REPUBLIC OF YEMEN
21 SEPTEMBER UMAS

Development Academic Center &
Quality Assurance

الجمهورية اليمنية

جامعة 21 سبتمبر
للعلوم الطبية والتطبيقية
مركز التطوير الأكاديمي وضمان الجودة

University of 21 September for Applied and Medical Sciences

Faculty of Clinical Pharmacy

Program of Master in Clinical Pharmacy

Course Specification of Pharmacogenomics and Personalized Medicine

Course No. (CPh107)

2021/2022

I. Course Identification and General Information:

1	**Course Title:**	Pharmacogenomics and Personalized Medicine				
2	**Course Code & Number:**	CPh107				
3	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2				2
4	**Study level/ semester at which this course is offered:**	**- level 1/ semester 2**				
5	**Pre –requisite (if any):**	Therapeutics-II				
6	Co –requisite (if any):	NA				
7	Program (s) in which the course is offered:	Master in Clinical Pharmacy				
8	Language of teaching the course:	English				
9	Study System	Regular				
10	Mode of delivery:	**Semester based** system				
11	Location of teaching the course:	Faculty of Clinical Pharmacy				
12	Prepared By:	Dr. Ali Alkaf				
13	Date of Approval					

II. Course Description:

The Course is designed to addresses the genetic basis for individual differences in metabolizing enzymes, transporters, and other biochemicals impacting drug disposition and action that support the practice of precision (personalized) medicine to understand how these information can be used to provide quality personalized pharmaceutical care for patients. Pharmacogenomics is a young pharmaceutical science that introduces a newly emerging discipline in therapeutics, thought to greatly impact and revolutionize the practice of pharmacy.

III. Course Intended learning outcomes (CILOs):		Referenced PILOs
a.1	Define the basic principles of genetic inheritance and variability in humans	A1
a.2	Describe the impact of genetic variability on drug action	A1
a.3	Discuss probable current and future trends in applications of these fields in clinical practice.	A2
b.1	Design patient-specific pharmacotherapy regimen to optimize patient outcomes based on the patient's pharmacogenomic profile.	B1, B2
b. 2	Explain how genomics and other individual factors can influence drug pharmacokinetics and pharmacodynamics.	B1, B2
c.1	Provide Pharmacogenomics-Based Care	C2, C3
d. 1	Search efficiently for pharmacogenomic information from professional resources.	D2
d.2	Communicate pharmacogenomic-specific drug therapy recommendations to the health care team and patients	D1

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1- Define the basic principles of genetic inheritance and variability in humans	- Lecture - Self-learning - Interactive Discussion - Use of updated medical references	- Exam - Assignment - Quizzes
a2- Describe the impact of genetic variability on drug action.	- Lecture - Self-learning - Interactive Discussion - Use of updated medical references	- Exam - Assignment - Quizzes
a3- Discuss probable current and future trends in applications of these fields in clinical practice.	- Self-learning - Interactive Discussion - Use of updated medical references	- Exam - Assignment - Quizzes

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- Design patient-specific pharmacotherapy regimen to optimize patient outcomes based	- Lecture	- Exam - Assignment

on the patient's pharmacogenomic profile.	- Self-learning - Interactive Discussion - Use of updated medical references	- Quizzes
b2- Explain how genomics and other individual factors can influence drug pharmacokinetics and pharmacodynamics.	- Lecture - Self-learning - Interactive Discussion - Use of updated medical references	- Exam - Assignment - Quizzes

© Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
C1- Provide Pharmacogenomics-Based Care	- Lecture - Self-learning - Use of updated medical references	- Exam - Assignment - Assignment

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Search efficiently for pharmacogenomic information from professional resources.	- Self-learning - Seminar - Interactive Discussion	- Exam - Assignment
d2- Communicate pharmacogenomic-specific drug therapy recommendations to the health care team and patients.	- Interactive Discussion - Presentation	- Presentation

IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
1	Introduction to Pharmacogenomics (PGx)	a 1, a2, d1	- Principles of genetic medicine - Basic DNA and Genome structure - Human Genome Project	2	4
2	Human Genetic Variability and	a 3, b2, b3, d1	- P450 Enzymes & Drug Transporters	1	2

