARM 711**

**Cr. Hr. 01**

- Clerkship in the Clinical Setting. A project Related to Clinical Pharmacy Practices will be completed by the students and will be evaluated by the external examiner.
- Students are required to participate in verbal presentation, communication, written and problem-solving skills, critical analysis of data and provision of care through a weekly conference and projects.

**PHARMACY PRACTICE-VII (FORENSIC PHARMACY)**

**PHARM 712**

**Cr. Hr. 03**

1. **GENERAL INTRODUCTION:** Forensic Pharmacy & Forensic Pharmacist, History of Drug Legislation and Pharmacy Profession in Pakistan, National Health Policy, National Drug Policy, Essential Drugs, Prescription handling at Retail level and Recordkeeping, Drug Control Administration at Federal and Provincial level.
2. **ROLE OF FORENSIC PHARMACIST:** Forensic drug Measurement, Post-mortem redistribution (PMR), Medication errors, prescription forgery, product tampering, Insurance fraud, Use of drugs or alcohol in car accidents or violent actions, Legal and illegal pharmaceutical evidence in criminal investigations, use of abused drugs in the workplace, professional malpractice, quackery and health care fraud.
3. **PHARMACEUTICAL ETHICS:** Patents and Generics, Ethics in Sale, Ethics in Industry, Ethics in Research.
4. **STUDY OF DRUG LAWS:**
  - a. The Drugs Act 1976 and rules framed there under.
  - b. Provincial Drug Rules (Respective Drug Rules will be taught in the relevant province).
  - c. Advertisement rules.
  - d. Other Related rules and Legal aspects.

**PHARMACY PRACTICE-VIIIA (Pharmaceutical Management & Marketing)**

**PHARM 713**

**Cr. Hr. 03**

1. **MANAGEMENT & MARKETING:**
  - a. Nature and Principles of Management
  - b. Types and Functions of Managers
  - c. Planning: Purpose and types of Planning, Steps in Planning
  - d. Organizing
  - e. Management Control Systems. Purpose: Steps in the Control Process, Forms of Operations control. Requirements for adequate control, Critical control points and standards
  - f. Motivation
  - g. Innovation and creativity
  - h. Principals of Marketing
  - i. Product Management
  - j. Marketing Research

2. **PRODUCTION MANAGEMENT:** Material Management, Planning of production, Batch record maintenance.

**PHARMACEUTICAL CHEMISTRY-IVA (Medicinal Chemistry) [Theory]**

**PHARM 714**

**Cr. Hr: 03**

**NOTE:** The topics will be taught with special reference to their Pharmaceutical Applications.

1. **INTRODUCTION TO MEDICINAL CHEMISTRY:** Chemical constitution and biological activity: (Receptor, Theory, Structure Activity Relationships (SAR) and Drug Metabolism). Modern concept of rational drug design, prodrug, combinatorial chemistry and computer aided drug design (CADD) and concept of antisense molecules.
2. **DRUG TARGETS AND DRUG DESIGNING:**
  - a. Introduction and types of drug targets
  - b. Introduction to molecular modeling and computational chemistry
  - c. Structure based designing
  - d. Ligand based designing
  - e. Various techniques in drug synthesis
3. **GENERAL PROPERTIES, CHEMISTRY, BIOLOGICAL ACTION, STRUCTURE ACTIVITY RELATIONSHIP AND THE THERAPEUTIC APPLICATIONS OF THE FOLLOWING:**
  - a. Hormones: Steroidal Hormones (Testosterone, Progesterone, Estrogen, Aldosterone and Cortisol), Proteinous Hormones (Insulin, Glucagon, Oxytocin and Vasopressin).
  - b. Anti-neoplastic Agents: Tamoxifen, Fluorouracil, Mercaptopurine, Methotrexate and Vincristine.
  - c. Sedatives & Hypnotics: Benzodiazepines, Barbiturates, Paraldehyde, Glutethimide, Chloral hydrate, and alcohols.
  - d. Anaesthetics: Local anaesthetics (Procaine, Lignocaine, Eucaine, Cocaine and Benzocaine), General anaesthetics (Cyclopropane, Halothane, Nitrous oxide, Chloroform, Thiopental Sodium, Ketamine, Methohexital, Thioamylal Sodium, Fentanyl Citrate, Tribromo ethanol).
  - e. Analgesics and Antipyretics: Paracetamol, Salicylic acid analogues, Quinolines derivatives, Pyrazolone and Pyrazolodiones, N- arylanthranilic acids, Aryl and heteroaryl acetic acid derivatives.

**PHARMACEUTICAL CHEMISTRY-IVA (Medicinal Chemistry) [Practical]**

**PHARM 714**

**Cr. Hr. 01**

**NOTE:** Practical of the subject shall be designed from time to time on the basis of the above mentioned theoretical topics and availability of the facilities, e.g. Estimation of functional groups; Carboxylic, Hydroxy, Amino and Nitro groups; Determination of Molecular weights of Organic Compounds. Synthesis of Paracetamol, Salicylic Acid, Methyl salicylate, Azobenzene, Benzoic Acid, 5-Hydroxy-1, 3-benzoxazol-2-one, Aspirin, P-nitrosophenol, 3-nitrophthalic acid, o-Chloro-benzoic acid. Assay of the Drugs like Sulpha drugs, Aspirin, Paracetamol, Benzyl Penicillin, Inorganic preparations. (Note: A minimum of 10 practicals will be conducted).