Course Detailed Description – Procedures of the Course Plan Committee /Faculty of Pharmacy	QF02/0408-2.1E

Department	Pharmacy

Course Name	Advanced Biopharmaceutics & Pharmacokinetics	**Course No.**	201761
Prerequisite	------	Credit Hours	2
Number & date of course plan approval		Brief Description	See form QF02/0409

Course Objective	1. Gain an understanding of the advanced skills necessary for specific problem solving techniques related to the relationship between concentration and effect, and clearance concepts. The knowledge gained from this course would be used to evaluate the pharmacokinetic parameters. 2.determine the inter-relationship between binding and clearance parameters of high, low and intermediate clearance drugs 3. Familiarize students with the relationships between binding, volume of distribution and half-life. 4. Differentiate between linear and non-linear pharmacokinetics 5. Adjust dose in renal and hepatic disease 6. Understand the principles of therapeutic drug monitoring
Intended Learning Outcomes	At the end of this module, student will gain: • **Knowledge and understanding** 1. Understanding of the compartmental modeling and its significance 2. Knowledge of the pharmacokinetics and biopharmaceutics of drugs after different routes of administration. 3. Knowledge of dose adjustment in renal and hepatic diseases. 4. knowledge of the therapeutic drug monitoring for individual drugs 5. Understanding the theory behind bioequivalence. • **Cognitive skills (thinking and analysis)** 1. The student should be able to estimate the pharmacokinetic parameters using different approaches. 2. The student should be able to analyze and scientifically use mathematical equations to understand the ADME of drugs in the body. 3. The student should be able to relate the basic principles of biopharmaceutics and pharmacokinetics to practical clinical situations.
Course Topics	1. Pharmacokinetics of intravascular and extravascular route of drug administration. 2. Nonlinear Pharmacokinetics 3.physiologic drug distribution and kinetics of protein binding 4. dose adjustment in hepatic and renal disease 5.therapeutic drug monitoring for individual drugs

Text Books	Applied Biopharmaceutics & Pharmacokinetics 7th edition, 2016, editor Leon Shargel		
References	1. Pharmacokinetics, 2nd edition, by M. Gibaldi and D. Perrier 2. Clinical Pharmacokinetics. Concepts and Applications, 4th edition, by M. Rowland and T. N. Tozer.		
Grade Determination	Mid-Term Exam = 30% Seminar and assignment = 30% Final Exam = 40%	Practical Course Grade Determination	

Course Outline

Week	Hours	Subjects	Chapters in Textbook	Notes
1 - 3	6	**Basic Pharmacokinetics:** Kinetic processes review. Compartments model. IV bolus dosing. IV infusion dosing. Oral dosing. Bioavailability studies.		
4	2	**Non – Linear Pharmacokinetics:** Saturable enzymatic elimination processes. Drug elimination by capacitry limited pharmacokinetics. Non – linear pharmacokinetics due to drug – protein binding.		
5	2	**Relationship between pharmacokinetics and pharmacodynamics:**		

		Relation of dose to pharmacologic effect. Factors affect the duration of action. Rate of drug absorption and pharmacodynamic response.		
6	2	**Application of PK in Clinical Situations**		
7	2	**MID – TERM EXAM**		
8	2	**Dose adjustment in renal and hepatic disease:** General approaches for dose adjustment in renal disease. Measurement of GFR. Measurement of creatinine clearance. Dose adjustment for uremic patients. Effect of hepatic disease on pharmacokinetics. Fraction of drug metabolized. Hepatic blood flow and intrinsic clearance. Dosage consideration in hepatic disease		
9	2	**Mean Resident Time and Statistical Moment Theory:** Mean Resident Time Statistical Moment Theory Selection of PK model		
10	2	**Physiologic factors related to drug absorption:** Nature of cell membranes. Passage of drugs across cell membranes. Effect of dosage form on drug absorption. Effect of disease states on drug absorption.		
11	2	**Physiologic drug distribution and protein binding:** Physiologic factors of distribution. Protein binding of drugs. Determinants of protein binding. Kinetics of protein binding. Clinical significance of drug protein binding.		

12-13	4	**Therapeutic drug monitoring**		
14-15	4	**SEMINAR DISCUSSION**		
16	2	**FINAL EXAM**		

Approved by Dept. Chair		Date of Approval	1/2/2017

Extra Information: (Updated every semester and filled by course instructor)

Course Instructor	Dr. Suhair Hikmat
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Department	Pharmacy

Course Name	Advanced Clinical Biochemistry	Course No.	201711
Prerequisite		Credit Hours	3
Number & date of course plan approval		Brief Description	See form QF02/0409

Course Objective	By the end of the course, the students should be able to demonstrate advanced knowledge and understanding in the following core areas. 1- Lipids metabolism and disorders. 2- Antioxidants benefits and disorders. 3- Free Radicals and Diseases. 4- Hormones function and deficiency.
Intended Learning Outcomes	(1) special branch of medicine dealing with measurement and interpretation of the physicochemical condition and dynamics in healthy and diseased humans. (2) branch of chemistry that deals with the composition and measurement of the secretions, excretions, concretions, and fluids of the human body in health and disease, and the chemical composition of cells and tissues. (3) study of metabolic processes in relation to their physiological and pathological changes in man. (4) Analysis of body fluids, cells and sometimes tissues, together with interpretation of the results of analysis, as well as the knowledge and skills necessary for management of a clinico-chemical laboratory.
Course Topics	Cholesterol and Hyperlipidemia Cholesterol Lipoproteins and Lipid Transport Plasma Cholesterol and Risk of Heart Disease Plasma Triglycerides and Risk of Heart Disease Dietary Management Drug Therapy Hypocholesterolemia Effect s o f Low Blood Cholesterol Inborn Errors of Cholesterol Biosynthesis Antioxidants and Health Format ion of Free Radicals Free Radicals in Biological Systems Protection from Free Radicals Benefits of Free Radicals Free Radicals and Diseases Large Doses of Antioxidants Introduction to hormones and pituitary function Anterior pituitary hormones

