



Jordan University of Science and Technology
Faculty of Pharmacy
Pharmacy Department

PHAR772 Advanced Pharmacological Sciences
Second Semester 2023-2024

Course Catalog
3 Credit Hours. This comprehensive pharmacology course emphasizes recent advances in the understanding of pharmacological principles. The course appraises the cellular and molecular biology of signal transduction and will provide a more detailed discussion of the molecular pharmacology of receptors, channels and enzymes. This course will focus also on receptor theory, receptor-ligand interactions, receptors and signal transduction, protein structure-activity relationships, concepts of protein scaffolding and trafficking, genomic regulation of drug action, and pharmacogenomics. Many of these aspects will be reviewed in the context of how defects in such molecular processes produce pathological diseases.
Teaching Method: On Campus

Text Book	
Title	Introduction to Protein Structure
Author(s)	Carl Branden and John Tooze.
Edition	2nd Edition
Short Name	Ref #1
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref #2	Rang & Dale's PHARMACOLOGY	H P Rang, J M Ritter, R J Flower, and G Henderson.	9th Edition	
Ref #3	Plasmid 101 - Addgene 2 e-book	Addgene Team	4th Edition	
Ref #4	Protein Kinase C: Structure, Function, and Regulation.	Alexandra C. Newton	1st Edition	Paper
Ref #5	Crystal Structure and Allosteric Activation of Protein Kinase C-Beta II.	Thomas A Leonard, etal.	1st Edition	Paper
Ref #6	Molecular dynamics simulation for all.	Scott A Hollingsworth and Ron O Dror.	1st Edition	Paper
Ref #7	2.2 A Refined Crystal Structure of the Catalytic Subunit of cAMP-Dependent Protein Kinase Complexed with MnATP and a Peptide Inhibitor.	Jianhua Sheng, etal.	1st Edition	Paper
Ref #8	Crystal Structure of the Cys2 Activator-Binding Domain of Protein Kinase C δ in Complex with Phorbol Ester.	Gongyl Zhang, etal.	1st Edition	Paper
Ref #9	High-Throughput Screening: The Hits and Leads of Drug Discovery- An Overview.	Martis E A, Radhakrishnan R, and Badve R R.	1st Edition	Paper
Ref #10	The MTT Assay: Utility, Limitations, Pitfalls, and Interpretation in Bulk and Single-Cell Analysis.	Mahshid Ghasemi, etal.	1st Edition	Paper
Ref #11	Flow Cytometry: An Overview.	Katherine M McKinnon	1st Edition	Paper
Ref #12	Basic Methods of Cell Cycle Analysis.	Anna Ligasov, Ivo Frydrych, and Karel Koberna.	1st Edition	Paper
Ref #14	Western Blot: Technique, Theory, and Trouble Shooting.	Tahrin Mahmood and Ping-Chang Yang.	1st Edition	Paper
Ref #13	Annexin V-Affinity Assay: A Review on an Apoptosis Detection System Based on Phosphatidyl serine Exposure.	Manon van Engeland, etal.	1st Edition	Paper
Ref #15	Protein kinase C-delta inactivation inhibits the proliferation and survival of cancer stem cells in culture and in vivo.	Zhihong Chen, etal.	1st Edition	Paper

Instructor	
Name	Dr. Rasha Khader
Office Location	M5 - L-4
Office Hours	
Email	rekhader@just.edu.jo

Class Schedule & Room
Section 1: Lecture Time: Sun, Tue, Thu : 11:30 - 12:30 Room: قاعة الكندي/اصيدلة

Tentative List of Topics Covered		
Weeks	Topic	References
Week 1	Proteins: Amino acids, metal atoms, rotamers, and interactions in protein function.	Chapter 1 From Ref #1
Week 1	Proteins: Folding and domains.	Chapter 6 From Ref #1
Week 2	Workshop: The structure-function relationship of proteins and proteins in therapy.	From Ref #4, From Ref #5
Weeks 3, 4	Proteins: Prediction, engineering, and design of protein structures.	Selected software packages and Chapter 17 From Ref #1
Week 7	Student assignment (1) discussion: Structure-function relationship of proteins.	
Week 5	Proteins: Molecular dynamics and simulations.	From Ref #6
Week 6	Proteins: Determination of protein structures in wet lab settings.	Chapter 18 From Ref #1
Week 8	Receptors and receptor-ligand interactions: An overview.	Chapters 11, 12, and 13 From Ref #1
Weeks 9, 10	Receptor-ligand interactions: An in-depth discussion.	From Ref #5, From Ref #7, From Ref #8
Weeks 10, 11	Workshop: Computational methods in pharmacological investigation of receptors and their ligands.	From Ref #9
Weeks 12, 13	Receptors and receptor-ligands interactions: Wet lab methods in pharmacological investigation of receptors and their ligands.	From Ref #10, From Ref #11, From Ref #12, From Ref #14, From Ref #13
Weeks 13, 14	Pharmacogenetics, biopharmaceuticals, and gene therapy: A discussion.	Selected topics From Ref #3, From Ref #15
Weeks 15, 16	Drug development: A discussion.	Chapter 60 From Ref #2

Mapping of Course Outcomes to Program Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
Learn the recent advances in the understanding of pharmacological principles regarding proteins, their folding and structure prediction, and their structure-function relationship; and the experimental methods currently used and developed to test these principles and to be able to discuss the principles and the methods, then apply some of these methods to certain principles.	40%	Midterm Exam, Assignment (1), Final Exam
Learn the recent advances in the understanding of pharmacological principles regarding receptors (including channels and enzymes), signal transduction, and receptor-ligand interactions in-depth and the experimental methods currently used and developed to test these principles and to be able to discuss the principles and the methods, then apply some of these methods to certain principles.	40%	Midterm Exam, Assignment (2), Final Exam
Learn the recent advances in the understanding of pharmacological principles regarding pharmacogenomics and how defects at the genomic level can affect upstream and downstream cell components and the experimental methods currently used and developed to test these principles and be able to discuss the principles and the methods, then apply some of these methods to certain principles.	20%	Final Exam

Relationship to Program Student Outcomes (Out of 100%)															
PLO1.1	PLO2.1	PLO3.2	PLO3.3	PLO2.2	PLO2.3	PLO2.4	PLO3.1	PLO3.4	PLO3.5	PLO3.6	PLO4.1	PLO4.2	PLO4.3	PLO4.4	PLO5.1

Evaluation	
Assessment Tool	Weight
Midterm Exam	20%
Assignment (1)	10%
Assignment (2)	20%
Final Exam	50%

Policy	
Exams	The format for the exams includes multiple-choice questions and short essay questions. Grades will not be given out via e-mail. Makeup exams should not be given unless there is a valid excuse. Arrangements to take an exam at a time different than the one scheduled MUST be made prior to the scheduled ex

