

BSc. Degree in Doctor of Pharmacy (Pharm.D.)

Course Description (Doctor of Pharmacy)

Faculty Requirements

0304101 General Biology (1) (3 Cr. Hrs.)

Prerequisite :(None)

Internal structure of the cell. Molecules of the cell. Metabolism-respiration and photosynthesis, cell- cell signaling, cell division, Mendelian inheritance, molecular biology of the gene, DNA technology, chemical signals in plants and animals, phylogeny and systematic introduction to ecosystematics and introduction to ecosystems.

0304111 General Biology Laboratory (1) (1 Cr. Hrs.)

Prerequisite :(0304101 Or Co-Req.)

Laboratory experiments in microscopy and cells, chemical aspects of cells, tissues, and plant physiology. Mammalian anatomy, and systems of major living groups.

0303101 General Chemistry (1) (3 Cr. Hrs.)

Prerequisite :(None)

Measurements and significant figures, chemical reactions, stoichiometry, the gaseous state, thermochemistry, electronic structure and periodicity, chemical bonding, molecular shapes, states of matter and intermolecular forces, physical properties of solutions, principles of equilibrium.

0301101 Calculus (1) (3 Cr. Hrs.)

Prerequisite :(None)

Functions: domain, operations on function, graphs of functions, trigonometric functions; limits: meaning of a limit, computational techniques, limits at infinity, infinite limits :continuity; limits and continuity of trigonometric functions; the;the derivative : techniques of differentiation, derivatives of trigonometric functions chain rule; implicit differentiation; differentials; Rolls Theorem; the mean value theorem; the extended mean value theorem; L Hopital s rule; increasing and decreasing functions; concavity maximum and minimum and minimum values of a function; graphs of functions including rational functions (asymptotes) and factions with vertical tangents(cusps);antiderivatives; the indefinite integral; the definite integral; the fundamental theorem of calculus; the area under curve; the area between two curves; transcendental functions: inverse functions, logarithmic and exponential functions; derivatives and integrals; limits(the indeterminate forms);hyperbolic functions and their inverses; inverse trigonometric functions; some techniques of integration.

- 0304102 General Biology (2) (3 Cr. Hrs.)**
Prerequisite : (0304101)
 Animal and plant tissues Mammalian circulation, immune system, gas exchange, controlling the internal environment, nervous system and motor mechanism. Transport in plants, plant nutrition, plant reproduction and development. Eco-distribution and adaptations of organisms, population ecology and community ecology.
- 0303231 Organic Chemistry (1) (3 Cr. Hrs.)**
Prerequisite : (0303101)
 Alkanes and cycloalkanes, alkenes and alkynes , stereochemistry, common organic reactions, substitution, addition, elimination, alcohols, ethers, conjugated systems.
- 1902102 Computer Skills (2) (3 Cr. Hrs.)**
Prerequisite : (1900100)
 Introduction: forms, controls, properties, methods, events, files, Mouse events, click, mouse movement, drag and drop, Keyboard events: Press, up and down, Menus: Creation and Code writing, Dialogue boxes: Messages, input, built-in boxes, programming: Variables, statements, arithmetic logical operators, strings, built-in functions, Control statements: simple IF, multiple IF, CASE, Loops, FOR-NEXT, DO-WHILE, DO-UNTIL, Arrays, Files: Random, sequential, binary, procedures and functions, Applications using Visual Basic, Introduction to Microsoft Access. Weekly practice in the lab.
- 0551214 Physiology for Pharmacy (1) (2 Cr. Hrs.)**
Prerequisite : (0304102)
 Correlation of morphological, biochemical, and functional organization of the human body as related to normal state. Topics include cell, nerve and muscle, autonomic nervous system, blood and body fluids, cardiovascular system, respiratory system physiology.
- 0532201 Anatomy and Histology for Pharmacy (2 Cr. Hrs.)**
Prerequisite : (0304102)