	Pituitary tumors Growth hormone Actions of growth hormone Acromegaly Growth hormone deficiency Hypopituitarism Etiology of hypopituitarism Treatment of panhypopituitarism Posterior pituitary hormones Oxytocin		
Text Books	1- Clinical Biochemistry: An Illustrated Colour Text, 5e Jul 16, 2013, by Allan Gaw MD PhD FRCPath FFPM PGCertMedEd and Michael J. Murphy FRCP Edin FRCPath. 2- Harpers Illustrated Biochemistry 30th Edition, Jan 8, 2015, by Victor Rodwell and David Bender 3- Handbook of Antioxidants for Food Preservation (Woodhead Publishing Series in Food Science, Technology and Nutrition), Mar 18, 2015, by Fereidoon Shahidi		
References	1- Clinical Biochemistry: An Illustrated Colour Text, 5e by Allan Gaw MD PhD FRCPath FFPM PGCertMedEd, Michael J. Murphy FRCP Edin FRCPath, Rajeev Srivastava and Robert A. Cowan BSc PhD (Jul 16, 2013). 2- Free Radicals in Biology and Medicine, Oct 20, 2015, by Barry Halliwell and John M. C. Gutteridge		
Grade Determination	1st Exam = 25% 2nd Exam = 25% Final Exam = 50%	Practical Course Grade Determination	Course Work = 50% (Reports, Term Papers, Quizes) Final Exam = 50%

Course Outline

Week	Hours	Subjects	Chapters in Textbook	Notes
1	1 1 1	Cholesterol and Hyperlipidemia Cholesterol		
2	1 1 1	Lipoproteins and Lipid Transport Plasma Cholesterol and Risk of Heart Disease		
3	1 1 1	Plasma Triglycerides and Risk of Heart Disease Dietary Management		
4	1 1 1	Drug Therapy Hypocholesterolemia		

5	1 1 1	Effect s o f Low Blood Cholesterol Inborn Errors of Cholesterol Biosynthesis		
6	1 1 1	Antioxidants and Health Format ion of Free Radicals		
7	1 1 1	Free Radicals in Biological Systems Protection from Free Radicals		
8	1 1 1	Benefits of Free Radicals Free Radicals and Diseases		
9	1 1 1	Large Doses of Antioxidants Introduction to hormones and pituitary function		
10	1 1 1	Introduction to hormones and pituitary function Anterior pituitary hormones		
Week	**Hours**	**Subjects**	**Chapters in Textbook**	**Notes**
11	1 1 1	Pituitary tumors Growth hormone		
12	1 1 1	Actions of growth hormone Acromegaly		
13	1 1 1	Growth hormone deficiency Hypopituitarism		
14	1 1 1	Etiology of hypopituitarism Treatment of panhypopituitarism		
15	1 1 1	Posterior pituitary hormones Oxytocin		

Approved by Dept. Chair		Date of Approval	

Extra Information: (Updated every semester and filled by course instructor)

Course Instructor	Dr. Tariq Al-Qirim
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Course Detailed Description – Procedures of the Course Plan Committee /Faculty of Pharmacy	QF02/0408-2.1E

Department	Pharmacy

Course Name	Advanced Organic Chemistry	Course No.	201700
Prerequisite		Credit Hours	3
Number & date of course plan approval		Brief Description	See form QF02/0409

Course Objective	This course is designed to address the mechanistic, theoretical and synthetic aspects of a broad range of reactions utilized in organic chemistry. Classical reactions and developed reactions will be reviewed with examples from the literature. It will explore the stereochemical features including conformation and stereoelectronic effects; reaction dynamics, isotope effects and molecular orbital theory applied to pericyclic and photochemical reactions; and special reactive intermediates including carbenes, carbanions, and free radicals.
Intended Learning Outcomes	At the end of this course students will be able to: • Delineate mechanisms for reactions in organic chemistry, polymer chemistry and biochemistry • Apply organic reactions in multi-step synthesis • Describe principles concerning green- and sustainable chemistry • Describe principles regarding reaction energetics and reaction kinetics • Apply molecular orbital theory on reactivity and stereochemistry • Describe supramolecular principles applied to reactivity • Describe principles for the rationalization of regio- or enantioselective reaction outcomes • Apply knowledge in organic chemistry on pharmaceutical chemistry, biochemistry, polymer chemistry, environmental chemistry, cellulose technology and chemical engineering
Course Topics	• Chemical Kinetics & Thermodynamics- Kinetic and thermodynamic requirements for reaction, kinetic versus thermodynamic control. • Non-kinetic and kinetic methods for determining mechanisms. Stereochemistry- Optical isomerism- Plane, center & axis of symmetry, chiral molecules-test and biological importance of chirality. • Stereospecific and stereoselective synthesis. Resolution of racemic mixtures. Geometric isomerism- Resulting from double bonds, monocyclic compounds, fused ring systems. • Conformational isomerism-conformations in cyclic compounds. Reactive intermediates - structure, generation, stability and reactivity of carbocation, carbanions, carbenes, nitrenes and free radicals. • Alkylation - Alkylation of nucleophilic carbon; enolates and enamines: generation & alkylation of enolates, dianions; oxygen vs. carbon as site of

