

# **Faculty of Pharmacy**

**Department of Basic  
Pharmaceutical Sciences**

**and Department of Applied  
Pharmaceutical Sciences and  
Clinical Pharmacy**

**Study Plan for the Bachelor Degree in  
Pharmacy  
Course description**

**2023 / 2024**

## Course description

### **05011205 Mathematics and Pharmaceutical Statistics: (3 Cr.Hr.)**

Introduction to Mathematics and Biostatistics, Frequency Distributions and Graphical Presentation of Data, Descriptive Statistics, Measures of Central Tendency, Measures of Variation (Dispersion), Probability and Probability Distributions, Estimation, Statistical Hypothesis Testing, Statistical Analysis and Interpretation: Chi-Square Distribution and Analysis of Variance (ANOVA) And Mann-Whitney Test. Logarithms and Integrations.

### **05011102 General Chemistry for Pharmacy: (3 Cr.Hr.)**

The basic principles of chemistry, the study of atoms, elements, molecules, and ions, the study of mass relationships for chemical reactions, physical properties and calculations of concentrations in different ways, and reactions in aqueous solutions. A study of the basic principles of neutralization titrations in volumetric analysis, gravity titration in gravimetric analysis, and the use of chemistry in pharmaceutical calculations.

### **05011103 General Biology for Pharmacy: (3 Cr.Hr.)**

Biological macromolecules and lipids, Cell structure and function (Eukaryotes and prokaryotes), Cell membranes, Introduction to cellular respiration, Cell cycle, Mitosis and meiosis, Introduction to genetics, From gene to protein (Eukaryotes and prokaryotes), DNA replication, Regulation of gene expression, Introduction to molecular technologies.

### **05011212 Pharmaceutical Organic Chemistry: (3 Cr.Hr.), Prerequisite: 05011102**

The Basic Principles of Organic Chemistry, Nature of Bond, Polarity, The IUPAC Nomenclature of Organic Compounds and The Effect of Their Stereo-Chemical Aspects on Drugs Activities. In Addition to Chemistry and Reactions of Organic Functional Groups with Emphasis on the Physicochemical Properties of Biological Importance Such as Alkenes, Alkynes, Alkyl Halides, Aromatic Compounds, Alcohols, Phenols, Aldehydes, Ketones, Carboxylic Acids and their Derivatives, Nitriles, Amines and Heterocycles

### **05011215 Pharmaceutical Organic Chemistry Lab. (1 Cr.Hr.) Co-requisite: 05011212**

Melting points and boiling points determination of pure substances and separation of a mixture by means of simple and fractional distillation, Study the principle of purification of solid compound by recrystallization, and isolation of natural products by extraction. Essential oil isolation by steam distillation, the principle of thin layer chromatography, nucleophilic and electrophilic substitution reactions.

### **05011200 Anatomy and Histology: (2 Cr.Hr.), Prerequisite: 05011103**

Anatomical Terminology, Surface Anatomy, Types of Tissues and All Body Systems: Integumentary, Skeletal, Muscular, Nervous, Circulatory, Respiratory, Digestive, Urinary, Reproductive and Endocrine Systems. This Course will integrate Human Gross and Microscopic Anatomy with Functions and Morphology.

**05011207 Anatomy and Histology Lab.: (1 Cr.Hr.) Co-requisite: 05011200**

Anatomical terminology and the anatomical plans of the body, Anatomy of the human body systems including (Skeletal, Muscular, Nervous, Cardiovascular, Digestive, Respiratory and Urogenital systems). Histology of the epithelial and connective tissues, skin appendage, and lymphatic system.

**05011208 Physiology (3 Cr.Hr.): Co-requisite: 05011207**

Homeostasis in achieving normal functions of the human body, Fluid balance, Studying the functions of the different systems (cardiovascular system, central and peripheral nervous system, Gastrointestinal system and liver, Renal system, Endocrine system and Pulmonary system.)

**05012110 Pharmaceutical Biochemistry: (3 Cr.Hr.), Prerequisite: 05011215**

Introduction to biochemistry, Water properties and buffer, Amino acid, Proteins structures, Types of proteins such Globular protein and Fibrous protein, Enzymes, Enzymes kinetics, Nucleic acid, Introduction to Carbohydrate, Carbohydrate metabolism, Lipid structure, function and metabolism.