An overview of structure of the human body and tissues and their cooperative role in normal function. Topics include: embryology, blood, nervous, musculoskeletal, skin, cardiovascular, digestive, urinary, respiratory, endocrine, and reproductive system.,

- 0532202 Anatomy and Histology for Pharmacy-practical (1 Cr. Hrs.)**
Prerequisite : (0532201 or Co-Req)
A laboratory course that familiarizes students with normal structure of the human body using gross and microscopic preparations of different organs and tissues.
- 0551215 Physiology for Pharmacy (2) (2 Cr. Hrs.)**
Prerequisite : (0551214)
Correlation of morphological, biochemical, and functional organization of the human body as related to normal state. Topics include: GI system, endocrine system, reproductive systems, renal system, central nervous system and special topics such as skin, and sensory organs.
- 0534315 Pathology for Pharmacy (2 Cr. Hrs.)**
Prerequisite : (0532201)
Introduces the basic concepts, terminology, etiology, and characteristics of inflammation, cell injury, aging, neoplasia, and skin disorders.
- 1203302 First aid (2 Cr. Hrs.)**
Prerequisite : (0532201)
Concerns general principles and techniques of first aid at premedical stage in case of life-threatening situations.
- 1203301 Pathophysiology for Pharmacy (2 Cr. Hrs.)**
Prerequisite : (0551215)
Considers the nature of major diseases, associated alterations in structure and function of human organs, and their clinical manifestations. Topics include cardiology, rheumatology, endocrine gastrointestinal disorders and hematologic/ oncologic, respiratory, renal and infectious diseases.,
- 0702501 Basic Nursing skills for pharmacy (1 Cr. Hrs.)**
Prerequisite : (1203471)
Familiarizes students with methods of parenteral and rectal drug administration, vascular access and devices, wound care, blood pressure and pulse measurement

Specialty Requirements

- 1203102 Medical terminology (1 Cr. Hrs.)**
Prerequisite :(None)
Development of basic knowledge of medical terms used in medical and biological sciences. Students systematically analyze/build words from combining forms, suffixes, and prefixes.
- 1202134 Physicochemical Principles of Pharmacy (2 Cr. Hrs.)**
Prerequisite: (0303101)
Study of the physicochemical properties of molecules incorporated in pharmaceutical preparations.
- 1203251 Biochemistry (1) (2 Cr. Hrs.)**
Prerequisite: (0303231)
Provides principle information concerning the chemical and physical properties of biomolecules (carbohydrates, lipids and proteins) and their interrelated functioning in a biological system. Bioenergetics and oxidative phosphorylations will be covered.
- 1201215 Pharmaceutical Organic Chemistry (3 Cr. Hrs.)**
Prerequisite: (0303231)
Classification, nomenclature, properties, reactions and preparation of various organic compounds (emphasis on those of pharmaceutical significance).
- 1201212 Pharmaceutical Organic Chemistry -Practical (1 Cr. Hrs.)**
Prerequisite: (1201215 or Co-Req.)
Applications of various methods and techniques used in the identifications of functional groups of organic compounds of pharmaceutical interest. Synthesis of some compounds will be undertaken
- 1202230 Pharmaceutical Calculations and Compounding (2 Cr. Hrs.)**
Prerequisite: (1202134)
Formulation and compounding of various pharmaceutical dosage forms (solutions, suspensions, emulsions and ointments). In addition to calculation methodologies needed to produce any pharmaceutical preparation.
- 1202234 Pharmaceutical Calculations and Compounding - Practical (1 Cr. Hrs.)**
Prerequisite: (1202230 or Co-Req.)
Application of pharmaceutical preparation methods. Introduction to pharmaceutical packaging. Utilization of component properties in pharmaceutical preparations and their impact on the final product.