	alkylation. • Alkylation of aldehydes, esters, amides & nitriles. • Enamines and imine anions. Pericyclic reactions- Molecular orbital symmetry, Woodward-Hofmann rules. • Electrocyclic (Diels-Alder reaction) and sigmatropic reactions-Cope, Benzidine rearrangements. • Cycloaddition. • Rearrangements- Carbon to carbon migration- Wagner-Meerwein, Pinacol-pinacolone, Benzilic acid, Favorskii. C to N migration -Hoffmann, Curtius, Beckmann, Schmidt, Lossen. C to O migration- Bayer-Villiger, hydroperoxides**.** • Reduction reactions of carbonyl and other functional groups-Catalytic hydrogen- cation, reduction by Group III and Group IV hydride donors, dissolving metal reductions, reductive deoxygenation of carbonyl groups. • Synthon approach- Concept, half-reactions, FGI, analysis of target molecule, synthetic strategies. Application to synthesis of benzocaine, propranolol, haloperidol, salbutamol and other drugs. Miscellaneous reactions. • Electrophilic Aromatic Substitution –Nitration, halogenation, sulphonation, Friedel-Crafts reactions. • Nucleophilic Aromatic Substitution –via diazonium ions. • Electrophilic addition to C=C double bond- halogens, halogen halides, water. Carboxylic acids- formation from alcohols and aldehydes, interconversions of carboxylic acid derivatives. • Reagents used in reduction & oxidation.
Text Books	1. March- Advanced Organic Chemistry –Reaction Mechanisms. 2. Sykes- A Guidebook to Mechanism in Organic Chemistry. 3. Jerry March- Advanced Organic Chemistry.
References	1. Eliel- Stereochemistry of Carbon Compounds. 2. Alexander- Principles of Ionic Organic Reaction. 3. Surrey- Reaction in Organic Chemistry. 4. Hendrickson – Organic Chemistry. 5. Asymmetric Synthesis, Vol. 1-7, Ed. J. A. Morrison 6. Chirotechnology - R.A Sheldon. 7. Practical Organic Synthesis: A Student's Guide - Reinhart Keese, Martin Brändle, Trevor Toube 8. Norman, Principles of Organic Chemistry, Carry and Sunberg, Organic Chemistry Part A & B. 9. Beuhler and Pearson – Organic Chemistry – Part A & B. 10. Mc Murry, Organic Chemistry.

Grade Determination	1st Exam = 25% 2nd Exam = 25% Final Exam = 50%	Practical Course Grade Determination	Course Work = 50% (Reports, Term Papers, Quizes) Final Exam = 50%

Course Outline

Week	Hours	Subjects	Chapters in Textbook	Notes
1-3	3 3 3	**Stereochemistry & Chiral Techniques** • Principles of stereochemistry including geometric isomerism, optical isomerism and conformational isomerism, Dynamic stereochemistry. • Concept of chiral drugs, resolution of racemic mixtures and racemic switches • Asymmetric synthesis of the following drugs: Vit C, Propranolol, Nifedipine, Atenolol, Ethambutol, Penicillamine, Omeprazole, Aspertame, Ampicillin, and Thalidomide.		
4-8	3 3 3 3 3	**Mechanisms, stereochemistry and applications of following individual reactions**: • Hydrogenation • Reduction with metallic hydrides • Clemensen Reduction • Wolf Kishner reduction • Birch Reduction • Meerwein-Pondorff reduction • Oppennauer oxidation • Free radical reaction • Allylic Bromination • Use of diazomethane and peracids in synthesis • Grignard Reaction • Pinacol and related rearrangements • Beckmann rearrangement and ozonolysis • Heck reaction • Sharpless oxidation • Suzuki coupling • Wittig Reaction		

9-11	3 3 3	**Synthone approach:** • Definition, terms and abbreviation, rules and guidelines. • Synthesis of following drugs. - Rosiglitazone, Trimethoprim, Terfenadine, Ibuprofen, Fentanyl, Midazolam, Ciprofloxacine, Captopril, Diclofenac, Losartan		
12-13	3 3	**Solid phase Chemistry** Reaction involved with mechanism, which include protection, de-protection, and coupling.		
14-15	3 3	**Green Chemistry**		

Approved by Dept. Chair		Date of Approval	

Extra Information: (Updated every semester and filled by course instructor)

Course Instructor	Professor Ghassan Abu Sheikha, Ph.D.
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Course Detailed Description – Procedures of the Course Plan Committee /Faculty of Pharmacy	QF02/0408-2.1E

Department	Pharmacy

Course Name	advanced pathophysiology for nursing	**Course No.**	0201701
Prerequisite		Credit Hours	3
Number & date of course plan approval	2015-2016 (Nursing Plan)	Brief Description	See form QF02/0409