**05012116 Pharmaceutical Biochemistry Lab: (1 Cr.Hr.) Co-requisite: 05012110**

Introduction on safety rules, Types of solutions, Buffer and amino acid titration, Spectrophotometry and Demonstration of Beer's law, Paper Chromatography, Qualitative Test for detection of amino acids, proteins, carbohydrates and fats, Electrophoresis.

**05012113 Pharmaceutical Instrumental Analysis: (3 Cr.Hr.), Prerequisite: 05011215**

Introduction to the modern instrumental methods of quantitative and qualitative analysis, Fundamental principles of operation of these methods, Spectroscopic and chromatographic methods, their strengths and limitations and their application in pharmaceutical analysis will be discussed. Statistical data handling and analysis, method validation, making reasonable choices among several analytical methods.

**05012118 Pharmaceutical Analytical Chemistry and Instrumental Analysis Lab: (1 Cr.Hr.) Co-requisite: 05012113**

Sampling and Statistical Handling of Data, Acid-base, Argentometric, Compleximetric, Oxidation-reduction titrations and some important contents related to analytical methods covering: Chemical analysis using different instrumental methods, such as: Ultraviolet/visible spectroscopy, Flame photometry, Infrared absorption spectroscopy and High Performance Liquid Chromatograph.

**05011113 Physical Pharmacy: (3 Cr.Hr.)**

Introduction to physical pharmacy, Chemical kinetics and rate of reactions, Thermodynamics for pharmaceutical applications, States of matter and phase equilibrium, Electrolytes and non-electrolytes, Surface phenomenon and interfacial tension, Rheology for pharmaceutical applications.

**05011114 Physical Pharmacy Lab: (1 Cr.Hr.) Co-requisite: 05011113**

The basic concepts of physicochemical principles including states of matter, Solubility terms, Distribution phenomena, Chemical kinetics, and their application. Drug diffusion through membranes, The effect of temperature on solubility, Solubilization of drugs, Interfacial phenomena, Adsorption concepts, rheology, micellar solubilization, and applications of surface - active agents.

**05012107 Pathophysiology: (3 Cr.Hr.), Prerequisite: 05011208**

Pathophysiological basis of cellular injury, Inflammation, Acute and chronic, Carcinogenesis and Common diseases such as diabetes, Heart failure, and asthma. It provides an essential understanding of the mechanism of such diseases. Symptoms and disease progression.

**05022121 Pharmacognosy: (3 Cr.Hr.), Prerequisite: 05011215**

Introduction, history and the future of pharmacognosy, Factors affecting secondary metabolites in plants e.g. cultivation, collection, drying, adulteration, packing and evaluation of active constituents., Study of Origin, Family, geographical source, macro and micro-morphology, chemical constituents, uses and tests for identity of drugs of different Organs, Volatile oils and resins, Saponins, Cardioactive drugs, Phenols and phenolic glycosides, Coumarins and chromones, Flavonoids, Tannins, Anthracenes, Alkaloids, Natural Antioxidants.

**05022251 Pharmaceutical Dosage Forms: (3 Cr.Hr.), Prerequisite: 05011113**

Introduction to Drugs and Pharmacy, Routes of Drug Administration, Liquid Dosage Forms (Solutions, Suspensions, Emulsions), Semisolid Dosage Forms (Ointments, Creams, And Gels), Suppositories, Capsules and Sterile Products.

**05022252 Pharmaceutical Dosage Forms Lab: (1 Cr.Hr.) Co-requisite: 05022251**

Types of Dosage Forms, Labelling of Dispensed Medicines, Pharmaceutical Calculations, Pharmaceutical Abbreviations, Preparation of Pharmaceutical Aqueous Solutions, Pharmaceutical Non-Aqueous Solutions, Topical Solution Dosage Forms, Liniments, Lotions, Emulsions, Semisolid Preparations, Suppositories and Suspensions.

**05022220 Pharmacology (1): (3 Cr.Hr.), Prerequisite: 05012107**

Basic principles of Pharmacology, Routes of Administration, Pharmacokinetics, Pharmacodynamics, Drug- Pharmacogenetics, Drug acting on Autonomic Nervous System, Cholinergic Agonists, Cholinergic antagonists, Adrenergic Agonists, Adrenergic antagonists, Drugs Acting on Central Nervous System, Neurodegenerative Disease, Antidepressants, Antipsychotic Drugs, Sedative- Hypnotics, CNS Stimulants

**05022210 Medicinal Chemistry (1): (3 Cr.Hr.), Prerequisite: 05012116, Co-requisite: 05022220**

Introduction to Medicinal Chemistry, Drug Receptors and Drug Metabolism. Drugs Affecting Cholinergic Receptors, Anticholinesterase Drugs, Drugs Affecting Adrenergic System, Drugs Affecting Cardiovascular System, Drugs Affecting Central Nervous System.