- 1203252 Biochemistry - Practical (1 Cr. Hrs.)**
Prerequisite: (1203251 or Co-Req.)
 Application of basic methods in the identification of sugars, proteins and fats. In addition to the analysis of these groups in biological fluids and analysis of enzymatic reactions.
- 1203253 Biochemistry (2) (3 Cr. Hrs.)**
Prerequisite: (0551214)
 Main biochemical concepts regarding the different metabolic pathways of biomolecules; carbohydrates, lipids. Proteins and nucleotides. Storage and expression of genetic information will also be covered.
- 1202235 Physical Pharmacy (2 Cr. Hrs.)**
Prerequisite: (1202134)
 Study of physico-chemical properties that control complex formation including drug stability and factors affecting it and shelf-life determinations. In addition, diffusion and absorption will be discussed.
- 1201201 Pharmaceutical Chemical Analysis (2 Cr. Hrs.)**
Prerequisite: (0303231)
 discusses various analytical methods used in drug analysis in order to identify structure, purity and action.
- 1201202 Pharmaceutical Chemical Analysis - Practical (1 Cr. Hrs.)**
Prerequisite: (1201201 or Co-Req)
 The practical course is designed for the applications of various analytical methods to substances used in pharmacy and medicine.
- 1203363 Pharmacology (1) (3 Cr. Hrs.)**
Prerequisite: (0551215)
 Basic principles of pharmacology: pharmacodynamics, pharmacokinetic principles, adverse drug reactions, drug-drug interactions, development of new drugs. Major categories: drugs affecting autonomic nervous system, cardiovascular system, blood, autacoids, respiratory and gastrointestinal system.
- 1203364 Pharmacology-practical (1 Cr. Hrs.)**
Prerequisite : (1203363 or Co-Req.)
 A laboratory course designed to familiarize students with methods used to assess drug action and to demonstrate pharmacological properties of some drugs.
- 1201321 Pharmacognosy (2 Cr. Hrs.)**
Prerequisite: (0304102 + 1203251)
 Study of basic information on pharmacognosy and medicinal plants regarding classification and identification of their components with emphasis on primary metabolites (carbohydrates, lipids, amino acids and drugs derived from them).

- 1201322 Pharmacognosy - Practical (1 Cr. Hrs.)**
Prerequisite: (1201321 or Co-Req.)
 Physical and microscopical examinations of some medicinal plants and identification of them and of their components using chromatographic and compendial qualitative and quantitative analysis
- 1202381 Pharmaceutical Statistics (2 Cr. Hrs.)**
(Prerequisite: (0301101))
 Application of basic statistical principles in different pharmaceutical fields; research results analysis, pharmaceutical marketing and industry.
- 1202331 Pharmaceutical Technology (1) (2 Cr. Hrs.)**
Prerequisite: (1202230)
 Comprehensive survey of industrial processes used in the production of pharmaceuticals. Transfer processes and unit operation with emphasis on subjects of pharmaceutical interests especially tableting.
- 1202332 Pharmaceutical Technology - Practical(1) (1 Cr. Hrs.)**
Prerequisite: (1202331 or Co-Req)
 Covers the unit process operation (size reduction, mixing, granulation and tableting) in addition to quality control and pre-formulation; suggesting formula for certain drug knowing its physiochemical properties, formulation and evaluation using proper instruments .
- 1203364 Pharmacology (2) (3 Cr. Hrs.)**
Prerequisite: (1203363)
 Continuation of Pharmacology-1. Considers CNS pharmacology, local anesthetics, chemotherapy: antineoplastic, antibacterial, antiprotozoal, anthelminthic, antifungal, antiviral agents and immunomodulators.
- 1203302 Immunology and genetics (3 Cr. Hrs.)**
Prerequisite: (1203253)
 Overviews basic biologic mechanisms of immune system. Emphasizes drug allergies, autoimmune conditions, transplantation, immunodeficiency, monoclonal antibodies, other immunology-derived agents in diagnosis/treatment of diseases. Encompasses structure and function of genes and chromosomes, genetic variation, the chromosomal basis of human diseases, disorders of metabolism, immunogenetics, cancer genetics, genetic diagnosis and treatment.
- 1202315 Pharmaceutical Instrumental Analysis (2 Cr. Hrs.)**
Prerequisite: (1201201)
 Study of the basic instrumental methods used in the qualitative and quantitative analysis of pharmaceutical active and non-active chemicals in different dosage forms. In addition to analysis stated in the pharmacopoeias e.g. spectroscopy and chromatography.