Course Objective	This course is designed to examine alterations in functions affecting individuals across the lifespan. The students will examine the phenomena that produce alterations in human physiologic function and the resulting human response. Students will understand pathophysiological changes, including how pathological processes are manifested, progress in the body, as well as primary and secondary effects. This course focusing on pathological factors that influence the disease process; in which the scientific approach will provide a further understanding of the mechanisms of disease, and will help students in incorporating critical thinking skills in their future practical applications.
Intended Learning Outcomes	**Knowledge and understanding** 1. Outline the basic physiological mechanisms leading to diseased state. 2. Describe the impact and abnormal functions upon the organ(s) associated with the disease process of targeted body systems. 3. Describe clinical manifestations associated with the diseased organ(s). **Intellectual skills** 1. Integrate the etiology, pathogenesis, and clinical manifestations in patients' teaching plan. 2. Correlate pathophysiology with signs and symptoms of disease and with laboratory data. 3. Develop basic critical thinking skills that correlate the abnormal functions of body systems with the disease process. **Professional skills** 1. Apply general pathophysiologic concepts to specific disease entities and selected clinical situations. 2. Apply the sciences of pathophysiology to common system disorders across the lifespan. 3. Utilize the nursing process, critical thinking skills, experience, and basic concepts of pathophysiology in daily clinical practice. **Transferable skills.** 1. Valuate health care systems; including community resources that may assist the patient/family in meeting their self-care demands.

	2. Valuate transferring the knowledge into healthy behaviors in order to help people avoiding diseases.
Course Topics	1. Pathophysiology for endocrine system disorders 2. Pathophysiology for nervous system disorders 3. Pathophysiology for fluids and electrolytes imbalance 4. Pathophysiology for cardiovascular system disorders 5. Pathophysiology for respiratory system disorders 6. Pathophysiology for renal system disorders 7. Pathophysiology for gastrointestinal and hepato-biliary system disorders 8. Pathophysiology for hematological disorders
Text Books	**Essential Textbook:** • Text Book: Porth, C. M. (2014) *Pathophysiology: concepts of Altered Health Status.* (9th edition) Lippincott. Williams & Wilkins.
References	**Recommended Textbooks:** • Copstead-Kirkhorn, L. & Banasik, J. (2005) *Pathophysiology*. (3rd edition) St. Louis, Mosby Elsevier. • Huether, S. E., & McCance, K. L. (2004) *Understanding Pathophysiology* (4th edition) St. Louis, MO: Mosby Elsevier. • Hogan, M & Hill, K (2004) *Pathophysiology, Review & Rationales.* Prentice Hall publishing. • Sylvia A. Price & Lorraine M. Wilson (2003) *Pathophysiology: Clinical Concepts of Disease Processes* (6th edition), Mosby Elsevier.

Grade Determination	1st Exam = 25% 2nd Exam = 25% Final Exam = 50%	Practical Course Grade Determination	

Course Outline

Week	Hours	Subjects	Chapters in Textbook	Notes
1	3	• **Course orientation.** - Introductions to the course and overview of texts. - Review of course assignments.		
2	3	• **Alterations in Fluids, Electrolytes, and Acid-Base Balance**	**39** **40**	
3	3	• **Alterations in the Endocrine System** - Alterations in Pituitary, Thyroid, Parathyroid, and Adrenal Function. - Diabetes Mellitus.	**49** **50**	
4	3	• **Alterations in the Cardiovascular System** - Structure and Function of the Cardiovascular System. - Alterations in Blood Pressure.	**29** **31**	
5	3	- Alterations in Cardiac Function	**32**	
6	3	- Heart Failure and Circulatory Shock	**34**	
7	3	- Mid Exam		
8	3	• **Alterations in the Respiratory System** - Structure and Function of the Respiratory System	**35**	
9	3	- Alterations in Respiratory Function: Infectious Disorders and Neoplasia	**36**	
10	3	- Alterations in Respiratory Function: Disorders of Gas		

		Exchange	**37**	
11	3	• **Alterations in the Urinary System** - Control of Kidney Function - Alterations in Renal Function	**38** **41**	
12	3	- Renal Failure	**42**	
13	3	• **Alterations in the Nervous System** - Alterations in Brain Function - Alterations in Neuromuscular Function	**20** **19**	
14	3	• **Alterations in the Gastrointestinal System** - Alterations in Hepatobiliary Function	**46**	
15	3	• **Alterations in the Hematologic System** - Alterations in Hemostasis and Blood Coagulation	**26**	

Approved by Dept. Chair		Date of Approval	

Extra Information: (Updated every semester and filled by course instructor)

Course Instructor	Dr. Luay Al-Essa
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Course Detailed Description – Procedures of the Course Plan Committee /Faculty of Pharmacy	QF02/0408-2.1E

Department	Pharmacy

Course Name	Advanced Pharmaceutical Biotechnology	**Course No.**	201764
Prerequisite	——	Credit Hours	3
Number & date of course plan approval		Brief Description	See form QF02/0409

