

Fifth: Advisory Study Plan

(1) Year

(1) Semester			(2) Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
301101	Calculus (1)	3	303231	Organic Chemistry (1)	3
304111	General Biology Laboratory (1)	1	1202134	Physicochemical principles of pharmacy	2
303101	General Chemistry (1)	3	1203251	Biochemistry (1)	2
301101	Calculus (1)	3	1902103	Computer skills for Medical Faculties	3
	University requirement	3			
	University requirement	3		University requirement	3
				University requirement	3
Total		16	Total		16

(2) Year

(1) Semester			(2) Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
1201215	Pharmaceutical organic chemistry	3	1202235	Physical pharmacy	2
1211212	Pharmaceutical organic chemistry-practical	1	1202381	Pharmaceutical Statistics	2
1202230	Pharmaceutical calculations and compounding	2	0551215	Physiology for Pharmacy (2)	2
1202234	Pharmaceutical calculations and compounding-practical	1	1201203	Pharmaceutical analysis	3
1203253	Biochemistry (2)	3	1201204	Pharmaceutical analysis – Practical	1
0532201	Anatomy and histology for Pharmacy	2		University requirement	3
0551214	Physiology for pharmacy (1)	2		University requirement	3
	University requirement	3			
Total		16	Total		17

(3) Year

(1) Semester			(2) Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
1203363	Pharmacology (1)	3	1203302	First aid	2
1212331	Pharmaceutical technology (1)	2	1203364	Pharmacology (2)	3
1212332	Pharmaceutical technology-practical (1)	1	1202341	Pharmaceutical microbiology (1)	3
1203303	Pharmacotherapy: A Pathophysiologic Approach	3	1203401	Pharmacoeconomics	2
1201301	Phytotherapy and natural products chemistry (1)	2	1201302	Phytotherapy and natural products chemistry (2)	2
	University requirement	3	1202333	Pharmaceutical technology (2)	2
	University requirement	3	1203311	Clinical Biochemistry	3
Total		17	Total		17

(Summer) Semester

Course Number	Course Title	Credit Hours
1210401	Pharmaceutical field training (1)	3
Total		3

(4) Year

(1) Semester			(2) Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
1203426	Therapeutics (1)	3	702501	Basic nursing skills	1
1203427	Case studies in therapeutics (1)	1	1203429	Therapeutics (2)	3
1201401	Medicinal Chemistry (1)	3	1203430	Case studies in therapeutics (2)	1
1203471	Biopharmaceutics	2	1201402	Medicinal chemistry (2)	2
1202441	Pharmaceutical Microbiology (2)	2	1203475	Pharmacokinetics	2
1202442	Pharmaceutical Microbiology -practical	1	1203476	Case studies in pharmacokinetics	1
1203402	Pharmacology (3)	3	1203513	Pharmaceutical promotion and marketing (1)	3
	Elective	2		Elective	2
	Elective seminar	1		Elective	2

Total	18	Total	17
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(Summer) Semester		
Course Number	Course Title	Credit Hours
1220402	Pharmaceutical field training (2)	3
Total		3

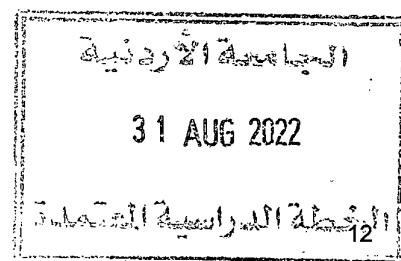
(5) Year

(1) Semester			(2) Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
1203504	Therapeutics (3)	3	1203506	Therapeutics (4)	3
1203505	Case studies in therapeutics (3)	1	1203507	Case studies in therapeutics (4)	1
1203577	Clinical pharmacokinetics	2	1202517	Pharmacy regulations and ethics	2
1201515	Medicinal Chemistry (3)	3	1203518	Pharmaceutical Literature evaluation	2
1203562	Toxicology	2	1203519	Pharmaceutical Nutrition and diet therapy	3
1203501	Pharmaceutical care	2	1201535	Pharmaceutical biotechnology	2
1203502	Pharmaceutical care/ practical.	1	1203563	Over the counter drugs	2
1203503	Pharmacy Informatics	3	1203508	Intravenous Admixture and Sterile Compounding	1
				Elective	2
Total		17	Total		18

(Summer) Semester		
Course Number	Course Title	Credit Hours
	Elective Clerkship	4
	Elective Clerkship	4
Total		8

(6) Year

(1) Semester			(2) Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
1203610	Research project	1	1203614	Advanced Community Pharmacy clerkship	4
1203611	Internal medicine clerkship	4	1203615	Ambulatory care clerkship	4
1203612	Pediatric clerkship	4	1203616	Hospital Pharmacy clerkship	4
1203613	Critical Care clerkship	4		Elective Clerkship	4
	Elective Clerkship	4			
Total		17	Total		16



Course Description

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.

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.

1202134 Physicochemical Principles of Pharmacy**2 Cr. Hrs****Prerequisite: (0303101)**

Learn the basics and relevance of physicochemical properties of drug entities which influence drug solubility, dosage form design, formulation development, drug delivery and bioavailability. Understand principles involving solubility, intermolecular forces and states of matter, phase equilibria, physical properties of molecules, solutions of nonelectrolytes and electrolytes including application of their colligative properties. Moreover, gain insight into isotonic solutions.

1203251 Biochemistry (1)**2 Cr. Hrs****Prerequisite: (0303101)**

Learn information concerning the chemical and physical properties of biomolecules (carbohydrates, lipids and proteins) and their interrelated functions in a biological system. Gain knowledge about bioenergetics and oxidative phosphorylation.