- 1201316 Pharmaceutical Instrumental Analysis - Practical (1 Cr. Hrs.)**
Prerequisite: (1201315 Co-Req.)
Practical application of instrumental methods. In addition, training on the interpretation of instrumental analysis results and applications of these methods in the elucidation of their structures and concentration determination of the studied samples.
- 1201390 Chemistry of medicinal plants (2 Cr. Hrs.)**
Prerequisite : (1201321)
Biosynthesis, isolation and identification of the primary and secondary plant constituents and discussion of natural drugs containing these constituents. The main plant active constituents from chemical and pharmacological points of view will be covered. Topics related to carbohydrate, lipids, phenolic compounds and alkaloids are also discussed.
- 1202341 Pharmaceutical Microbiology (1) (3 Cr. Hrs.)**
Prerequisite: (0304102)
Basic information of microorganisms, their basic structure and mode of growth. Medical, pharmaceutical and environmental importance of some microorganisms. Basic principles of immunity and immunization. Anti-microbial chemotherapy: mode of action and prudent use.
- 1200401 Pharmaceutical Field Training (1) (2 Cr. Hrs.)**
Prerequisite: (1203364)
Field training according to a prepared plan under direct supervision of a faculty member. Evaluation at the end of training.
- 1203426 Therapeutics (1) (3 Cr. Hrs.)**
Prerequisite: (1203364)
Patho-physiology, symptoms and aims of treatment. In addition to the basic knowledge on the drugs used, kinetics drug interactions, dose calculations, side effects, treatment algorithms and patient awareness. The diseases of the following systems will be covered: cardiovascular, endocrine, GIT and rheumatic diseases.
- 1203427 Case studies in Therapeutics (1) (1 Cr. Hrs.)**
Prerequisite: (1203426 Co-Req.)
Uses simulated clinical cases to develop the students ability to assess a patient's condition, determine reasonable treatment alternatives, select appropriate therapy and monitoring parameters and to justify those choices by utilizing knowledge and skills acquired in therapeutics (1).
- 1201401 Medicinal Chemistry (1) (3 Cr. Hrs.)**
Prerequisite: (1201215+1203364)
Introduction to medicinal chemistry. Study of drug physicochemical properties, distribution, metabolism and excretion. In addition to structure activity relationships. Emphasis on drugs used for the treatment of some vital organs.