Course Objective	At the end of this module, student will be able to understand the current topics in pharmaceutical and biotechnology focusing on transforming small molecules, proteins, and genes into therapeutic products. Includes new drug therapies, drug design, pharmacogenomics, molecular modeling, high throughput screen, production and stability considerations, and delivery systems of protein and gene therapeutics in relation to pharmacokinetic and therapeutic responses.
Intended Learning Outcomes	The students are expected to: 1. Understand the genetic basics of normal cells and disease development as a major step to identify new drug targets. 2. Know that diseases develop by molecular and cellular changes at many levels of the central dogma. 3. Interpret the knowledge obtained to identify new drug targets and pathways. 4. Determine the molecular options to treat diseases like gene and cell therapies.
Course Topics	The course covers a wide range of pharmaceutical biotechnology topics including: 1. Recombinant DNA technologies. 2. Drug discovery using biotechnology techniques. 3. Gene therapy. 4. Delivery of Biopharmaceuticals. 5. Pharmacogenomics and the effect of SNPs on drug metabolism. 6. Cancer genetics and stem cells.
Text Books	Pharmaceutical Biotechnology: Concepts and Applications Gary Walsh, 2007

References	Updated papers and reviews in the topics discussed.		
Grade Determination	Midterm Exam = 30% Assignments, seminars, presentation = 30% Final Exam = 40%	Practical Course Grade Determination	Course Work = 60% (Reports, Term Papers, Quizes) Final Exam = 40%

Course Outline

Week	Hours	Subjects	Chapters in Textbook	Notes
1	1 1 1	DNA, RNA and proteins. Replication, gene expression and post translational modifications. **Sense, antisense and nonsense**		
2	1 1 1	Molecular techniques: Primers design PCR Gel electrophoresis Real time PCR Sequencing		
3	1 1 1	Recombinant DNA technology		
4	1 1 1	Pharmacokinetics of biopharmaceuticals Formulation and delivery of biopharmaceuticals		
5	1 1 1	Pharnmacogenomics and personalized medicine.		
6	1 1 1	DNA vaccines		
7	1 1 1	**MID – TERM EXAM**		
8	1 1 1	Gene therapy		
9	1 1 1	Cancer genetics		

Week	Hours	Subjects	Chapters in Textbook	Notes
10	1 1 1	**Immunotherapy and cell culture techniques**		
11	1 1 1	**Mitochondrial DNA, diseases, applications and treatments**		
12	1 1 1	Stem cells		
13	1 1 1	Epigenetics		
14	1 1 1	**SEMINAR DISCUSSION**		
15	1 1 1	**FINAL EXAM**		

Approved by Dept. Chair		Date of Approval	

Extra Information: (Updated every semester and filled by course instructor)

Course Instructor	Dr. Lama Hamadneh
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Course Detailed Description – Procedures of the Course Plan Committee /Faculty of Pharmacy	QF02/0408-2.10E

Department	Pharmacy

Course Name	Advanced Pharmaceutical technology	Course No.	0201762
Prerequisite	NA	Credit Hours	2
Number & date of course plan approval		Brief Description	See form QF02/0409

Course Objectives	1. To familiarize the student with the interplay between delivery system design and physiological barriers. 2. To introduce students to the principles and technologies applied in the preparation of pharmaceutical dosage forms and delivery systems. To provide a knowledge base for the comparison of delivery system technologies.
Intended Learning Outcomes	1. The students should be capable of understanding biopharmaceutical and physiological aspects that affect route of administration, drug dissolution, absorption and bioavailability. 2. The students should be able to correlate the design of delivery system to the physiological environment. 3. The students should be able to employ the principles and technology 4. The student should be able of understanding drug engineering and the merged disciplines that revolves around pharmacy.
Course Topics	1. This course provides students with an introduction to the drug delivery and targeting. 2. This course will provide students with the gastrointestinal tract physiology, immediate and modified release oral dosage forms. In addition, it will provide student with an introduction to the sustained action parenteral delivery systems and other drug delivery systems. 3. This course will cover subjects of particulate carriers in drug delivery such as liposomes, microparticles and nanoparticles 4. This course will introduce the students to the principles of pharmaceutical engineering and biomaterials

Text Books	Aulton's Pharmaceutics: The Design and Manufacture of Medicines, by: M. E. Aulton and K. M. G. Taylor. 4th Edition. 2013. Churchill Livingstone.		
References	Selected research articles from the literature.		
Grade Determination	1st Exam = 25% 2nd Exam = 25% Final Exam = 50%	Practical Course Grade Determination	Course Work = 50% (Reports, Term Papers, Quizes) Final Exam = 50%

Course Outline

Week	Hours	Subjects	Chapters in Textbook	Notes
1	1 1	Introduction to drug delivery systems Gastrointestinal tract physiology		
2	1 1	Modified release solid oral dosage forms		
3	1 1	Modified release solid oral dosage forms (cont'd)		
4	1 1	Introduction to nanotechnology and targeting , Polymer- and antibody-drug conjugates		
5	1 1	Liposomes, Nanoparticles, Polymeric micelles		
6	1 1	Introduction to Biomaterials		
7	1 1	Introduction to Biomaterials		
8	1 1	Materials for urinary catheters and stents		
9	1 1	Rheology		

10	1 1	Seminars		

Approved by Dept. Chair		Date of Approval	

Extra Information: (Updated every semester and filled by course instructor)

Course Instructor	Ola A. Altarawneh
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Course Detailed Description – Procedures of the Course Plan Committee /Faculty of Pharmacy	QF02/0408-2.1E

Department	Pharmacy

Course Name	Advanced Pharmacology	Course No.	201721
Prerequisite		Credit Hours	3
Number & date of course plan approval	2010-2011	Brief Description	See form QF02/0409