1902103 Computer skills for Medical Faculties**3 Cr. Hrs****Prerequisite: (1902099)**

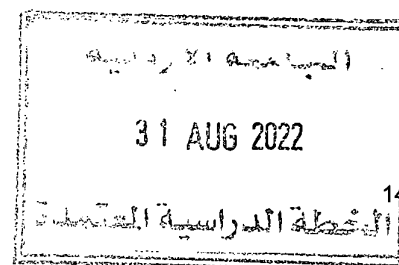
This course empowers the medical students with the necessary computer skills associated with the health information systems. It also provides entry level knowledge for conducting medical research experiments and utilizing the available software tools including spread sheet (Excel) and database (Access). Moreover, it introduces the necessary computer skills for understanding medical experimental settings, hypotheses testing, and statistical tests (student t-test and Chisquare) as well as the computer skills for computing both the correlation and regression. Furthermore, this course includes case studies for both a database in health information system and medical data analysis

1201215 Pharmaceutical Organic Chemistry**3 Cr. Hrs****Prerequisite: (0303231)**

Learn the classification, nomenclature, general properties, chemical reactions and their mechanisms and methods of preparation of various organic compounds (alcohols, phenols, ethers, aldehydes and ketones, carboxylic acids and derivatives, nitro compounds, amines, thiols and thiophenols). Recognize the heterocyclic and poly-carbocyclic compounds specially those of pharmaceutical significance. Know the stereochemistry and its applications in pharmacy and relation to pharmacological action of some organic compounds.

1211212 Pharmaceutical Organic Chemistry -Practical**1 Cr. Hrs****Prerequisite: (1201215 or Co-Req.)**

Explore the physical and chemical properties of different functional groups of organic compounds of pharmaceutical interest and differentiate between them by chemical reactions. Synthesize different organic compounds by employing chemical reactions and learn techniques that involve their separation, purification, and testing.



1202230 Pharmaceutical Calculations and Compounding

2 Cr. Hrs

Prerequisite: (1202134)

Learn the fundamentals of extemporaneous compounding and the standards for applying good practice to all aspects of small-scale manufacture of medicines. Explore dispensing techniques, pharmaceutical calculations, packaging, storage considerations and stability of compounded formulae. Recognize routes of administration and various dosage forms. Gain knowledge of appropriate techniques and correct practice applied in extemporaneously compounded formulae that are in the form of solutions, suspensions, emulsions, suppositories, powders and semi-solid preparations (ointments, creams), in addition to their packaging and storage conditions, labelling, and dispensing.

1202234 Pharmaceutical Calculations and Compounding - Practical

1 Cr. Hrs

Prerequisite: (1202230 or Co-Req.)

Gain the knowledge and practical skills that are essential for applying good pharmacy practice during small-scale compounding of pharmaceutical preparations in which quality, safety and stability are maintained. Utilise practical aspects concerning pharmaceutical calculations, proper dispensing techniques, labelling, suitable packaging and appropriate storage conditions through direct application on worked examples of various compounded formulae including solutions, suspensions, emulsions, creams, ointments, gels, suppositories and powders.

1203253 Biochemistry (2)

3 Cr. Hrs

Prerequisite: (1203251)

Learn the main biochemical concepts regarding different metabolic pathways of biomolecules, carbohydrates, lipids, proteins, and nucleotides. Gain knowledge about storage and the expression of genetic information.

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. Topic include: embryology, blood, nervous, musculoskeletal, skin, cardiovascular, digestive, urinary, respiratory, endocrine, and reproductive system.,

1202235 Physical Pharmacy

2 Cr. Hrs

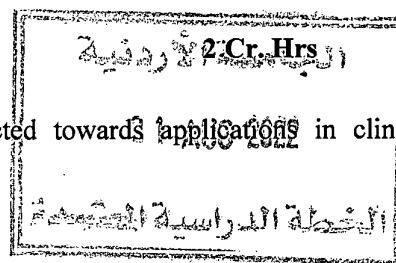
Prerequisite: (1202134)

Explore critical concepts and phenomena in Physical Chemistry with relevance to pharmaceutical systems such as: partitioning, complexation, reaction kinetics/drug stability, diffusion, dissolution and interfacial phenomena. Identify the applications/implications of each phenomenon in pharmaceutical systems.

1202381 Pharmaceutical Statistics

Prerequisite: (0301101)

Gain knowledge of statistical analysis approaches directed towards applications in clinical



pharmacy and the pharmaceutical industry. Develop an insight into sampling and experimentation, descriptive statistics, probability, binomial and normal distributions, confidence interval and hypothesis testing. Learn how to perform computerized statistical analysis which is an integral part of the course.

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.

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.

1201203 Pharmaceutical analysis

3 Cr. Hrs

Prerequisite: (1201215)

Learn the classical and instrumental methods used in the pharmacopeia for the qualitative and quantitative analyses of pharmaceutical raw materials and final drug products. Gain the concepts of chemical equilibrium including the analytical aspects i.e., parameters that maximize analytical methods validity. Explore equilibria including: acid base (aqueous/non aqueous), precipitation, complexation, and oxidation reduction. Recognize the theoretical principles behind spectroscopic and separation techniques and their main pharmaceutical applications. Acquire the necessary knowledge about Spectroscopic methods such as ultraviolet (UV), Infrared (IR), mass spectrometry (MS) and nuclear magnetic resonance (NMR) spectroscopy.

1201204 Pharmaceutical analysis – Practical

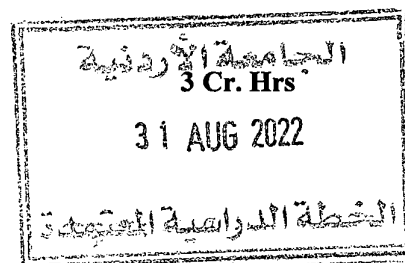
1 Cr. Hrs

Prerequisite: (1201203 Or Co-Req.)