**05012217 Pharmaceutical Microbiology: (3 Cr.Hr.), Prerequisite: 05011207**

Early History of Microbiology and Contributions of Major Scientists, a Brief Note on Microbial Cell Structures: Prokaryotes (Bacteria and Gram Staining), The Germ Theory of Disease and Koch Postulates. Characteristics, of Eukaryotic Microbial Cells (Protozoa and Fungi), Viruses and Prion, Microorganisms and Pharmacy: Beneficial and Harmful Effects, Controlling Infections (Antimicrobials): Biocides: Antiseptics and Disinfectants. Factors Affecting Choice of Antimicrobial Agent. Short Notes on Some Important Types, Antimicrobial Chemotherapy, Development of Antibiotics, Modes of Action, Development of Antibiotic Resistance, Laboratory Evaluation of Antimicrobial Agents, Microbial Contamination and Spoilage of Pharmaceutical Products: Detection of Pyrogens, Preservation, Challenge Test, Sterile and Non-Sterile Pharmaceutical Products, Aseptic Areas and Aseptic Processing in Pharmaceutical Industries

**05012218 Pharmaceutical Microbiology Lab: (1 Cr.Hr.) Co-requisite: 05012217**

Safety and Aseptic Techniques, Tools and Devices, The Kinds and Uses of Culture Media, Different Inoculation Techniques as Pour Plate Method, Spread Plate Method and Streaking, Isolation and Detection of Bacterial Isolates, Characterization of Grown Colonies Macroscopically and Microscopically by Both Simple and Differential Staining Techniques, Bacteriologic Examination of Water by Millipore Filtration, Total Viable Count by Serial Dilution of Solid and Liquid Pharmaceutical Products, Antibiotic Sensitivity by Disc Diffusion Test and Checking The MIC and The MBC of The Antibiotic and Sterility Test.

**05023153 Industrial Pharmacy: (3 Cr.Hr.), Prerequisite: 05022252**

Pre-Formulations Studies (Physicochemical Properties of the Drug). Downstream Processes (Size Reduction, Mixing, Size Enlargement (Granulation) and Drying) and their Mechanisms, Instruments for Different Purposes (Mixing, Coating, Compression ...Etc.), Powders Characterization (Flow ability and Particle Size) and How to Improve this Property, Types of Powder Compactions and The Instruments Which Are Used to Perform this Process, Classifications and Evaluation of Different Excipients Which Are Used in Tablet Formulation. Mechanisms for Controlling Oral Solid Dosage Form Release, Tablets Coating Methods, The Instruments Which Are Used for This Purpose and The Ingredients Which are used in this Process and their Properties.

**05023154 Industrial Pharmacy Lab: (1 Cr.Hr.), Co-requisite: 05023153**

Performing Pharmaceutical Operations Used in Pharmaceutical Industry Such as, Milling, Mixing and Granulation of Powder, Measuring Powder Flow ability, Calculation of Porosity and Powder Density, Tablets Preparation by Three Methods: Direct Compression, Wet and Dry Granulation. Quality Control Tests of Tablets, Performing Hard Gelatin Capsule Filling and Quality Control Tests for Capsules.

**05023120 Pharmacology (2): (3 Cr.Hr.), Prerequisite: 05022220**

Antihypertensive drugs, Drugs for heart failure, Antianginal drugs, Antiarrhythmic drugs, Antiplatelets and anticoagulant drugs, Antihyperlipidemic drugs, Drugs for diabetes mellitus, Drugs for the treatment of respiratory diseases, Drugs acting on the gastrointestinal tract (GIT), Hormones, Overview on the drugs acting on the skin and topical drugs

**05023112 Medicinal Chemistry (2): (3 Cr.Hr.), Prerequisite: 05022210, Co-requisite: 05023120**

The study of structure – activity relationship of Antibacterial agents, Non-steroidal, Anti-inflammatory drugs, Antiviral drugs, Opioid analgesics and Anti-fungal agents.