	Pharmacogenomic studies		- Influence of Genetic variations on drugs pharmacokinetics and pharmacodynamics	2	4
			- Phenotyping studies - Genotyping studies - Adjustment of doses based on pharmacogenomic studies with examples	2	4
3	**Midterm Exam**	a 1, a2, a3, b2, b3	-	1	2
4	Principles of Gene Therapy	a 2, a3, b1, b2, d1	- Introduction to gene therapy - Gene delivery systems	2	4
5	Clinical Applications of Pharmacogenomics	b 2, c1, d1, d2	- Pharmacogenomics of cardiovascular diseases	1	2
			- Pharmacogenomics of central nervous system diseases and psychiatry	1	2
			- Pharmacogenomics of Diabetes - Other applications	2	4
			- Limitation and ethical issues of gene therapy	1	2
6	**Final Exam**	a 1, a2, b1, b2, c1, d1		1	2
Number of Weeks /and Units Per Semester				**16**	**32**

V. Teaching strategies of the course:

1- Lecture

2- Seminars

3- Self-learning

4- Interactive Discussion

5- Use of updated medical references

6- Office hour

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	**Assignment 1**: Each student is assigned to provide a search-based report on metabolism variability of one type of Cyt450.	a 2, a3, b2, d1	Week 6	5%
2	**Assignment 2:** Each students group will be assigned to provide a search-based report on one recent advances in gene therapy techniques and applications.	a 2, a3, b2, d1	Week 12	5%
	Total			10

VII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments	Week 6 and 12	10	10%	a 2, a3, b2, d1
2	Quiz 1	Week 6	5	5%	a 2, a3, b2, d1, d2
3	Midterm Exam	Week 8	20	20%	a 1, a2, a3, b1, b2
4	Quiz 2	Week 12	5	5%	a 2, a3, b2, d1, d2
5	Final exam	Week 16	60	60%	a 1, a2, b1, b2, c1, d1
	Total		`100	100%	

VIII. Learning Resources:

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

1- Required Textbook(s) (maximum two).

1. J Licinio and M Wong (2003), Pharmacogenomics: The Search for Individualized Therapies; 1st Edition
2. Anthony Meagre (1999), Gene therapy technologies, applications and regulations, John Wiley & Sons Ltd

2- Essential References.

1. American College of Clinical Pharmacy (ACCP); 2009, Pharmacogenomics: Applications to Patient Care; 2nd Edition
2. American Society of Health System Pharmacists, 2010.Concepts in

	Pharmacogenomics
3- Electronic Materials and Web Sites *etc*.	
	- Updated evidence-based literatures

IX. Course Policies سياسات المقرر	
1	**Class Attendance سياسة حضور الفعاليات التعليمية** - يلتزم الدارس بحضور 75 % من المحاضرات ويحرم في حالة عدم الالتزام بذلك. إذا تغيب الطالب 25% من المحاضرات بدون عذر، يحرم من دخول امتحان المقرر النهائي.
2	**Tardy الحضور المتأخر** - يسمح للطالب دخول المحاضرة إذا تأخر لمدة خمس عشرة دقيقة في ثلاث محاضرات، وإذا تأخر زيادة عن ذلك يعطى إنذار شفوي من أستاذ المقرر ثم إنذار كتابي من القسم وإذا لم يتم الالتزام بعدها يمنع الطالب من دخول المحاضرة.
3	**Exam Attendance/Punctuality ضوابط الامتحان** - كما هو محدد في لائحة شئون الطلاب.
4	**Assignments & Projects التعيينات والمشاريع** - يسلم الطالب التكاليف في الوقت المحدد من قبل استاذ المقرر او في الخطة وتعتبر غير مقبولة إذا سلمت بعد الوقت المحدد.
5	**Cheating الغش** - تطبق لائحة شئون الطلاب الخاصة بذلك.
6	**Plagiarism الانتحال** - تطبق لائحة شئون الطلاب الخاصة بذلك.
7	**Other policies سياسات أخرى** - إغلاق الموبايل أو تصميته على الأقل في حالة حضور الطالب للمحاضرات أو التجارب المعملية، ويمنع اصطحابه في الاختبارات.