Identify the applications of various analytical and instrumental methods to substances used in pharmacy and medicine. Discover the equipment as well as the experimental techniques of quantitative and qualitative analysis. Conduct Various experiments in titration, such as: acid-base titration, non-aqueous titration, oxidation reduction titration, potentiometric titration, etc. Perform different quality control experiments, derived from the pharmacopoeias, using UV-Visible spectrophotometer. Gain and develop the skills of interpretation and identification based on spectra resulting from different spectroscopic (UV-Visible, IR, and NMR) and chromatographic methods (HPLC and GC, TLC).

1203363 Pharmacology (1)

Prerequisite: (0551215)



Understand the basic principles of drugs' pharmacodynamics, pharmacokinetics, adverse reactions, and drug-drug interactions, also learn about drugs affecting the autonomic nervous system (cholinergic and adrenergic agonists and antagonists), drugs for neurodegenerative diseases, antihypertensives, drugs for hyperlipidemia, heart failure treatments, antiarrhythmics, antianginal medications, anticoagulants, and antiplatelet therapies.

1212331 Pharmaceutical Technology (1)

2 Cr. Hrs

Prerequisite: (1202230)

Understand the process of a product development in the pharmaceutical industry and the organizational structure of a pharmaceutical manufacturer. Gain knowledge of unit processes used in pharmaceutical manufacturing including milling, granulation, drying, mixing and tableting in terms of rationalization for use, equipment utilized and characteristics of the product.

1212332 Pharmaceutical Technology - Practical(1)

1 Cr. Hrs

Prerequisite: (1212331 or Co-Req)

Gain advanced skills in the area of pharmaceutical technology with particular emphasis on methods, materials and testing procedures associated with the manufacture of pharmaceutical grade tablets. Illustrate the flow properties of powders, mixing and milling of powders, wet and dry granulation methods, powder particle size analysis, evaluation of granules flow properties, studying the effect of excipients on granules flow properties, quality control tests, tableting technology, and dissolution methods. Comprehend and perform comprehensive/complete data analysis of results collected for each experiment. Employ Microsoft® Excel in the data analysis for each experiment results.

1203303 Pharmacotherapy: A Pathophysiologic Approach

3 Cr. Hrs

Prerequisite: (0551215)

Learn about the nature of major diseases, its associated alterations in the structure and function of human organs, and their clinical manifestations, related to cardiology, rheumatology, endocrine system disorders, gastrointestinal disorders, and hematologic/ oncologic, respiratory, renal, and infectious diseases.

1201301 Phytotherapy and natural products chemistry (1)

2 Cr. Hrs

Prerequisite: (1201203)

Provides students with basic knowledge regarding the use of drugs or extracts of natural origin as medicines or health-promoting agents. It introduces biosynthesis, isolation and identification of the primary and secondary plant constituents and discussion of natural drugs containing these constituents. 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.

31 AUG 2022

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1203302 First aid**2 Cr. Hrs****Prerequisite: (0532201)**

Learn general principles and techniques of first aid necessary to save the life in case of life threatening situations, before it reaches the necessary medical attention.

1203364 Pharmacology (2)**3 Cr. Hrs****Prerequisite: (1203363)**

Learn about anxiolytic and hypnotic drugs, antidepressants, antipsychotic, drugs for Epilepsy, anaesthetics, opioids, CNS Stimulants, drugs of abuse, drugs affecting pituitary and thyroid, drugs for diabetes, estrogens and androgens, adrenal hormones, drugs affecting bone metabolism, histamine and serotonin, anti-inflammatory, antipyretic, and analgesic agents, drugs for disorders of the respiratory system, gastrointestinal and antiemetic drugs.

1202341 Pharmaceutical Microbiology (1)**3 Cr. Hrs****Prerequisite: (0304102)**

Know different types of microorganisms: what they are made of, how they live and function, how they can affect aspects of life and how to deal with the biorisk associated with them. Appreciate the importance of having a variety of antimicrobial medications, discover the way they work and learn how to properly use them. Understand the microbial disease processes and how new diseases emerge. Explain how the immune system and other defence mechanisms can protect the human body from pathogens and other threats, and also what happens upon their malfunction. Recognize the common infectious diseases that can affect the body and how they could be prevented, controlled and treated.

1203401 Pharmacoeconomics**2 Cr. Hrs****Prerequisite: (1203363)**

Learn about the principles and tools of pharmacoeconomics and health outcomes assessment particularly those commonly used to assess the cost-effectiveness of health, medical, and pharmaceutical interventions. Study cases and examples from other health systems that focus on evidence-based decision-making, economic evaluation, decision analysis, and modeling techniques. Recognise applications to technology assessment, health policy process, clinical practice, drug pricing policy and price control, drug expenditure, and resource allocation from a local and international context.

1201302 Phytotherapy and natural products chemistry (2)**2 Cr. Hrs****Prerequisite: (1201301)**

This course is a continuation of "Phytotherapy and natural products chemistry (1)" course. It discusses the chemistry and the pharmaceutical uses of secondary metabolites obtained from both the mevalonate pathway and the alkaloids. This course also provides a review of the alternative and complementary therapies that are current and available. 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 in this course

1203311 Clinical Biochemistry

3 Cr. Hrs

Prerequisite: (1203253)

Learn about body's chemistry in health and disease. Gain knowledge about specimens collection and processing, the assessment of water and electrolytes balance, hydrogen ion homeostasis, blood gases, the kidneys and liver disorders, disorders of carbohydrate metabolism, plasma proteins, clinical enzymology, endocrinology, lipids metabolism, inherited metabolic diseases, and metabolic aspects of malignant diseases in addition to clinical chemistry at the extremes of age. Recognise the principles of biorisk management.

1202333 Pharmaceutical Technology (2)

2 Cr. Hrs

Prerequisite: (1212331)

Identify different formulation and manufacturing aspects of coated solid dosage forms, capsules, disperse systems and parenteral products. Explore the processing technologies, knowledge of materials and quality testing procedures, and combine such knowledge into pharmaceutical products capable of satisfying therapeutic objectives.

