



Course Specification

(Bachelor)

Course Title: **Pharmacogenomics and Pharmacogenetics**

Course Code: **543 PHL-2**

Program: **Pharmaceutical Sciences**

Department: **Pharmacology**

College: **Pharmacy**

Institution: **Najran University**

Version: **1**

Last Revision Date: **24/12/2023**



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A. General information about the course:

1. Course Identification

1. Credit hours: (2 (2+0))

2. Course type

A. ☐ University ☐ College ☐ Department ☐ Track ☒ Program
B. ☐ Required ☒ Elective

3. Level/year at which this course is offered: (10th level/ 5^h year)

4. Course general Description:

This course introduces pharmacy students to the emerging fields of pharmacogenomics and pharmacogenetics, the basic sciences for personalized 'precision' medicine that are now transforming the face of modern health care. Powerful modern technologies revolutionizing genomics and molecular medicine are creating unprecedented opportunities for patient-specific treatments and health care. The course helps students build their knowledge and understanding of these new fields and develop professional evidence-based approaches to keep pace of these fast-moving areas into the future

5. Pre-requirements for this course (if any):

None

6. Co-requisites for this course (if any):

None

7. Course Main Objective(s):

Students after completion this course will be:

- Demonstrate fundamental knowledge of the molecular basis of responses to drugs and other therapeutics.
- Explain the new field of precision medicine and how recent technological advances in areas such as genomics, pharmacogenomics and bioinformatics are revolutionizing modern health care.
- Discuss how modern pharmacogenomics differs from traditional pharmacogenetics and why this is important for clinical utility.
- Provide balanced, critical evaluations of the benefits and limitations of important current and emerging technologies in these fields, including modern genotyping technologies such as polymerase chain reaction (PCR), microarrays and next generation sequencing.
- Explain how genomics and other individual factors such as environment or lifestyle can influence drug pharmacokinetics and pharmacodynamics.
- Apply evidence-based, systematic approaches to understanding and implementing pharmacogenomics and personalized health care.
- Discuss the advanced concepts of multifactorial drug-gene interactions and maternal-fetal pharmacogenomics.
- Perform balanced, evidence-based assessments of controversial issues and new information and concepts in these and other emerging fields.
- Describe potential impacts of personalized healthcare for consumers, health professionals, industry, government and society and demonstrate responsible professional attitudes in relation to ethical, legal and social issues (ELSI) in personalized health care.
- Discuss probable future trends in applications of these fields in clinical practice.

2. Teaching mode (mark all that apply)





No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	100%
2	E-learning	-	-
3	Hybrid <ul style="list-style-type: none"> Traditional classroom E-learning 	-	-
4	Distance learning	-	-

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	-
3.	Field	-
4.	Tutorial	-
5.	Others (specify)	-
Total		30

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Students after completion this course will be able to: - Demonstrate fundamental knowledge of the molecular basis of responses to drugs and other therapeutics. - Explain the new field of precision medicine and how recent technological advances in areas such as genomics, pharmacogenomics and bioinformatics are revolutionizing modern health care.	K1	Lectures	Written exams with multiple choice questions (MCQs) and short-answer questions (Quizzes, Mid-term and Final exams)
2.0	Skills			





Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	<ul style="list-style-type: none"> •Discuss how modern pharmacogenomics differs from traditional pharmacogenetics and why this is important for clinical utility. •Provide balanced, critical evaluations of the benefits and limitations of important current and emerging technologies in these fields, including modern genotyping technologies such as polymerase chain reaction (PCR), microarrays and next generation sequencing. 	S1	<p>Lectures</p> <p>Laboratory work</p> <p>Case studies or multimedia instruction</p>	<p>Written exams with multiple choice questions (MCQs) and short-answer questions (Quizzes, Mid-term and Final exams)</p> <p>Practical Exams</p>
2.2	<p>Explain how genomics and other individual factors such as environment or lifestyle can influence drug pharmacokinetics and pharmacodynamics.</p> <ul style="list-style-type: none"> • Apply evidence based, systematic approaches to understanding and implementing pharmacogenomics and personalized health care 	S2	<p>Lectures</p> <p>Laboratory work</p> <p>Case studies or multimedia instruction</p> <p>Group discussion</p>	<p>Written exams with multiple choice questions (MCQs) and short-answer questions (Quizzes, Mid-term and Final exams)</p> <p>Practical Exams</p>
3.0	Values, autonomy, and responsibility			
3.1	Demonstrate leadership, skills, in addition to accountability, confidence, and independent thinking to respond to routine or unanticipated circumstances.	V1	<p>Lectures</p> <p>Practice sessions</p>	Observation card
3.2	Professional use of computer in preparing reports, assignments, and		Lectures	Assignments (using rubrics)



Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
	oral presentations and to be skilled in the use of electronic library and internet resources for self-directed learning.	V2		Presentations (using rubrics)

C. Course Content

No	List of Topics (Theory)	Contact Hours
1.	The molecular basis of disease and individual responses to drugs and other therapeutics including herbal and complementary medicines.	2
2.	Personalized precision medicine and the 'new biology' fields such as genomics and other big data 'omics', bioinformatics and systems biology that are transforming health care and medicine	3
3.	The transition from traditional pharmacogenetics to modern pharmacogenomics.	3
4.	Current and emerging technologies including modern genotyping technologies such as polymerase chain reaction (PCR), microarrays and next-generation sequencing.	4
5.	Influence of genomics and other factors such as environment and lifestyle on individual pharmacokinetics and pharmacodynamics, including drug targets.	3
6.	Systematic approaches to understanding and implementing pharmacogenomics, personalized health care and precision medicine in pharmacy practice.	2
7.	Advanced pharmacogenomics concepts including multifactorial drug gene interactions and maternal-fetal pharmacogenomics.	4
8.	Controversies in pharmacogenomics and personalized health care and strategies for balanced, evidence-based assessment of new information and concepts.	3
9.	Ethical, legal and social issues and potential impacts of personalized health care for consumers, health professionals, industry, government and society.	2
10.	Current and future applications of pharmacogenomics and pharmacogenetics in clinical practice.	4
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz	5 th week	10%
2.	Midterm Exam	8 th week	25 %





No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
3.	Practical Quiz	9 th week	5%
4.	Student Activity/Assignment/Presentation	14 th Week	5%
5.	Students Observation card	Per semester	5%
6.	Final Theoretical Exam	17 th week	50%
7.	Total		100%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Russ B. Altman, David Flukhart, David Goldstein. Principles of Pharmacogenetics and Pharmacogenomics. 2nd Edition.
Supportive References	1. Goodman& Gilman: Pharmacological Basis of Therapeutics. 14 th Edition.
Electronic Materials	1. Pub Med 2. Science direct. 3. Medscape. 4. www.dlaf.nu.edu.sa
Other Learning Materials	Library contains adequate number of copies of the required reference text books.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	1. Suitable lecture room equipped with data show and internet and sufficient number of seats. 2. Blackboard collaborative system for e-learning in NU.
Technology equipment (projector, smart board, software)	1. Data show. 2. Computer software listed above. 3. Internet and Wifi- access
Other equipment (depending on the nature of the specialty)	1. Microsoft Office Package software

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Program Leaders Students	Direct Indirect
Effectiveness of Students assessment	Faculty Department council Peer Reviewer	Direct Direct Direct
Quality of learning resources	Students Faculty	Indirect Direct



Assessment Areas/Issues	Assessor	Assessment Methods
The extent to which CLOs have been achieved	Faculty	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	PHARMACOLOGY DEPARTMENT COUNCIL
REFERENCE NO.	COUNCIL NO. 5, 1445-1446 H
DATE	24/12/2023