



**Jordan University of Science and Technology**  
**Faculty of Pharmacy**  
**Pharmacy Department**

PHAR729 Pharmacogenetics In Health And Disease - JNQF Level: 6

First Semester 2024-2025

**Course Catalog**

3 Credit Hours. Pharmacogenomics is the study of genetic variation associated with drug response, adverse drug events, and disease outcomes related to drug treatment. One of the great challenges in drug development and therapy is maximizing therapeutic response while avoiding adverse effects. Advances in genetic knowledge gained through sequencing have been applied to both of these areas and identifying heritable genetic variants that predict response and toxicity is an area of great interest to researchers. The ultimate goal is to identify clinically significant variations to predict the right choice and dose of medications for individuals, "personalizing medicine". This is particularly desirable in the case of anticancer or antiviral agents where the therapeutic index is very narrow and a large proportion of patients do not respond. The study of pharmacogenomics is complicated by the fact that response and toxicity are multigenic traits and are often confounded by nongenetic factors (e.g., age, co-morbidities, drug-drug interactions, environment, diet, etc). Using knowledge of an individual's DNA sequence as an integral determinant of drug therapy has not yet become standard clinical practice; however, several genetics-guided recommendations for physicians have been developed and will be highlighted. As pharmacogenomic advances allow for individualized drug therapies based on genotypic information, the cost of and morbidity from drug toxicity is expected to decrease, and drug efficacy is expected to increase. The ethics and economics of pharmacogenomics will also be discussed. This course will focus on how pharmacogenomics can be used in patient care.

**Teaching Method:** On Campus

**Text Book**

<b>Title</b>	Pharmacogenomics in Clinical Practice
<b>Author(s)</b>	Dragan Primorac ? Wolfgang H?ppner ? Lidija Bach-Rojecky
<b>Edition</b>	1st Edition
<b>Short Name</b>	1
<b>Other Information</b>	DOI: <a href="https://doi.org/10.1007/978-3-031-45903-0">https://doi.org/10.1007/978-3-031-45903-0</a>

**Course References**

Short name	Book name	Author(s)	Edition	Other Information
2	Pharmacogenomics in Precision Medicine	Weimin_Cai Zhaoqian_Liu Liyan_Miao Xiaoqiang_Xiang	1st Edition	DOI: <a href="https://doi.org/10.1007/978-981-15-3895-7">https://doi.org/10.1007/978-981-15-3895-7</a>

**Instructor**

<b>Name</b>	Prof. Maha Al-Keilani
<b>Office Location</b>	P1L0
<b>Office Hours</b>	Mon : 13:00 - 15:00 Tue : 08:00 - 09:00 Wed : 13:00 - 14:00 Thu : 08:00 - 10:00
<b>Email</b>	mskeilani@just.edu.jo

**Class Schedule & Room**

Section 1:  
Lecture Time: Mon, Wed : 10:00 - 11:30  
Room: U

**Tentative List of Topics Covered**

Weeks	Topic	References
Week 1	Genetics Background and Introduction to Pharmacogenomics	
Week 2	Pharmacogenomics of Drug-Metabolizing Enzymes	
Week 3	Role of Membrane Transporters in Pharmacogenomics	
Week 4	Role of Drug Targets and Other Proteins Important in Pharmacogenomics	
Week 5	Pharmacogenomics in Cancer Therapeutics	
Week 6	Journal Club for Pharmacogenomics in Cancer Therapeutics	
Week 7	Pharmacogenomics in Cardiovascular Diseases	
Week 8	Journal Club for Pharmacogenomics in Cardiovascular Diseases	
Week 9	Pharmacogenomics of Anti-Infective Agents	
Week 10	Journal Club for Pharmacogenomics of Anti-Infective Agents	
Week 11	Pharmacogenomics of Immunosuppressants	

Week 12	Journal Club for Pharmacogenomics of Immunosuppressants	
Week 13	Rare Diseases ? Genetic Discovery and Treatment	
Week 14	Journal Club for Role of Pharmacogenetics in Drug discovery and development for rare genetic disorders	
Week 15	The Ethical, Legal, and Regulatory Issues Associated with Pharmacogenomics	
Week 16	Application of Pharmacogenomics in Drug Discovery and Development	

Mapping of Course Outcomes to Program Outcomes and NQF Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
Explain the basic principles of human genetics and heredity as they apply to inter-individual variation in treatment response [1PLO1.1] [1L6K2]	20%	
Discuss how genetic variability in genes encoding drug metabolizing enzymes, drug transporting proteins, and drug receptors (targets) can contribute to variability in drug disposition and action, leading to changes in pharmacokinetics, pharmacodynamics, and clinical outcome [1PLO2.1]	30%	
Discuss impact of pharmacogenomics in different therapeutic areas [1PLO1.1]	30%	
Critically evaluate the current and future literature in pharmacogenomics [1PLO3.1]	20%	

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	PLO-PT1.1	PLO-PT2.1	PLO-PT2.2	PLO-PT3.1
50	30						20												

Relationship to NQF Outcomes (Out of 100%)
L6K2
20

Evaluation	
Assessment Tool	Weight
Midterm	30%
Active learning	20%
Final exam	50%