1210401 Pharmaceutical Field Training (1)

3 Cr. Hrs

Prerequisite: (1203364+ successful completion of 60 credit hours)

Practice the fundamental role of pharmacists in community pharmacy settings. Identify different medications and distinguish different dosage forms in community pharmacy including chronic prescribed and OTC. Recognize different products available in community pharmacy like cosmetics products, Infant formula, medical supplies ... etc. Exhibit the skills of proper reading and handling of medical prescription (all types including ordinary, controlled and insurance prescriptions). Perform at-home medical tests like blood pressure measurement using Stethoscope and blood glucose testing using different types of Glucometers. Operate a community pharmacy, manage the pharmacy inventory and utilize technology in pharmacy practice. Role play patients and pharmacists in simulated settings of real pharmacies and educate patients on their medications, different dosage forms and devices for example stethoscope and glucometer. Develop communication skills necessary to interact with patients, colleagues and health care team members.

1203426 Therapeutics (1)

3 Cr. Hrs

Prerequisite: (1203364)

Learn diseases manifestations and aims of treatment. Gain basic knowledge on used drugs, pharmacokinetics, drug interactions, dose calculations, side effects, treatment algorithms and patient education, related to cardiovascular, endocrine and rheumatic disorders.

1203427 Case studies in Therapeutics (1)

Prerequisite: (1203426 Co-Req.)

Apply simulated clinical cases to develop the ability to assess a patient's condition, determine reasonable treatment alternatives, and select appropriate therapy and monitoring parameters. Utilize knowledge and skills acquired in therapeutics (1) to justify those choices.

1201401 Medicinal Chemistry (1)

3 Cr. Hrs

Prerequisite: (1201215 and 1203364)

Understand the relationship between biology and chemistry. learn how pharmacologically active molecules are designed to treat human diseases. Explore the relationship between drugs' chemical structures and their therapeutic properties, in addition to the chemical considerations in drug design.

1203471 Biopharmaceutics

2 Cr. Hrs

Prerequisite: (1202235)

Learn factors influencing drug availability in the systemic circulation such as physicochemical properties of an active ingredient, dosage forms, physiological factors and routes of administration. Recognize limitations and advantages of each route of administration. Acquire knowledge about drug distribution and elimination.

1202441 Pharmaceutical Microbiology (2)

2 Cr. Hrs

Prerequisite: (1202341)

Identify the different levels of disinfection and types of biocides. Categorize biocides based on their physiochemical characteristics, level of activity and applications. Know the advantages, disadvantages, mode of action of biocides and the factors affecting their activity. Understand different methods used for the evaluation of antimicrobial efficacy and factors affecting it. Recognize sources and risks of product contamination and methods used to control it. Introduce the most common sterilization methods, their advantages, disadvantages, applications and the commercially available sterile products. Design a sterilization method for a pharmaceutical product. Describe a sterile manufacturing plant and Good Manufacturing practice governing the manufacturing processes.

1202442 Pharmaceutical Microbiology - Practical

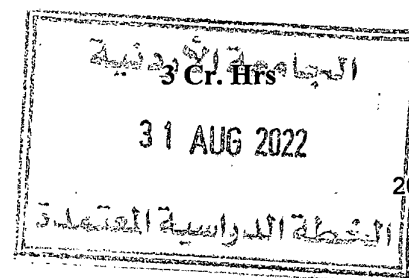
1 Cr. Hrs

Prerequisite: (1202441 or Co-Req.)

Develop the skills of working aseptically in the laboratory and mitigating biorisks. Identify microorganisms and measure the efficacy and potency of different antimicrobial agents. Apply techniques and procedures to evaluate and monitor microbial quality of environment and the sterile and non-sterile pharmaceutical products. Recognize different sterilization procedures and their limitation.

1203402 Pharmacology (3)

Prerequisite: (1203363)



Understand the principles of antimicrobial agents, cell wall synthesis inhibitors, protein synthesis inhibitors, quinolones, folic acid antagonists, urinary tract antiseptics, antimycobacterial drugs, antifungal drugs, antiviral drugs, anticancer drugs, immunosuppressants, drugs for urologic disorders, drugs for anemia, drugs for dermatologic disorders, antiprotozoal drugs, anthelmintic drugs.

0702501 Basic Nursing skills for pharmacy

1 Cr. Hrs

Prerequisite: (1203471)

Learn about methods of parenteral and rectal drug administration, vascular access and devices, wound care, blood pressure and pulse measurement.

1203429 Therapeutics (2)

3 Cr. Hrs

Prerequisite: (1203364)

Learn diseases manifestations and aims of treatment. Gain basic knowledge on the used drugs, pharmacokinetics, drug interactions, dose calculations, side effects, treatment algorithms and patient education, related to infections, GI, blood, respiratory and kidney disorders.

1203430 Case studies in Therapeutics (2)

1 Cr. Hrs

Prerequisite: (1203429 Co-Req.)

Apply simulated clinical cases to develop the ability to assess a patient's condition, determine reasonable treatment alternatives, select appropriate therapy and monitoring parameters. Utilize knowledge and skills acquired in therapeutics (2) to justify those choices.

1201402 Medicinal Chemistry (2)

2 Cr. Hrs

Prerequisite: (1201401)

Apply the knowledge gained from the prerequisite courses in this course. Understand various aspects of medicinal chemistry (discovery, mechanism of action, structure-activity relationship, pharmacodynamics, and pharmacokinetic properties) of drug categories of two major classes of therapeutic agents: the antimicrobials (including antibiotics, synthetic antibacterial, antiviral, antifungal, anthelmintic, and antiprotozoal agents); and anticancer agents (including alkylating agents, antimetabolites, steroid analogues, and anti-kinases).