**05023113 Medicinal Chemistry Lab: (1 Cr.Hr.), Co-requisite: 05023112**

Synthesis and Characterization Techniques Commonly Used for The Preparation of Drugs, Synthesis of Paracetamol, Synthesis of Aspirin, Synthesis of Acetanilide, Synthesis of Methyl Salicylate. In Addition, UV Determination of Some Drugs in Tablet Formulations.

**05023125 Clinical Biochemistry: (2 Cr.Hr.), Prerequisite: 05012116**

Introduction to clinical biochemistry, Water and Electrolyte, disturbances Acid-base disturbances, Aminoacidopathies, and the use of enzymes and plasma proteins as clinical markers, Renal and liver function tests.

**05023215 Phytochemistry: (3 Cr.Hr.), Prerequisite: 05022121**

Introduction to Phytochemistry Includes Methods of Isolation, Characterization of Active Herbal Compounds and their Biological Activities Such as Volatile Oils, Macrolides, Flavonoids, Glycosides, Terpenes, Alkaloids, and Others. In Addition to The Major Biosynthetic Pathways of these Natural Products Such as Acetate, Shikimate and Mevalonate Pathways.

**05023216 Phytochemistry Lab: (1 Cr.Hr.), Co-requisite: 05023215**

Basic Information about Practical Phytochemistry, Including Using Microscopy to Identify Different Plants Constituents, Extraction, Separation and Purification Chromatographic Techniques, In Addition to Different Methods and Tests for The Detection of Natural Compounds, Like Terpenes, Flavonoids and Alkaloids.

**05013219 Immunology and Vaccines: (2 Cr.Hr.), Prerequisite: 05012218**

Introduction to Immunology and Vaccines, Defense Barriers, Blood Cells (Cells of Innate and Adaptive), Phagocytosis, Inflammatory Reaction, Soluble Defense Proteins, Antiviral Response, Primary and Secondary Lymphoid Organ, B Cell Development, Activation, and Humoral Response, T Cell Development, Activation, and Cell Mediated Immunity, Antibody Structure and Function, Primary and Secondary Response, Active And Passive Immunization, Immunogen and Antigen, Adjuvants and Vaccines, Immunological Disorders and Hypersensitivity Reactions.

**05023223 Pharmacology (3): (3 Cr.Hr.), Prerequisite: 05023120**

Principle of Antimicrobial therapy, Cell wall inhibitors Antibacterial drugs, Protein Synthesis Inhibitors, Quinolones, folic acid antagonists, Urinary Antiseptic, Antimycobacterial, Antifungals, Antiprotozoal Drugs, Antimalarial Drugs, Anthelmintic Drugs, Antiviral Drugs, Chemotherapy of Neoplastic diseases, Drugs for obesity & overweight, Vitamins & Minerals, Drug-drug interactions, Pharmacology during pregnancy & lactation, Pharmacology for paediatrics and Pharmacology for Geriatrics

**05023214 Medicinal Chemistry (3): (3 Cr.Hr.), Prerequisite: 05023113, Co-requisite: 05023223**

The study of structure – activity relationship of Anti-Diabetes Drugs, Anti Histamine First Generation, Anti Histamine Second Generation, Anti-Ulcer Drugs, Anti-Cancer Agents, Steroidal Estrogens, Steroidal Progestins, Steroidal Androgens, Mineral-Corticosteroids, Glucocorticosteroids.

**05023224 Biopharmaceutics and Pharmacokinetics: (3 Cr.Hr.), Prerequisite:05023154**

Basic Concepts in Biopharmaceutics and Pharmacokinetics, Fundamental Principles in Compartmental Modeling, Pharmacokinetics of Intravenous Bolus-One Compartment Open Model, Intravenous Infusion- One Compartment Model, Intravenous Bolus- Two Compartment Open Model, Oral Dose- One Compartment Open Model. Further, Basic Concepts of Bioavailability, Pharmacokinetics of Multiple Dose Regimens and The Concept of Nonlinear and Linear Pharmacokinetic Model. Illustration of The Interrelationship Between Formulation, Drug Design and Physiological Factors and Drug's Absorption, Distribution, Metabolism and Excretion.