- 1203471 Biopharmaceutics (2 Cr. Hrs.)**
Prerequisite: (1202235)
Study the factors influencing drug availability to the systemic circulation such as physicochemical properties of active ingredients, pharmaceutical dosage forms, physiological factors and routes of administration. Limitation and advantages of each route of administration of conventional and new drugs will be discussed. Drug distribution and elimination will also be covered.
- 1202441 Pharmaceutical Microbiology (2) (2 Cr. Hrs.)**
Prerequisite: (1202341)
Study sterilization, disinfection, anti-sepsis, preservation and good manufacturing practice in the control of contamination. Methods used for the evaluation of antimicrobial efficacy and factors affecting it. Some applications of microorganisms in pharmaceutical sciences.
- 1202442 Pharmaceutical Microbiology - Practical (1 Cr. Hrs.)**
Prerequisite: (1202441 or Co-Req.)
Develop the skills of identifying microorganisms, measuring the efficacy and potency of different antimicrobial agents, using different sterilization methods. Designing optimum sterilization cycles. Techniques for microbial quality monitoring for both sterile and non sterile dosage forms.
- 1203411 Clinical biochemistry (1) (2 Cr. Hrs.)**
Prerequisite: (1203301)
This course describes what happens to the body's chemistry when affected by diseases. The course includes specimen collection and processing, water and electrolytes balance, hydrogen ion homeostasis and blood gases, the kidneys, the liver, disorders of carbohydrate metabolism, plasma proteins, clinical enzymology.
- 1203405 Pharmacy practice (1) (2 Cr. Hrs.)**
Prerequisite: (1203364)
A course that introduces students to the concept and application of pharmaceutical care and develops skills in communication with health care professionals and patients.
- 1203429 Therapeutics (2) (3 Cr. Hrs.)**
Prerequisite: (1203346)
Patho-physiology, symptoms and aims of treatment. In addition to the basic knowledge on the drugs use, kinetics drug interactions, dose calculations, side effects, treatment algorithms and patient awareness. The diseases of the following topics will be covered: infections, neurological diseases, blood diseases, tumors, respiratory diseases and kidney diseases.
- 1203430 Case studies in Therapeutics (2) 1 Cr. Hrs.)**
Prerequisite: (1203429 Co-Req.)
Uses simulated clinical cases to develop the students ability to assess a patient's condition, determine reasonable treatment alternatives, select appropriate therapy and monitoring parameters and to justify those choices by utilizing knowledge and skills acquired in therapeutics (2).

- 1201402 Medicinal Chemistry (2) (2 Cr. Hrs.)**
Prerequisite: (1201401)
Study of chemistry of drugs; chemical structure and mechanism of action. Antibiotics; their chemistry, mechanisms of actions and medical usesetc are extensively discussed.
- 1203475 Pharmacokinetics (2 Cr. Hrs.)**
Prerequisite: (1203471)
Study of the pharmacokinetic concepts, terminology, models, factors affecting drug absorption, distribution, metabolism, excretion and its importance in drug activities and side effects. Emphasis will be placed upon the prediction of plasma levels of drugs under varying conditions applying different pharmacokinetic parameters.
- 1203476 Case Studies in Pharmacokinetics (1 Cr. Hrs.)**
Prerequisite: (1203475 Or Co-Req.)
Handling pharmacokinetic parameters of drugs in the body and solving problems related to them through selected cases.
- 1203412 Clinical biochemistry (2) (2 Cr. Hrs.)**
Prerequisite : (1203411)
This course is a continuation to Clinical Biochemistry (I) and covers the clinical aspects of diseases and their effect on body chemistry. Topics include endocrinology, lipids and lipoproteins, inherited metabolic diseases, metabolic aspects of malignant diseases and clinical chemistry at the extremes of age.
- 1203406 Pharmacy practice (2) (2 Cr. Hrs.)**
Prerequisite : (1203405)
Includes medication history taking, physical assessment, constructing patient database, and drug therapy assessment.
- 1201414 Complementary and alternative medicine (3 Cr. Hrs.)**
Prerequisite : (1201390)
Provides a review of the alternative and complementary therapies that are current and available (Homeopathy, aromatherapy, Reflexology therapy, etc...). Also covers a group of diverse medical and health care systems, practices, and products that are not presently considered to be part of conventional medicine. In addition, it discusses the science of using herbal remedies and botanical extracts to treat illness and improve health with special emphasis on herbal therapy in Jordan. Contraindications of herbs and their interactions with drugs will be also discussed.