1203475 Pharmacokinetics

2 Cr. Hrs

Prerequisite: (1203471)

Learn about the pharmacokinetic concepts, terminology, models, factors affecting drug absorption, distribution, metabolism, excretion and its importance in drug activities and side effects. Gain knowledge on how to predict plasma levels of drugs under varying conditions and apply different pharmacokinetic parameters.

1203476 Case Studies in Pharmacokinetics

1 Cr. Hrs

Prerequisite: (1203475 Or Co-Req.)

Apply case studies to practice theoretical knowledge obtained in the pharmacokinetics course. Handle pharmacokinetic parameters of drugs in the body and solve problems related to them taking into consideration different physiological factors affecting drugs absorption, distribution, metabolism and excretion through selected cases.

1203513 Pharmaceutical Promotion and Marketing (1)

3 Cr. Hrs

Prerequisite: (1203401)

Learn principles of marketing and marketing activity concepts. Gain knowledge about market needs, exchange and communication strategies taking into consideration the modern concept of marketing and influence of environment. Recognise pharmaceutical marketing aspects and its applications in Jordan and regional market emphasizing on detailing and role plays, selling skills and techniques.

1220402 Pharmaceutical Field Training (2)

3 Cr. Hrs

Prerequisite: (1203364+ successful completion of 90 credit hours)

Practice the fundamental role of pharmacists in both inpatient and outpatient hospital pharmacies settings. Identify hospital medications and distinguish different dosage forms in both inpatient and outpatient hospital pharmacies including chronic medications, IV preparations, narcotics, SALA, emergency and high alert medications. Operate inpatient and outpatient hospital pharmacies, manage hospital pharmacy inventory and utilize technology in pharmacy practice. Utilize online resources to ensure best pharmacy practice. Identify medications error in medical prescription in real hospital settings. Role play patients and pharmacists in simulated settings of real pharmacies and educate patients on their medications, different dosage forms and devices for example inhalers, smoking cessation and contraceptives. Explore and recognize concepts related to infection control, biosafety management and quality assurance connected to real hospitals settings.

1203504 Therapeutics (3)

3 Cr. Hrs

Prerequisite: (1203364)

Learn diseases manifestations and aims of treatment. Gain basic knowledge on the used drugs, pharmacokinetics, drug interactions, dose calculations, side effects, treatment algorithms and patient education, related to neoplastic, psychiatric and neurology disorders.

1203505 Case studies in Therapeutics (3)

1 Cr. Hrs

Prerequisite: (1203504 Or Co-Req.)

Apply simulated clinical cases to develop the ability to assess a patient's condition, determine reasonable treatment alternatives, select appropriate therapy and monitoring parameters. Utilize

knowledge and skills acquired in therapeutics (3) to justify those choices.

1203577 Clinical pharmacokinetics

2 Cr. Hrs

Prerequisite: (1203475)

Apply 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)

Explore various aspects of medicinal chemistry (discovery, mechanism of action, structure-activity relationship, pharmacodynamics, and pharmacokinetic properties) of drugs from diverse categories such as antihistamines, NSAIDs, steroids, cholinergic anticholinergics, antihyperlipidemic, diuretics, adrenergic and antiadrenergic drugs, and hypoglycaemic agents.

1203562 Toxicology

2 Cr. Hrs

Prerequisite: (1203364)

Learn about epidemic, physiologic and symptoms of poisoning. Gain knowledge about treatment procedures of toxic materials that humans would be exposed to. Understand toxicity of medicines, side effects and contraindications, and how this is related to strength, dosing frequency, dosage forms and routes of administration. Know basic strategies to adjust patient's therapy to optimize safety.

1203501 Pharmaceutical care

2 Cr. Hrs

Prerequisite: (1203426)

Learn about patient-centred care including cultural competency and health literacy, informatics, medication therapy management, evidenced-based pharmacy/medicine, population-based care, medication safety, health policy, and leadership.

1203502 Pharmaceutical care/ practical

1 Cr. Hrs

Prerequisite: (1203501 Or Co-Req.)

Apply skills acquired in "Pharmaceutical care" course to perform interpretation of subjective and objective patient data correctly, identify medication-related problems, develop a specific and complete pharmacist patient care plan, outline a plan for monitoring drug efficacy and toxicity, support the care plan and decisions with evidence-based literature, and deliver an organized presentation using effective communication skills.

1203503 Pharmacy Informatics

Prerequisite: (1203401)

Learn about effective and secure design and the use of electronic and other technology-based systems, including electronic health records, to capture, store, retrieve, and analyze data for use in patient care, and confidentially/legally share health information. Identify patient-specific information, which is created and applied in the process of caring for individual patients, includes medication and medical histories, laboratory tests results, radiology interpretations, immunization histories, physical assessments, and other information that is unique to the specific patient. Identify knowledge-based information, which forms the scientific basis of health care and includes referential information (about medications, procedures, disease states, etc.), clinical practice guidelines.

1203506 Therapeutics (4)

3 Cr. Hrs

Prerequisite: (1203364)

Learn diseases manifestations and aims of treatment. Gain basic knowledge on the used drugs, pharmacokinetics, drug interactions, dose calculations, side effects, treatment algorithms and patient education, related to general care (including pain, presurgical care, acid-base and electrolyte disorders) and women's health.

1203507 Case studies in Therapeutics (4)

1 Cr. Hrs

Prerequisite: (1203506 or Co-Req.)

Apply simulated clinical cases to develop the ability to assess a patient's condition, determine reasonable treatment alternatives, select appropriate therapy and monitoring parameters. Utilize knowledge and skills acquired in therapeutics (3) to justify those choices.

1202517 Pharmacy Regulations and Ethics

2 Cr. Hrs

Prerequisite: (1203364)

Gain knowledge of the Drug and Pharmacy Law in the Hashemite Kingdom of Jordan which includes the regulations and legislations concerning the practice of pharmacy profession, in addition to the significance of ethics in all aspects of pharmacy practice.