Course Objective	1. This course provides students with the latest and updated information regarding the drugs and treatment of selected diseases. 2. The student should learn to read, understand, present and discuss research papers in the field of pharmacology.
Intended Learning Outcomes	This course is intended to discuss the most recent advances in pharmacology of the most important drugs that affect different organ systems with a special emphasis on the treatment of patients from the pharmaceutical point of view.
Course Topics	1. Parkinson disease 2. Epilepsy 3. Depression 4. Heart failure 5. Schizophrenia 6. Alzheimer 7. Asthma 8. Diabetes Type II 9. Hypertension
Text Books	- Latest research articles - Modern pharmacology with clinical applications – latest edition - Goths medical pharmacology – latest edition - Lippincott's illustrated reviews – latest edition
References	1. **Goodman and Gilman pharmacological basis of therapeutics** – latest edition

Grade Determination	1st Exam = 25% 2nd Exam = 25% Final Exam = 50%	Practical Course Grade Determination	Course Work = 50% (Reports, Term Papers, Quizes) Final Exam = 50%

Course Outline

Week	Hours	Subjects	Chapters in Textbook	Notes
1and 2		- Current management of Parkinson disease.	31	**Ref 2**
2 and 3		- Basic mechanism of antiepileptic drugs and their pharmacokinetic/phamacodynamic interaction: an update.	32	**Ref 2**
4 and 5		- Pharmacotherapies for depression	33	**Ref 2**
6 and 7		- Heart failure	15	**Ref 2**
8 and 9		- Schizophrenia treatment. Critical review on the drugs and mechanisms of action of antipsychotics.	34	**Ref 2**
10		- Alzheimer' disease: an update	31	**Ref 2**
11 and 12		- The increasing challenge of discovering anti-asthma drugs.	39	**Ref 2**
13 and 14		- Management of type 2 diabetes: new and future developments in treatment.	67	**Ref 2**
15		- Hypertension treatment update.	**20**	**Ref 2**
16		- Final examination		

Approved by Dept. Chair		Date of Approval	

Extra Information: (Updated every semester and filled by course instructor)

Course Instructor	Dr. Luay Al-Essa
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Department	Pharmacy

Course Name	Advanced Pharmacology for Nursing Master Students	Course No.	0201722
Prerequisite		Credit Hours	3
Number & date of course plan approval		Brief Description	See form QF02/0409

Course Objective	To understand the advanced clinical applications of drug therapy.
Intended Learning Outcomes	At the end of this course, the students are expected to have good understanding of the followings: 1) The clinical trials in drug development. 2) Pharmacology of special populations such as pediatric, geriatric patients and pregnant women. 3) The new clinical drugs used in treatment of infectious, cancer and cardiovascular diseases.
Course Topics	Clinical trials in drug development Pharmacology of special populations Future trends in cardiovascular, endocrine and chemotherapy drugs.
Text Books	Goodman and Gilman's The Pharmacological Basis of Therapeutics 12th edition Lippincott Illustrated Reviews: Pharmacology 7th edition

References	Basic and Clinical Pharmacology, Katzung and Trevor 13th edition.		
Grade Determination	Mid Exam = 30% Seminars = 20% Final Exam = 50%	Practical Course Grade Determination	Course Work = 50% (Reports, Term Papers, Quizes) Final Exam = 50%

Course Outline

Week	Hours	Subjects	Notes
1	3	**Principles of drug therapy (pharmacodynamics and pharmacokinetics)**	
2	3	**Clinical trials in drug development**	
3	3	**Bioequivalent drug studies**	
4	3	**Drug-drug and drug-food interaction**	
5	3	**Pediatric Pharmacology**	
6	3	**Geriatric pharmacology**	
7	3	**Drugs used in pregnant women**	
8	3	**Advances in Endocrine Pharmacology**	
9	3	**Advances in anti-tuberculosis treatment**	
10	3	**Ionotropic drugs**	
11	3	**Antidepressants**	
12	3	**Advances in Anticancer therapy**	
13	3	**Advances in analgesic drugs**	
14	3	**Immunumodulator drugs**	
15	3	**Advances in antihypertensive drugs**	

Approved by Dept. Chair		Date of Approval	

Extra Information: (Updated every semester and filled by course instructor)

Course Instructor	Dr. Yazun Jarrar
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Department	Pharmacy

Course Name	Advanced Medicinal Chemistry and Drug Design	Course No.	201742
Prerequisite		Credit Hours	3
Number & date of course plan approval		Brief Description	See form QF02/0409

Course Objectives	This course is designed to impart the knowledge in computational methods and drug design approaches. It aims to build students' knowledge in theoretical chemistry and its application in drug design. It is proposed to provide students with an understanding of hit discovery, lead identification, lead optimization, target selection, and molecular recognition employing computer-aided drug design software. And, it will shed the light on computer-based methods, combinatorial chemistry, high-throughput screening, and database mining.
Intended Learning Outcomes	At the end of this course students will be able to: -recognize theoretical strategies and their classifications. -distinguish between bioinformatics and cheminformatics methods and their recruitment in drug design. - describe the drug design pipeline and understand where computational chemistry fits in. - discuss informatics approaches to the prediction of chemical properties. - understand the importance of drug-like properties and their prediction. - describe the use of lead candidates and database representations. - understand the use of classifier algorithms and quantum/classical descriptors - describe relations between thermodynamic properties and protein-ligand binding and structure - describe protein-ligand docking and the empirical/knowledge-based scoring functions - discuss empirical scoring, de-novo design and virtual screening - describe simulations of ligand binding thermodynamics - appreciate protein sequence searches, homology and loop modelling, protein-protein docking, and describe biologics design - describe the relation between IC_{50} and Kd, and discuss biophysical methods. - know how to use software such as MOE, MAESTRO, AMBER, and PYMOL.