- 1203401 Pharmacoeconomics (2 Cr. Hrs.)**
Prerequisite : (1203364)
 Methods and techniques for evaluating costs and cost-effectiveness of health, medical, and pharmaceutical interventions. Emphasis on economic evaluation, decision analysis, and modeling techniques for resource allocation and decision making. Applications to technology assessment, health policy, clinical practice, drug pricing policy and price control, drug expenditure, and resource allocation.
- 1200402 Pharmaceutical Field Training (2) (2 Cr. Hrs.)**
(Prerequisite 1203364)
 Field training according to a prepared plan under direct supervision of a faculty member. Evaluation at the end of training.
- 1203504 Therapeutics (3) (3 Cr. Hrs.)**
Prerequisite: (1203346)
 Will cover the pathophysiology, clinical presentations, pharmacotherapy (pharmacokinetics & pharmacodynamics, drug/drug interactions, dosage calculations, adverse effects, treatment algorithm, goals of therapy & patient education) of: women's health, pediatric and geriatric disorders.
- 1203507 Case studies in Therapeutics (3) (1 Cr. Hrs.)**
Prerequisite: (1203504 Or Co-Req.)
 Uses simulated clinical cases to develop the students ability to assess a patient's condition, determine reasonable treatment alternatives, select appropriate therapy and monitoring parameters and to justify those choices by utilizing knowledge and skills acquired in therapeutics (3).
- 1203513 Pharmaceutical Promotion and Marketing (1) (3 Cr. Hrs.)**
Prerequisite: (1203401)
 Principles of marketing and marketing concepts. Needs, exchange and communication process. Modern concept of marketing and influence of environment. Pharmaceutical marketing aspects and its applications in Jordan market emphasizing on sales call steps, selling skills and techniques.
- 1203577 Clinical pharmacokinetics (2 Cr. Hrs.)**
Prerequisite: (1203475)
 Involves the clinically-oriented Pharm.D. student in the process of clinical pharmacokinetic and pharmacodynamic monitoring of drug therapy. The course is concerned with the application of concepts and techniques of pharmacokinetics and pharmacodynamics to the rational design of individualized drug dosage regimens in the total clinical context, taking into account such special problems as hepatic and renal functional impairment, other effects of disease, immaturity of drug metabolizing enzymes, and drug interactions.

- 1201515 Medicinal Chemistry (3) (3 Cr. Hrs.)**
Prerequisite: (1201401)
 The study of the various classes of pharmacodynamic drugs. Their chemistry, mechanisms of action, pharmacological - clinical uses and structure-activity relationships
- 1203516 Pharmacy practice (3) (1 Cr. Hrs.)**
Prerequisite : (1203405)
 Includes pharmacotherapy planning, patient monitoring and education.
- 1203562 Toxicology (2 Cr. Hrs.)**
Prerequisite : (1203364)
 Introduction into epidemic, physiologic and symptoms of poisoning. In addition to treatment procedures of main toxic materials that human would be exposed to.
- 1203506 Therapeutics (4) (3 Cr. Hrs.)**
Prerequisite: (1203364)
 Will cover the pathophysiology, clinical presentations, pharmacotherapy (pharmacokinetics & pharmacodynamics, drug/drug interactions, dosage calculations, adverse effects, treatment algorithm, goals of therapy & patient education) of: general Care, dermatovenerology and Psychiatric disorders.
- 1203507 Case studies in Therapeutics (4) 1 Cr. Hrs.)**
Prerequisite: (1203506 or Co-Req.)
 Uses simulated clinical cases to develop the students ability to assess a patient's condition, determine reasonable treatment alternatives, select appropriate therapy and monitoring parameters and to justify those choices by utilizing knowledge and skills acquired in therapeutics (4).
- 1203517 Pharmacy Regulations and Ethics (2 Cr. Hrs.)**
Prerequisite: (1203364)
 Introduction to existing laws and regulations governing the practice and ethics of pharmacy.
- 1203518 Pharmaceutical literature evaluation (2 Cr. Hrs.)**
Prerequisite: (1203364)
 Will enable students to identify, obtain, and utilize published medical literature to be used in patient care, research projects and lifelong learning. Emphasis on data searching and retrieval using computer database and written material.
- 1203519 (2 Cr. Hrs.)**
Pharmaceutical nutrition and diet therapy
Prerequisite : (1203412)
 This course involves the study of nutrition in health and health care. It includes the foundation of nutrition, nutrition in health care throughout the lifecycle and nutrition in clinical care such as total parenteral nutrition, nutrition in diabetes mellitus, renal diseases, hypertension and cancer.