1203518 Pharmaceutical literature evaluation

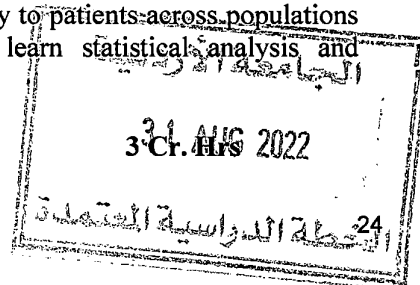
2 Cr. Hrs

Prerequisite: (1203364)

Learn about designs and types of research in health. Identify and retrieve medical literature using structured research strategies and refer to various sources of information or datasets. Know how to assess published evidence and identify potential for applicability to patients across populations or countries. Use published and fictional data examples to learn statistical analysis and hypothetical testing.

1203519 Pharmaceutical nutrition and diet therapy

Prerequisite: (1203311)



Understand nutrition in health and health care. Learn 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.

1201535 Pharmaceutical Biotechnology

2 Cr. Hrs

Prerequisite: (1201401)

Understand the principles of biotechnology and its applications in the pharmaceutical field. Discuss the most recent techniques such as recombinant DNA technology, gene cloning, and genetic engineering. Explore The application of such technologies in preparing new biopharmaceutical products (genes and proteins). Acquire knowledge about various delivery systems of these bioengineered products, together with the required detection techniques. Discover gene delivery as a module in the treatment of different genetic disorders and know possible dual-use research.

1203563 Over the counter drugs

2 Cr. Hrs

Prerequisite: (1203363)

Understand the concept of dispensing medications in the pharmacy without medical prescription and self-care. Learn about methods being used to assist the patient with optimal use of non-prescription drugs. Counsel patients regarding the proper and safe usage of drugs. Differentiate between cases that require the referral to the doctor and those that be treated in the pharmacy.

1203508 Intravenous Admixture and Sterile Compounding

1 Cr. Hrs

Prerequisite: (1203471)

Gain experience in preparing and dispensing parenteral and sterile preparations using aseptic techniques. Learn about the basics of intravenous drug therapy, how to work in laminar airflow workbenches, the common types of contamination that may occur when working in a laminar flow hood and how to minimize the risks of these types of contamination. Perform basic manipulations needed to prepare a sterile product by using aseptic technique. Know the risks of handling cytotoxic and hazardous drugs. Identify the steps in drug preparation and handling that are unique to cytotoxic and hazardous drugs. Recognise the typical ingredients of a total parenteral nutrition solution. Gain knowledge about manual and automated means of preparing total parenteral nutrition solutions, the benefits of having a formal intravenous admixture program, and how USP 797 has impacted the preparation of sterile products

1203610 Research project

1 Cr. Hrs

Prerequisite: (The successful completion of 173 credit hours)

Learn proper methods to prepare research proposals in a selected topic in the area of therapeutics and pharmaceutical care. Expose to different research designs, methodologies, and techniques. Gain the important concepts of research design, data collection, statistical and interpretative analysis, and final report presentation.

1203611 Internal medicine clerkship**4 Cr. Hrs****Prerequisite: (The successful completion of 173 credit hours)**

Provide patient-centered care for adults with acute and chronic medical conditions over four-week mandatory clerkship. Expose to daily cases and interprofessional discussions that enable ample opportunity to identify, prevent and resolve treatment-related problems. Develop and implement pharmacist care plans in order to achieve optimal therapeutic outcomes. Participate in several clinical activities including attending clinical rounds, management meetings, providing patient education and others.

1203612 Pediatric clerkship**4 Cr. Hrs****Prerequisite: (The successful completion of 173 credit hours)**

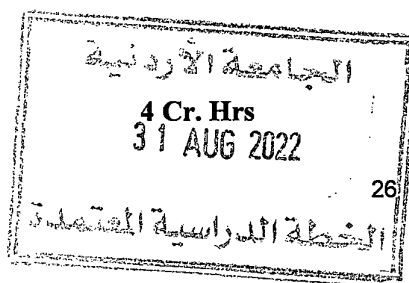
Provide patient-centered care to pediatric patients admitted to a hospital or attending outpatient clinics over four-week mandatory clerkship. Work alongside a specialized multidisciplinary medical team to design and implement pharmacist care plans to optimize care and monitoring of patients in common pediatric diseases. Learn about developmental mile stones and vaccination in healthy population. Participate in several clinical activities including attending clinics, rounds, management meetings, providing patient education and others.

1203613 Critical Care clerkship**4 Cr. Hrs****Prerequisite: (The successful completion of 173 credit hours)**

Provide patient-centered care within a multidisciplinary medical team involved in the management of patients with the most common critical conditions over four-week mandatory clerkship. Expose to daily cases in the intensive care unit (ICU) and interprofessional discussions that enable ample opportunity to identify, prevent and resolve medication-related problems in critically ill patients. Develop and implement pharmacist care plans in order to achieve optimal therapeutic outcomes. Participate in several clinical activities including attending clinical rounds, management meetings and others.

1203614 Advanced Community Pharmacy clerkship**4 Cr. Hrs****Prerequisite: (The successful completion of 173 credit hours)**

Provide patient-centered care to patients and community members in a community pharmacy setting over four-week mandatory clerkship. Implement a patient-centered approach to collect patient history information and perform prescription review activities and communication with other health providers to optimize care of patients in primary or non-hospital based settings. Participate actively in medicine reconciliation, health screening, community education or outreach activities, and other public health initiatives also.

1203615 Ambulatory care clerkship**Prerequisite: (The successful completion of 173 credit hours)**

Provide patient-centered care to patients in outpatient settings across various diseases such as nephrology, rheumatology, respiratory, cardiology, gastroenterology, oncology-hematology, and infectious diseases over four-week mandatory clerkship. Perform patient interviews and medication history to identify treatment-related problems and counsel patients on the appropriate use of prescribed and over-the-counter medications.