**05023225 Biopharmaceutics and Pharmacokinetics Lab: (1 Cr.Hr.), Co-requisite: 05023224**

Sampling Approach and Analytical Methods for Pharmacokinetic (PK) Investigations, Graphical Methods for Identifying and Analyzing Zero- and First-Order Reactions, Calculation of Area Under The Curve, Calculation Of PK Parameters Using Plasma or Urine Concentrations of Drugs Follow One Compartment Open Model After Intravenous Bolus Administration, Calculation of Intravenous Infusion Rate and The Time Needed to Reach The Steady State Concentration, Calculation of PK Parameters Using Plasma Concentration of Drugs Follow Two Compartment Open Model After Intravenous Bolus Administration, Calculation of PK Parameters Using Plasma Concentration of Drugs Follow One Compartment Open Model After Oral Administration, Calculation of Absolute and Relative Bioavailability And PK Of Multiple-Dosage Regimens.

**05024125 Over the counter medications: (3 Cr.Hr.), Prerequisite: 05023120**

Medicines that are Sold without a Prescription which can be Used for Treatment of Insomnia, Dermatologic Disorders, Gastro Intestinal Disorder, Minor otic and ophthalmic disorders, Pain and Fever, Vaginal Discharge, Headlice, Athlete Foot and Respiratory Symptoms.

**05024155 Pharmaceutical Biotechnology: (3 Cr.Hr.), Prerequisite: 05023125**

Introduction, Molecular Biotechnology, Biophysical Biochemical Characteristics of Recombinant Therapeutic Proteins, rDNA Technology, Production of Therapeutic Proteins, Formulation of Biotech Products, Dispensing Biotechnology Products, Recombinant Insulin and Human Growth Hormones, Monoclonal Antibodies, Vaccines, Gene Therapy and Personalized Medicine.

**05024120 Clinical Pharmacy and Therapeutics (1): (3 Cr.Hr.), Prerequisite: 05023120**

Common Disease States, Diagnosis, Prognosis, Therapeutic Objectives with Emphasis on Pharmaceutical Care Management and Monitoring of Patient's Drug Therapy. Areas Covered Include the Therapy of a number of Cardiovascular, Renal, Endocrine, and Gynecologic Disorders.

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**05024131 Clinical Cases Lab (1): (1 Cr.Hr.), Co-requisite: 05024120**

Clinical case studies of some selected cardiovascular, renal, and gynecologic diseases with a focus on clinical features, pharmacological and non-pharmacological treatment options and treatment choices, patient education about the disease and medication.

**05024126 Public Health and Clinical Nutrition: (2 Cr.Hr.), Prerequisite: 05023125**

Public Health Definition and Various Professions and Disciplines, within The Field of Public Health, The Foundational Principles of Demography And Epidemiology as They Relate to Public Health Practice, The Key Interventions and Approaches Used to Improve Population Health, assessment of nutrition status and nutrition requirements, parental and enteral nutrition.

**05024156 Drug Delivery: (2 Cr.Hr.), Prerequisite: 05022252**

Modified Release Drug Delivery Systems, Transdermal Drug Delivery Systems, Nanoparticles-Based Drug Delivery Systems, Delivery of DNA/RNA Therapeutics (Gene Therapy), Biopharmaceutics and Protein Delivery and Pulmonary Drug Delivery Systems

**05024132 Pharmacy Legislation and Ethics: (1 Cr.Hr.), Prerequisite: 05023120**

Introduction to existing laws that govern the practice and ethics of pharmacy profession. It presents the Jordan pharmacist Association law, regulations and requirement to license pharmacies and pharmacists, instructions for professional development and continuing education for the purpose of renewing licenses for pharmacist, Jordan drug and pharmacy law that controls handling pharmaceutical products.

**05024133 Pharmacy Practice Lab (1): (1 Cr.Hr.), Prerequisite: 05023120**

Introduction to Pharmacy Practice, Effective Pharmaceutical Communication Skills, prescription processing, Health Insurance Prescriptions, Introduction to Patient Counseling, product-specific and case-specific counselling, Students Patient Counseling Role Play.

**05024225 Toxicology: (2 Cr.Hr.), Prerequisite: 05023223**

Historical Overview of Toxicology, Sub-Disciplines of Toxicology, Basic Terms in Toxicology, Routes of Exposure to Poisons, Classification of Poisons, Toxicokinetics, Toxicodynamics, Basic Principles of Clinical Toxicology, Toxicity of Medicinal Poisons (Paracetamol and Aspirin) And Non-Medicinal Poisons (Carbon Monoxide, Pesticides, Heavy Metals and Abuse Drugs).