Course Topics	1. Computational Methods 2. Conformational Analysis. 3. Geometry Optimization. 4. Molecular Dynamic Simulation. 5. Ligand-Based Drug Design a. Pharmacophore modeling and Searching b. Virtual Screening c. High-throughput Screening. d. Quantitative Structure Activity Relationship (QSAR) 6. Structure-Based Drug Design. a. Molecular Docking. b. Glide Docking c. Induced-Fit Docking d. Quantum-Polarized Ligand Docking 7. Fragment-Based Drug Design. 8. De-novo Design 9. Combinatorial Chemistry. 10. Hit Discovery, lead identification, and lead Optimization Case study.
Text Books	1. The Organic Chemistry of Drug Design and Drug Action, 2nd edition, Richard B. Silverman, Elsevier, 2004. 2. Foye's Principles of Medicinal Chemistry, 6th edition, Thomas L. Lemke and David A. Williams, Lippincott Williams & Wilkins, 2008. 3. Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry, 12th edition, J. N. Delgado and W. A. Remers, Lippincott-Raven, 2011. 4. Burger's Medicinal Chemistry and Drug Discovery, 6th edition, M. E. Wolff, 2003.

References	1- An Introduction of Medicinal Chemistry, 4th edition, Graham Patrick, Oxford University Press, 2008. 2- The Organic Chemistry of Drug Synthesis, Vol. 1-6, D. Lednicer and L. A. Mitscher, John Wiley and Sons. 3- Computational Chemistry and Drug design Journals.		
Grade Determination	Mid-term Exam = 30% Presentations and assignments Exam = 30% Final Exam = 40%	Practical Course Grade Determination	Course Work = 50% (Reports, Term Papers, Quizzes) Final Exam = 50%

Course Outline

Week	Hours	Subjects	Chapters in Textbook	Notes
1	1 1 1	- Computational Methods - Potential energy. - Molecular mechanics. - Quantum Mechanics. - Geometry Optimization. - First Order Minimization. - Second Order Minimization.	Textbooks 1-3/ Drug Design Part	
2	1 1 1	- Conformational Analysis. - Molecular Dynamic (MD) Simulation. - Monte Carlo Method. - Metropolis Method. - NPT Model - NVT Model.	Textbooks 1-3/ Drug Design Part	
3-4	2 2 2	- X-ray crystallography - Homology Modeling - Bioinformatics. - Structure-Based Drug Design - Molecular Docking - Binding Free Energy.	Textbooks 1-3/ Drug Design Part	
5-6	2 2 2	- Ligand-Based Drug Design. - Cheminformatics. - Pharmacophore Modeling - Pharmacophore Searching - Druggability - Lipinski's Rule of Five - Database Mining - Virtual Screening	Textbooks 1-3/ Drug Design Part	

7-8	2 2 2	- Ligand-Based Drug Design - Quantitative Structure-Activity Relationship - Equations and Graphs. - Physicochemical Properties. - Hydrophobicity. - Electronic Property. - Steric Factor. - Craig Plot. - Topliss Scheme. - Hansch Equation. - Topliss operational schemes. - QSAR: 3D-QSAR (CoMFA).	Textbooks 1-3/ Drug Design Part	
9	1 1 1	- Combinatorial Chemistry. - Parallel Synthesis. - Solid Phase Technique. - High-Throughput Screening.	Textbooks 1-3/ Drug Design Part	
10	1 1 1	- Case Study I	Textbooks 1-3/ Drug Design Part	
11	1 1 1	- Case Study II	Textbooks 1-3/ Drug Design Part	
12	1 1 1	- Article Presentation and Discussion.	Computational Chemistry and Drug design Journals.	
13	1 1 1	- Molecular Modeling Practical		

Approved by Dept. Chair		Date of Approval	

Extra Information: (Updated every semester and filled by course instructor)

Course Instructor	Dima A. Sabbah, Ph.D.
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Extension **Email**	311 dima.sabbah@zuj.edu.jo
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Course Detailed Description – Procedures of the Course Plan Committee /Faculty of Pharmacy	QF02/0408-2.10E

Department	Pharmacy

Course Name	Research Methodology	Course No.	201702
Prerequisite		Credit Hours	2
Number & date of course plan approval		Brief Description	See form QF02/0409

Course Objectives	This course will provide an opportunity for students to establish or advance their understanding of research through critical exploration of research design, ethics, and approaches. The course introduces the language of research, ethical principles and challenges, and the elements of the research process within quantitative, qualitative, and mixed methods approaches. Students will use these theoretical underpinnings to begin to critically review literature relevant to their field or interests and determine how research findings are useful in forming their understanding of their work, social, local and global environment. This course is designed to examine the procedures and principles involved with experimental research. Problem formulation, literature review, writing proposal, research design, writing a research paper, and concise oral presentation will be addressed.
Intended Learning Outcomes	At the end of this course students will be able to: • Understand research terminology • Be aware of the ethical principles of research, ethical challenges and approval processes • Describe quantitative, qualitative and mixed methods approaches to research • Identify the components of a literature review process • Critically analyze published research
Course Topics	1. Research Categories. - Scientific Research. - Hypothesis Categories. - Aims of Research. - Choosing Research Methods. - Choosing Measurements. - Significance Tests. - Drawing Conclusions. - Generalization.