1203616 Hospital Pharmacy clerkship

4 Cr. Hrs

Prerequisite: (The successful completion of 173 credit hours)

Experience the roles of pharmacists in central distribution, decentralized clinical services, transitions of care activities, investigational drug services, pharmacy administration, pharmacy and therapeutics committee, inventory, purchase and storage over four-week mandatory clerkship. Learn and work with different technologies in pharmacy practice, such as order entry and verification, and the electronic healthcare record. Gain experience in the preparation of parenteral medications, drug distribution, practice management-related activities as well as decision-making and drug information activities.

1201531 Poisonous and Hallucinogenic Plants

2 Cr. Hrs

Prerequisite: (1203364)

Acquire basic knowledge about toxic, hallucinogenic, and narcotic plants, natural products, and derivatives. Identify narcotic and hallucinogenic plant material and compounds, their chemistry, and their biological effects. Know toxic plants namely endemic to Jordan, focus on the toxic part(s), toxic constituents, symptoms of poisoning, treatment, and precautions.

1201524 Applied chromatography

2 Cr. Hrs

Prerequisite: (Pharmaceutical analysis)

Understand the modern methods of chromatography used in separation and purification and their applications in quantitative and qualitative analyses. Identify the importance of chromatography in different pharmaceutical fields including drug discovery, bioanalysis, drug identification and characterization, quantitative and qualitative pharmacopeial analysis including its application in the limit test of impurities and in the assay of different drugs. Explore the chromatographic methods including column chromatography, thin-layer chromatography, gas chromatography, and hyphenated techniques. Discuss various aspects of different extraction and purification methods and analytical method validation.

1202533 Pharmaceutical Radioisotopes

2 Cr. Hrs

Prerequisite: (1201401)

Gain an insight of radioactivity and the types of radiation. Discuss the interaction of radiation with matter including biological tissues. Explore the main applications of radiation/radionuclides in therapy, diagnosis, research and analysis, and production of selected radiopharmaceuticals using generators. Learn the safe handling of radioactive substances and the protection from radiation.

1202536 Cosmetics Science

2 Cr. Hrs

Prerequisite: (1202230)

Understand a brief summary of the anatomy and physiology of skin, hair, nail and teeth. Learn about the ingredients and formulations of skin, hair and nail care products, as well as dental, and oral care products.

1202532 Selected Topics in Physical Pharmacy

2 Cr. Hrs

Prerequisite: (1202235)

Explore practical examples that emphasize the role of the physicochemical properties in either pharmaceutical formulation or drug delivery. Understand the basics of a selected topic, such as drug carriers like polymeric micelles and liquid crystals or processes like solubility and diffusion, and discuss a published article related to the chosen topic.

1203514 Pharmaceutical Promotion and Marketing (2)

2 Cr. Hrs

Prerequisite: (1203513)

Know about advanced marketing strategy, branding in the pharmaceutical field, and marketing management, in addition to strategies covered in marketing (1) course. Learn environmental forces anticipation and contingency planning, marketing plan development, teamwork, details of sales call steps, and advanced selling skills in addition to some consumer behaviour aspects.

1213552 Parapharmaceuticals

2 Cr. Hrs

Prerequisite: (1203364)

Advice 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). Learn about infants' formulas and strategies for smoking cessation.

1213563 Selected Topics in Clinical Toxicology

2 Cr. Hrs

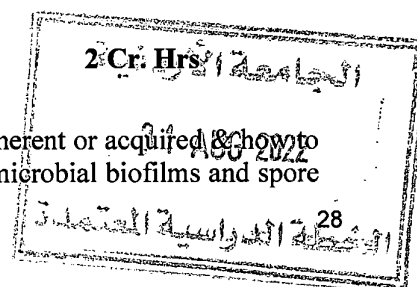
Prerequisite: (1203562)

Deal with different types of human intoxication. Understand the clinical toxicology of multiple medications. Learn the standard procedures undertaken in different cases of intoxication, signs and symptoms, and clinical manifestations. Gain knowledge regarding toxic exposure during pregnancy and intoxication in infants and geriatrics.

1202541 Selected Topics in Pharmaceutical Microbiology

Prerequisite: (1202441)

Recognize the mechanisms of resistance to antimicrobials, whether inherent or acquired & how to limit it. Identify the specific forms of microbial resistance including microbial biofilms and spore



formation. Describe the application of microorganisms in pharmaceutical industry and genetic engineering for the production of antibiotics, vaccines, immunological products & many other products. Explain the diagnostic tests & assays in which microorganisms or their products are major constituents. Implement the knowledge in presenting a report on microbial resistance, microbial application in industry, or assays.

1203515 Pharmaceutical Intellectual Property

2 Cr. Hrs

Prerequisite: (1203401)

Learn 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. Define world trading system, data exclusivity, patent protection, trademarks, Trade Related Aspects of Intellectual Property Rights (TRIPs) for pharmaceutical products and antitrust with case studies. Identify 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.

1201571 Seminar in Pharmaceutical Sciences

1 Cr. Hrs

Prerequisite: (1201401 and 1201302)

Prepare a research project in pharmaceutical sciences under the supervision of a faculty member. Identify different tools and concepts related to research and presenting, including conducting a literature review, and scientific writing. Use different software of importance such as Mendeley, ChemDraw, etc. Prepare a report based on the selected articles that follows the standard sections/parts of a review article. Gain and develop the skills of the oral presentation via presenting the prepared and selected articles.