**05024226 Pharmacology and Toxicology Lab: (1 Cr.Hr.), Co-requisite: 05024225**

Introduction To Experimental Pharmacology And Toxicology, Methods Of Animal Handling And Restraint, Routes Of Drug Administration To Laboratory Animals, Calculation Of Therapeutic Doses, Calculation Of The Median Lethal Dose, Assessment Of Nicotine Toxicity In Mice, Assessment Of The Preventive Effect Of Antidotes Against Heavy Metals And Cyanide Poisoning In Mice, Screening Of Analgesics Using The Acetic Acid-Induced Writhing Effect Test, Formalin Induced-Paw Licking Test, And Hot Plate Test in Mice.

**05024220 Clinical Pharmacy and Therapeutics (2): (3 Cr.Hr.), Prerequisite: 05024120**

Common Disease States, Diagnosis, Prognosis, Therapeutic Objectives with Emphasis On Pharmaceutical Care Management and Monitoring of Patient's Drug Therapy. Areas Covered Include the Therapy of a Number of Respiratory, Gastrointestinal, And Rheumatological Disorders

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**05024234 Clinical Cases Lab (2): (1 Cr.Hr.), Co-requisite: 05024220**

Cases Studies in The Management of selected Respiratory Disorders, Gastrointestinal Disorders, And Rheumatologic Disorders.

**05024241 Practical Training in Pharmacy Settings (1): (3 Cr.Hr.), Prerequisite: 05023223**

Community Pharmacy Training, Workshops Covering the Trade Names, Uses, And Side Effects of the Most Commonly Prescribed Medications in Jordan, Proper Use of Different Pharmaceutical Dosage Forms, Reading and Handling Prescriptions, And Efficient Patient Education, Communication and Pharmacy Management Skills.

**05024236 Pharmacy Practice Lab (2): (1 Cr.Hr.), Prerequisite: 05024133**

Introduction to Pharmacy Practice (2), Treatment Related Problems, Assessment of Treatment Related Problems, The Care Plan of Treatment Related Problems, The Follow Up Evaluation, The Documentation, Prescription Errors, Drug-drug interactions, Adverse Drug Reactions, Adherence and Compliance, Students Applications to Solve Prescription Errors

**05024235 Pharmacoeconomics: (3 Cr.Hr.), Prerequisite: 05023120**

Introduction to The Principles and Tools of Pharmacoeconomics and Health Outcomes Assessment that are Commonly Used to Study the Cost Impact of Pharmaceutical Products/Services and Interventions On Healthcare Systems and Patients' Outcomes. Understand The Basic Concepts of Pharmacoeconomics and Its Application in Informing the Decision Making Process in The Healthcare Sector and Resource Allocation.

**05025122 Clinical Pharmacy and Therapeutics (3): (3 Cr.Hr.), Prerequisite: 05024220**

Common Disease States, Diagnosis, Prognosis, Therapeutic Objectives with Emphasis On Pharmaceutical Care Management and Monitoring of Patient's Drug Therapy. Areas Covered Include the Therapy of a Number of Infectious Diseases, Neurological, Psychiatric, As Well as Oncologic Disorders.

**05015157 Drug Design: (3 Cr.Hr.), Prerequisite: 05023214**

Basics of the Design, Development, And Discovery of New Pharmaceutical Agents Based On the Available Information Related to Their Structural – Activity Relationships (SAR), Physicochemical Characteristics, Pharmacokinetic and Pharmacodynamics Properties. The Course Also Describes in Detail the Bioisosteric Modifications of Lead Compounds and Their Role in Designing and Developing New Drugs. Furthermore, The Subject Covers the Drug-Receptor Interactions, And Illustrates How the Molecular Modelling and Computer-Aided Drug Design (CADD) Are Applied in Drug Discovery.

**05025142 Practical Training in Pharmacy Settings (2): (3 Cr.Hr.), Prerequisite: 05024241**

Pharmacy Student Training in Pharmaceutical Industries, Hospitals or Community Pharmacies. The Student Is Supervised During the Training Period in Order to Ensure That the Best Pharmaceutical Practices Are Achieved.