Policy	
Communicating with Instructors	? Students should communicate through their official JUST emails. Communication through personal email accounts (yahoo, Gmail, Hotmail, etc.) or social media will NOT be accepted, and no response will be provided. ? Students are required to check their emails and the E-learning page of the course regularly for announcements and notifications.
Exams	? All exams are closed books and notes. ? The final exam is comprehensive (covers all the material). ? The first, second, and midterm incomplete exams need approval from the departments' heads. ? The final incomplete exams need approval from the dean.
Cheating	Prohibited; The commitment of the acts of cheating and deceit such as copying during examinations, altering examinations for re-grade, plagiarism of homework assignments, and in any way representing the work of others as your own is dishonest and will not be tolerated. Standard JUST policy will be applied. إذا ضبط الطالب أثناء الامتحان أو الاختبار متلبساً بالمادة 7 بالغش فتوقع عليه العقوبات التالية مجتمعة : أ- في ذلك الامتحان أو الاختبار ر اعتباره راسياً ب- إلغاء تسجيله في بقية المساقات المسجل لها في ذلك الفصل ج- فصله من الجامعة لمدة فصل دراسي واحد، و هو الفصل التالي للفصل الذي ضبط فيه
Attendance	? Attendance is mandatory and will be recorded regularly. ? Excellent attendance is expected. ? Students who miss more than 20% of the classes will be dropped from the course as per JUST policy. ? If you miss class, it is your responsibility to find out about any announcements or assignments you may have missed.
Active learning and students' participation	? Students are expected to actively participate in class discussions. A. Journal Club: there will be 5 journal clubs during the semester. Each will be out of 5, and the average will be taken. If you miss one of them, you will get a grade of 0/5. B. Term paper: You will be asked to choose a particular disease that has both a genetic and an environmental component to it, and write a brief paper (4-6 pages, double spaced) describing what is known about the etiology of the disease. In the paper, you should cover: 1. the fundamental biology of the disease, including which genes are involved 2. identify candidate genes that might act as susceptibility genes, and discuss their function 3. review the basic epidemiology of the disease that has led to discoveries that genetic factors are involved 4. identify and discuss any environmental factors that have been implicated in the etiology of the disease; environmental factors are defined in their broadest terms, and include diet, viruses and other microbiological factors, occupation, lifestyle factors, etc. 5. include all appropriate references (use Vancouver style for citation)

Withdraw	- Last day to drop the course is before the twelve (12th) week of the current semester
Classroom Etiquette	<ul style="list-style-type: none"> <li>? Respect <ul style="list-style-type: none"> <li>o Respect people, places, and things.</li> <li>o Raise your hand to speak.</li> <li>o Listen respectfully.</li> <li>o Food and drink are not permitted in class.</li> <li>o Do not engage in aside conversations.</li> </ul> </li> <li>? Participation or Disruption: <ul style="list-style-type: none"> <li>o Do not hesitate to ask questions at any time, especially if you are unsure of something.</li> <li>o Listen to other students' questions to avoid asking the same question five minutes later.</li> <li>o Allow your classmates to participate in class discussions and refrain from taking advantage of all opportunities for active participation.</li> </ul> </li> <li>? Cell Phones and Electronic Devices: <ul style="list-style-type: none"> <li>o Texting is not permitted in class.</li> <li>o The use of cell phones, smartphones, or other mobile communication devices is disruptive and is therefore prohibited during class without permission.</li> <li>o Your phone should be turned off. If you must keep your phone on, you should set it to vibrate or silent mode and leave class if you receive an emergency call.</li> <li>o Except in emergencies, those using such devices must leave the classroom for the remainder of the class period.</li> <li>o Do not use your laptop in class for browsing the Internet or using social media while in class.</li> </ul> </li> <li>? Missing a Class <ul style="list-style-type: none"> <li>o Do not miss classes. It is not appropriate to ask the professor if you missed anything important if you miss class. Obviously, something of importance was missed, you missed a whole class!</li> <li>o Whenever you are absent from class, it is your responsibility to make up the work and to get notes, not your professor's.</li> <li>o If you need to leave early, notify the instructor.</li> </ul> </li> <li>? Be Punctual <ul style="list-style-type: none"> <li>o Make sure you arrive to class on time</li> </ul> </li> </ul>
Email Etiquette	<ul style="list-style-type: none"> <li>? Type your email in the body of the email NOT in the subject line.</li> <li>? Provide a clear subject line. Keep it short and to the point, but not vague. Name, class, and what the email is specifically about should be in the subject line.</li> <li>? Body of the email: Your emails should always start with a formal greeting like you would in a letter, be brief (one screen length), check your spelling/grammar/punctuation, use a professional font (not decorative), and include a salutation aligned with your message (Thank you or Sincerely).</li> <li>? Avoid sending an email to your professor asking about grades or complaining about them. Schedule an appointment to meet in person to discuss areas for improvement if you have inquiries.</li> <li>? Consider the impression your tone will make in the email. It is recommended waiting 24 hours before sending an email or responding to an email if you are emotionally charged.</li> <li>? It is not appropriate to write in ALL CAPS. This conveys the impression that you are shouting at the recipient.</li> <li>? Make sure you read and reread your email before sending it. Make sure your emails are grammatically correct, have proper titles, and are properly spelled.</li> <li>? If you have multiple questions or the message runs long, you might consider revising the message or scheduling a face-to-face meeting.</li> <li>? You should double-check your ATTACHMENTS. Refer to your attachments within the body of your email. It is advisable to avoid attaching large files and to consider sending the document as a PDF.</li> <li>? Please allow sufficient time for a response. The sender and receiver should both allow sufficient time. As a rule of thumb, 24 work hours should be given. If sending emails after official work hours or during formal vacations, a delay in response is expected. Following that, if no response is received, you can follow up.</li> </ul>