1202572 Seminar in Pharmaceutics and Pharmaceutical Technology

1 Cr. Hrs

Prerequisite: (1212331+ 1202341)

Develop the skills required to search the available scientific resources related to the field of Pharmaceutics and Pharmaceutical Technology and perform literature search and review. Differentiate between the different types of scholarly articles and distinguish the quality of scientific journals. Learn how to read and summarize a scholarly article. Plan then prepare a mini review/report based on the selected articles that follows the standard sections/parts of a review article. Prepare an oral presentation using available media for example Microsoft® PowerPoint. Gain and develop the skills of oral presentation via presenting the prepared and selected articles.

1203573 Seminar in Biopharmaceutics and Clinical Pharmacy

1 Cr. Hrs

Prerequisite: (1203364)

Prepare a research project in biopharmaceutics and clinical pharmacy under the supervision of faculty member. Perform a presentation along with an oral discussion with other students and the

supervisor. Learn the use of different search databases, referencing and the skill of transferring knowledge to an audience.

1203617 Cardiology and Nephrology clerkship

4 Cr. Hrs

Prerequisite: (The successful completion of 173 credit hours)

Provide pharmaceutical care for adult patients in cardiology and nephrology specialties over four-week elective clerkship. Expose to daily cases and interprofessional discussions that enable ample opportunity to create patients database and identify, prevent and resolve treatment-related issues. Develop and implement pharmacist care plans in order to achieve optimal therapeutic outcomes. Participate in several clinical activities including attending clinical rounds, outpatient clinics, management meetings, providing patient education, and others.

1203618 Respiratory and Infectious disease clerkship

4 Cr. Hrs

Prerequisite: (The successful completion of 173 credit hours)

Provide pharmaceutical care for adult patients in respiratory and infectious disease specialties over four-week elective clerkship. Expose to daily cases and interprofessional discussions that enable ample opportunity to optimize clinical use, among the others, of the major classes of anti-infectives and provide evidence-based recommendations for empirical therapies and dosing adjustments for various infectious processes and justify such recommendations. Develop and implement pharmacist care plans in order to achieve optimal therapeutic outcomes. Participate in several clinical activities including attending clinical rounds, outpatient clinics, management meetings, providing patient education, and others.

1203619 Oncology and clinical pharmacokinetics clerkship

4 Cr. Hrs

Prerequisite: (The successful completion of 173 credit hours)

Provide pharmaceutical care relevant to therapy management and supportive care for oncology patients and apply pharmacotherapeutic principles to clinical situations and make rational, patient-specific drug therapy recommendations, including the appropriateness of medication dosing based on practical pharmacokinetic principles and patient considerations over four-week elective clerkship. Develop and implement pharmacist care plans in order to achieve optimal therapeutic outcomes. Participate in several clinical activities including attending clinical rounds, outpatient clinics, management meetings, providing patient education, and others.

1203620 Neurology and Psychiatric clerkship

4 Cr. Hrs

Prerequisite: (The successful completion of 173 credit hours)

Provide pharmaceutical care to patients with various neuropsychiatric disorders and monitoring the safe and effective use of psychotropic medications over four-week elective clerkship. Develop and implement pharmacist care plans in order to achieve optimal therapeutic outcomes. Participate in several clinical activities including attending clinical rounds, outpatient clinics, management meetings, providing patient education, and others.

1203621 Endocrinology and Geriatric clerkship**4 Cr. Hrs****Prerequisite: (The successful completion of 173 credit hours)**

Deliver pharmaceutical care for patients attending inpatient and outpatient settings for patients with advanced age, diabetes mellitus and other endocrine and metabolic disorders over four-week elective clerkship. Provide diabetes therapy goals assessments, education, and analysis of glycemic control, insulin therapy, disease complications and others. Assess the appropriateness of medications in elderly patients, Develop and implement pharmacist care plans in order to achieve optimal therapeutic outcomes. Participate in several clinical activities including attending clinical rounds, outpatient clinics, management meetings, providing patient education, and others.

1203622 Surgery and Pain management clerkship**4 Cr. Hrs****Prerequisite: (The successful completion of 173 credit hours)**

Provide pharmaceutical care for surgical patients with emphasis on antibiotics and pain medications over four-week elective clerkship. Develop and implement pharmacist care plans in order to achieve optimal therapeutic outcomes. Participate in several clinical activities including attending clinical rounds, outpatient clinics, management meetings, providing patient education, and others.

1203623 Gastrointestinal Diseases and Nutritional Support clerkship**4 Cr. Hrs****Prerequisite: (The successful completion of 173 credit hours)**

Deliver therapeutic drug monitoring for patients with gastrointestinal disorders, as well as assess and provide nutritional needs over four-week elective clerkship. Provide opportunities to develop skills in assessment and monitoring of patients with special nutritional needs and preparing parenteral nutrition formulation. Develop and implement pharmacist care plans in order to achieve optimal therapeutic outcomes. Participate in several clinical activities including attending clinical rounds, outpatient clinics, management meetings, providing patient education, and others.

1203624 Gynecology and obstetrics clerkship**4 Cr. Hrs****Prerequisite: (The successful completion of 173 credit hours)**

Deliver pharmaceutical care related to women's health care in inpatient antenatal, postpartum, and inpatient gynecology units over four-week elective clerkship. Develop and implement pharmacist care plans in order to achieve optimal therapeutic outcomes. Participate in several clinical activities including attending clinical rounds, outpatient clinics, management meetings, providing patient education, and others.

1203564 Selected Topics in Drug Misuse and Abuse

2 Cr. Hrs

Prerequisite: (1203364)

Identify and manage actual or potential drug misuse and abuse and prevent when necessary in case of the inappropriate use of prescription or non-prescription drugs (so-called OTC drugs). Know the most common illicit drugs and the medical complications they pose upon misuse or abuse and understand the drug user and the most common methods applied in the treatment of drug dependence. Learn the rules and regulations related to scheduled drugs and stories of misconduct, in collaboration with the Jordan Food and Drug Administration (JFDA).