**05025158 Cosmetics: (2 Cr.Hr.) Prerequisite: 05023154**

Legislation and Safety Regulations for Cosmetics, Basic Science of the Epidermis and Dermis, Photoaging and Wrinkled Skin, Anti-Aging Skin Care Ingredients, Skin Rejuvenating Agents, Moisturizing Agents, Skin Pigmentation and Pigmentation Disorders, Depigmenting and Whitening Agents, Acne Disorder and Management, Sunscreens Deodorants and Antiperspirants, Hair Loss and Treatments.

**05025220 Drug Information Lab: (1 Cr.Hr.) Prerequisite: 05023223**

Introduction to drug literature, How to conduct efficient search, The use of primary, secondary, and tertiary literature to find drug related information including dosing regimen, safety issues, and interaction.

**05025238 Evidence-Based Practice: (2 Cr.Hr.) Prerequisite: 05024120**

Introduces The Principles and Methodology of Scientific Research, The Main Research Methods, Ethical Considerations in Clinical Research. It Also Covers the Types of Clinical Studies, Basic Statistical Concepts, And Applying Drug Literature to Patient Care

**05025259 Drug Regulatory Affairs: (1 Cr.Hr.) Prerequisite: 05024132**

The Practical Applications for Compliance as Required by FDA Regulations for Biologics and Drug Development. Student Also Will Examine How a Pharmaceutical or Biotechnology Company Can Use the Graded Approach When Following the Good Manufacturing Practice (GMP) Regulation for Manufacturing, Testing and Control of Clinical Supplies and Commercial Products.

**05025237 Pharmaceutical Marketing: (2 Cr.Hr.) Prerequisite: 05024235**

Comprehensive Overview on Pharmaceutical Marketing Concepts and Techniques Including Distribution, Promotion, Pricing and Production. Emphasis Is Placed On the Use of Active Learning Strategies Rather Than Passive Listening and Regurgitation of Information. Strategies to Accomplish, Discussion with Some Role Models in The Field of Pharmaceutical Marketing in Jordan.

**- Elective Section Requirements: -**

**05025160 Pharmaceutical principles and medical terminology: (3 Cr.Hr.)**

principal information concerning meaning of the roots, prefixes and suffixes commonly used in Medical Literature, Analysis and Composition of Medical Terms as Well as Using Medical Terminology Appropriately, And About Medical Terminology Used to Describes the Anatomy, Physiology Diagnosis, Radiology, And Knowledge About Basic Vocabulary Necessary for Clinical Documentation and Communications with Other Healthcare Providers

**05025162 Drug Informatics: (3 Cr.Hr.) Prerequisite: 05023120**

Introduction to Pharmacy Informatics, Basics of Electronic Health Records and Automation, Managing Automation and Technology, Advanced Pharmacy Informatics, Health Information Technology Project Management, Informatics Optimization, Data, Analytics, Knowledge, And Reporting in Pharmacy Informatics.

**05025261 Special Topics in Pharmacy 1: (1 Cr.Hr.) Prerequisite: Graduate Semester**

Overview of Research, Literature Review, Abstract Writing, And Small Research Project of Selected Topics.

**05025262 Special Topics in Pharmacy 2: (2 Cr.Hr.) Prerequisite: Graduate Semester**

In-Depth Review of Research. Literature Review, writing an Extensive Project or Conduct a Small Study in Collaboration with Faculty Members.

**05025165 Pharmaceutical Quality Assurance and Quality Control: (3 Cr.Hr.), Prerequisite: 05023154**

Quality Management Systems and Its Relation to Good Manufacturing Practices (GMP), Quality Assurance (Qa) And Quality Control (Qc). Key Compendial Tests for Powders, Batch Record, Stability and Compatibility Studies, Quality by Design (Qbd), Sampling Process and Sampling Plans, Control of Quality Variations, Quality Control of Oral Solid Dosage Forms (Raw Material, In Process Quality Control (Ipcq) And Finished Product), Quality Control of Semisolids, Solutions, Suspensions, Suppositories, Pessaries and Parenteral Dosage Forms.

**05025166 Communication Skills in Pharmacy: (3 Cr.Hr.), Prerequisite: 05024120**

Patient-Centered Communication in Pharmacy Practice, Principles of Interpersonal Communication, Nonverbal Communications, Barriers to Communication, Listening and Empathic Responding, Interviewing and Assessment, Helping Patients Manage Therapeutic Regimens, And Electronic Communication.