- 1203563 Nonprescription Drugs (2 Cr. Hrs.)**
Prerequisite: (1203363)
Methods to assist the patient with optimal use of non-prescription drugs. Patients counseling regarding the proper and safe usage of drugs will be also discussed.
- 1203601 Internal medicine clerkship (1) (7 Cr. Hrs.)**
Prerequisite: (1203506)
During this full-time advanced clinical pharmacy experience, the students will provide pharmaceutical care in inpatient settings: in neurology, rheumatology, nephrology and oncology-hematology for a minimum of three patients a week.
- 1203603 Pediatric clerkship (4 Cr. Hrs.)**
Prerequisite: (1203506)
During this full-time advanced clinical pharmacy experience, the students will provide pharmaceutical care in inpatient and outpatient pediatric settings for a minimum of three patients a week.
- 1203604 Psychiatric and geriatric clerkship (2 Cr. Hrs.)**
Prerequisite: (1203506)
During this full-time advanced clinical pharmacy experience, the students will provide pharmaceutical care in outpatient settings for a minimum of three psychiatric and geriatric patients a week.
- 1203605 Gynecology and obstetrics clerkship (2 Cr. Hrs.)**
Prerequisite: (1203506)
During this full-time advanced clinical pharmacy experience, the students will provide pharmaceutical care in inpatients and outpatient settings for a minimum of three obstetric and gynecology patients a week.
- 1203602 Internal medicine clerkship (2) (7 Cr. Hrs.)**
Prerequisite: (1203506)
During this full-time advanced clinical pharmacy experience, the students will provide pharmaceutical care in inpatient settings: in infectious diseases, cardiology, respiratory, and gastroenterology for a minimum of three patients a week.
- 1203606 Surgery Clerkship (2 Cr. Hrs.)**
Prerequisite: (1203506)
During this full-time advanced clinical pharmacy experience, the students will provide pharmaceutical care in inpatient and outpatient surgery settings for a minimum of three patients a week.

- 1203607 Clinical pharmacokinetics clerkship (2 Cr. Hrs.)**
Prerequisite: (1203506)
 The clerkship in clinical pharmacokinetics is intended to allow Pharm.D. Students an opportunity to acquire the practical experience in the application of clinical pharmacokinetic principles to various drug therapies with emphasis on the selection and design of antimicrobial therapies. Students will learn how to apply these principles by gathering pertinent clinical information, development of pharmaceutical care and monitoring plans, thorough literature evaluation, and case discussions.
- 1203608 Ambulatory care clerkship (2 Cr. Hrs.)**
Prerequisite: (1203506)
 During this full-time advanced clinical pharmacy experience, the students will provide pharmaceutical care in outpatient settings: nephrology, rheumatology, respiratory, cardiology, gastroenterology, oncology-hematology, infectious diseases, neurology, dermato-venerology for a minimum of three patients a week.
- 1203610 Research project (1Cr. Hrs.)**
Prerequisite: (1203506)
 Introduction into proper methods for proposal preparation with application to a selected topic in the area of therapeutics and pharmaceutical care.
- 1201531 Poisonous and Hallucinogenic Plants (2 Cr. Hrs.)**
Prerequisite: (1203364)
 Identification and study of poisonous and hallucinogenic plants. In addition to symptoms, prophylactics and treatment. Emphasis is given on plants found in Jordan.
- 1201522 Applied chromatography (2Cr. Hrs.)**
Prerequisite: (1201315)
 Includes the study of the modern methods of chromatography used in separation & purification of pharmaceutical compounds such as: GC, DCCC, CCC, HPLC, SPE, Ion-Exchange Chromatography, Exclusion Chromatography and Affinity Chromatography
- 1202533 Pharmaceutical Radioisotopes (2Cr. Hrs.)**
Prerequisite: (1201401)
 Brief discussion of radioactivity. The use of radioisotopes in medicine and pharmacy with precautions in their handling and storage.