- Validity and Reliability.
- Errors in Research.
- Identifying Research Problems.

2. Research Design.
   - Descriptive Designs.
   - Correlational Studies.
   - Experimental Designs.
   - Semi-experimental Designs.
   - Research Methods.
   - Surveys and Questionnaires.
3. Research Ethics
   - Ethical Principles
   - Ethical Issues
   - Ethical Violation
   - Data Manipulation
   - Research Misconduct
   - Fabrication
   - Falsification
   - Plagiarism
4. Scientific Knowledge
   - Sharing Scientific Knowledge
   - Authorship
   - (Authorship) Author Responsibilities.
   - Publishable Papers and Not Acceptable Papers.
5. Application and Assignments
   - Structure of a Research Paper
   - Structure of a Proposal
   - Structure of a Thesis
   - Structure of a Dissertation
   - Structure of an informative, concise, and Attractive Presentation.

Text Books	1. The Art of Scientific Investigation, Author: *W.I. B. Beveridge*, 1950, recent copy November 2015. 2. An Introduction to Scientific Research, Author: *E. Bright Wilson, Jr*. 1952.		
References	Online Research Methodology material is sufficient.		
Grade Determination	Mid-term Exam = 30% Presentations and assignments Exam = 30% Final Exam = 40%	Practical Course Grade Determination	Course Work = 50% (Reports, Term Papers, Quizzes) Final Exam = 50%

Course Outline

Week	Hours	Subjects	Chapters in Textbook	Notes
1	1 1 1	- Introduction to Research and the Research Process	Textbooks 1-2	
2	1 1 1	- Prepare a concise Power Point Presentation		
3	1 1 1	- Research Ethics - Sharing Scientific Knowledge	Textbooks 1-2	
4	1 1 1	- Literature Review - Access to a large database of scientific and medical research such as Scopus ScienceDirect SciFinder		
5-6	1 1 1	- Research Categories and Research Design	Textbooks 1-2	

7-9	1 1 1	- Write a Research Article. - Write a Review Article. - EndNote Output Style Session. - Installation EndNote. - Prepare an EndNote Library. - Application.		
10-11	1 1 1	- Write a Proposal.	Textbooks 1-2	
12	1 1 1	- Prepare a Poster		

Approved by Dept. Chair		Date of Approval	

Extra Information: (Updated every semester and filled by course instructor)

Course Instructor	Dima A. Sabbah, Ph.D.
Office No.	227
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Department	Pharmacy

Course Name	Advanced Pharmaceutical Analysis	Course No.	0201741
Prerequisite		Credit Hours	3
Number & date of course plan approval		Brief Description	See form QF02/0409

Course Objectives	To explore the different pharmaceutical analytical techniques used in pharmaceutical analysis.
Intended Learning Outcomes	1. Students will learn the current state-of-the art procedures for the isolation, purification, derivatization, and characterization of complex chemical and biological samples. 2. Students will acquire knowledge about applications of spectrophotometric methods of analysis (ultraviolet/ visible spectroscopy, infrared, nuclear magnetic resonance, mass spectrometry, fluorescence, and atomic absorption/emission) to pharmaceutically important materials.
Course Topics	1. Electrophoresis 2. Chromatography 3. Advanced UV/Vis absorption spectroscopy 4. Spectrofluorimetry 5. Advanced FT-IR and its applications 6. ^{1}H-NMR 7. ^{13}C-NMR 8. Mass Spectroscopy
Text Books	1. Watson, D. G. 2012. Pharmaceutical Analysis, 3rd edition. Churchill Living stone, London. 2. Skoog, D. A. 2007. Principles of Instrumental Analysis, 6th edition. Brooks/ Cole Thomson Learning, Australia.

References	1. Francis Rouessac and Annick Rouessac. 2000. Chemical Analysis, 2nd edition. John Wiley and Sons, LTD. 2. Dudley Williams and Ian Fleming. 1999. Spectroscopic methods in organic chemistry, 5th edition. 3. Instructor lectures, articles, and web sites
Grade Determination	Mid Exam = 30% Seminars, assignments & practical evaluation = 30% Final Exam = 40%

Course Outline

Week	Hours	Subjects	Chapters in Textbook	Notes
1	2	**Separation Methods** Electrophoresis		
2	2	Electrophoresis		
3	2	General aspects of chromatography Application of Gas Chromatography		
4	2	High Performance Liquid Chromatography Qualitative and Quantitative Applications		
5	2	**Spectroscopic Methods** Advanced UV/Vis absorption spectroscopy		
6	2	Advanced UV/Vis absorption spectroscopy		
7	2	Spectrofluorimetry		
8	2	Advanced FT-IR and its applications		
9	2	^{1}H-NMR		
10	2	^{1}H-NMR		
11	2	^{13}C-NMR		
12	2	^{13}C-NMR		
13	2	Mass Spectroscopy		
14	2	Mass Spectroscopy		
15	2	Combined Structure Elucidation Problems		

Approved by Dept. Chair		Date of Approval	

Extra Information: (Updated every semester and filled by course instructor)

Course Instructor	Dr. Reema Abu Khalaf
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