**05015261 Research Project and Seminar: (3 Cr.Hr.), Prerequisite: Graduate Semester**

Research Topic in The Area of Pharmaceutical Sciences, Drug Delivery, Cosmetic Sciences, Medicinal Chemistry and Drug Design, Natural Products and Pharmacognosy, Pharmaceutical Biotechnology, Pharmaceutical Marketing and Management, Pharmaceutical Economics, Pharmacology, Or Clinical Pharmacy and Therapeutics.

**05025269 Therapeutic Drug Monitoring: (3 Cr.Hr.), Prerequisite: 05023120**

Therapeutic Monitoring of Drug with a Direct Relationship Between Serum Concentration and Response, Drugs with Narrow Therapeutic Range, Application of Clinical Pharmacokinetics Principles, Therapeutic Drug Monitoring in Patients with Special Considerations.

**05025260 Advanced Pharmacology: (3 Cr.Hr.), Prerequisite: 05023120**

Receptor Pharmacology and Pharmacological Techniques and Concepts, Molecular Basis of Pharmacology, How Genes Can Influence Human Physiology and Pharmacological Response to Drugs.

**05015264 Pharmacovigilance: (3 Cr.Hr.), Prerequisite: 05024120**

Adverse Event Reporting When Conducting Clinical Trials, Operational Requirements and Regulatory Processes Involved in The Detection, Assessment, Understanding and Prevention of Adverse Effects of Drugs After They Have Been Licensed for Use.

**05015163 Medical Parasites: (1 Cr.Hr.), Prerequisite: 05012218**

Introduction to Parasitology, The Amoeba, Flagellates and Ciliates, Malaria, Blood- And Tissue-Dwelling Protozoa, Trematodes, Cestodes, Nematodes, And Arthropods.

**05025164 Applied Pharmacognosy: (3 Cr.Hr.), Prerequisite: 05023216**

Factors Affecting Variability In Drug Activity, Hallucinogenic and Drug Abuse, Phytochemical Screening and Extraction And Isolation Of Active Constituents, Changes Taking Place During Collection, Drying And Storage Of Crude Drugs, Quality Control On Crude Drugs, Plant Cells, And Tissue Culture, Introduction To Herbal Medicine, Herbal Medicine For Cardiovascular, GIT, Nervous System, Respiratory, Urinary, Skin and Cancer diseases.

**05025265 Pharmaceutical Health Care: (3 Cr.Hr.), Prerequisite: 05024120**

Pharmaceutical Care Practice, Patient-Centered Pharmaceutical Care, Drug Therapy Problems, Assessing Patient History, Evaluating Medications, And Following Up On the Appropriate Treatment and Care Plan.

**05025266 Hospital Pharmacy: (3 Cr.Hr.) Prerequisite: 05024120**

Introduction to Practice of Pharmacy in Hospitals, Role of Hospital Pharmacists in Interpretation of Patient's Data, Recommendation of Therapeutic Options, And Choosing Appropriate Dosing Regimen of Medications and Evaluation of Treatment Effectiveness. Dealing with Medications Preparation, Administration, Compatibility Issues, Interactions, And Medication Errors, Patient Care Scenarios in Virtual Medical Environments.

**05025267 Alternative Medicine: (3 Cr.Hr.) Prerequisite: 05023216**

Introduction to Alternative Medicine, Homeopathy, Traditional Chinese Medicine, Ayurvedic Medicine, Acupuncture, Rational Phytotherapy. Aromatherapy

**05015263 Epidemiology and Virology: (3 Cr.Hr.), Prerequisite: 05012218**

Fundamental Concepts of Epidemiology. Definitions of Disease Occurrence -Epidemiological Rates, Infectious Disease Epidemiology, Host – Microbe Relationships. Early History, Structure and Classification of Viruses -Important Human Pathogenic Viruses: Infection Process and Life Cycles of Important Pathogenic Viruses.

**05025268 Management in Pharmacy: (3 Cr.Hr.), Prerequisite: 05024235**

Definition of Management, Definition of Pharmacy Management, Reasons for Success or Failure of Pharmacy Management, Characteristics and Selection of Successful Pharmacy Manager, Duties of The Pharmacy Manager, Managing The Pharmacy Human Resources, Managing The Pharmacy Stocks, Liaison with Other Sections Outside the Pharmacy, Strategic Planning in Pharmacy, Managing Satellite Pharmacies, Disaster Management.