- 1201535 Pharmaceutical Biotechnology (2 Cr. Hrs.)**
Prerequisite: (1201401)
 An introduction to replication and gene expression of prokaryotic and eukaryotic systems. In addition progress to cover recombinant (DNA) technology and cloning for the production of pharmaceuticals, followed by the application of (DNA) biotechnology including disease treatment, in vitro fertilization, and gene transfer.
- 1202536 Cosmetics Science (2 Cr. Hrs.)**
Prerequisite: (1202230)
 Covers the basics of cosmetic preparations, contents and their actions. (e.g. skin, hair and nail preparations).
- 1202532 Selected Topics in Physical Pharmacy (2Cr. Hrs.)**
Prerequisite: (1203513)
 Covers in detail topics like surface chemistry, colloid chemistry, preformulation and other related topics.
- 1203514 Pharmaceutical Promotion and Marketing (2) (2 Cr. Hrs.)**
Prerequisite: (1203513)
 Marketing strategy and marketing management. Environmental forces anticipation and contingency planning. Marketing plan development. Team work, time and stress management briefing. Some consumer behavior aspects.
- 1203552 Parapharmaceuticals (2 Cr. Hrs.)**
(Prerequisite 1203364)
 Basic knowledge to advise patients on medical/surgical appliances and devices, durable medical equipment, and prescription accessories, concerning their selection, use, and storage (e.g. cuts and burns products, thermometers, contraceptives, diabetic supplies, diagnostics, and lens preparations)
- 1203563 Selected Topics in Clinical Toxicology (2 Cr. Hrs.)**
Prerequisite: (1203562)
 Deals with different types of human intoxication's. It will focus on the standard procedures undertaken in different cases of intoxication, identification of poisons, signs and symptoms, and their clinical manifestations.
- 1202541 Selected Topics in Pharmaceutical Microbiology (2 Cr. Hrs.)**
Prerequisite: (1202441)
 Application of microbiology in different field of pharmacy practice. Microbial resistance and policies used to control hospital acquired infections. Microbial quality control and its application in pharmaceutical industry. Application of microorganisms in fermentation and genetic engineering.

1203515 Pharmaceutical Intellectual Property (2 Cr. Hrs.)
Prerequisite: (1203401)

General background of drug product life cycle, history, types and principles of intellectual property (IP) with an emphasis on the application of these principles within the pharmaceutical industry (PI), importance of intellectual property to the PI , research and development (R &D) issues internationally and locally. The world trading system, data exclusivity, patent protection, trade marks, Trade Related Aspects of Intellectual Property Rights (TRIPs) for pharmaceutical products and antitrust will be defined with case studies. Identifying potential commercial intellectual property: recording, ownership and registration of IP, strategies, planning and commercialization of IP, current and future impact of IP on the marketing strategies of Jordanian PI.

1201370 Seminar in Pharmaceutical Sciences (1 Cr. Hrs.)
(Prerequisite 1201401+ 1201390)

Preparation of a research project in pharmaceutical sciences under supervision of faculty member. Presentation and oral discussion are required.

1201371 Seminar in Pharmaceutics and Pharmaceutical Technology (1 Cr. Hrs.)
Prerequisite: (1202331+ 1202341)

Preparation of a research project in pharmaceutics and pharmaceutical technology under supervision of faculty member. Presentation and oral discussion are required.

1203373 Seminar in Biopharmaceutics and Clinical Pharmacy (1 Cr. Hrs.)
Prerequisite: (1203429)

Preparation of a research project in biopharmaceutics and clinical pharmacy under supervision of faculty member. Presentation and oral discussion are required.