

Diploma in Pharmacogenomics
Specialized Diploma
Department of Pharmaceutical Biochemistry/Department of Pharmacology
and Toxicology
 List of Diploma Courses (28 Cr. h)

No.	Code No.	Course Title / (Code)	Credit hours	
			L	P
First semester (14 cr.h)				
1	0608612	Molecular Biology	2	1
2	0608613	Bioethics	2	---
3	0608614	Bioinformatics	2	1
4	0602601	Pharmacology (Pharmacokinetics and Pharmacodynamics)	2	1
5	0602602	Data Analysis/Biostatistics	2	1
Second Semester (14 cr.h)				
6	0608615	Introduction to Pharmacogenomics	3	---
7	0608616	Pharmacogenomics in Practice	3	---
8	0602603	Clinical Drug Safety	2	1
9	0602604	Research project	2	---
١٠		Elective course	3	---
Elective Course (One)				
١١	0608617	Human Genetics	3	---
١٢	0602605	Molecular Pharmacology	3	---

Course Description

Semester One Courses (Total 12 cr.h)

Course Name	Credit Hours		Code No.
	L	P	
Molecular Biology	2	1	0608612

This course will discuss the structure and function of biologically important molecules such as DNA, RNA, and proteins and the molecular events that govern cell function. Also, it includes the theory and application of nucleic acid extraction and molecular diagnostic tools, including Polymerase Chain Reaction (PCR), reverse transcription, probe hybridization, and microarray technology. The relation between advances in molecular biology and the completion of genome projects will be discussed. This will help the learner to understand the molecular basis of illnesses in the more advanced courses in the next modules.

Course Name	Credit Hours		Code No.
	L	P	
Bioethics	2	---	0608613

This course will first discuss moral theories and the basis of morality. Then, it will zoom in on clinical ethics and its four main principles, and how they are used in different clinical situations. It will also shed light about different bioethical issues, such as genetically modified organisms, experimentation, and ownership of clinical and genetic data. All these issues will be connected with real-life examples and role play to make sure that students can translate their knowledge to situations in real life.

Course Name	Credit Hours		Code No.
	L	P	
Bioinformatics	2	١	0608614

This course covers the basics of bioinformatics from the preliminary definitions to the operating systems and programming languages. It also covers the most commonly used biological data analysis techniques and interpretation, such as phylogenetic analysis and molecular modelling, as well as their clinical applications.

Course Name	Credit Hours		Code No.
	L	P	
Pharmacology (Pharmacokinetics and Pharmacodynamics)	2	1	0602601
<p>This course provides an overview of basic principles of pharmacokinetics and pharmacodynamics and their applications in pharmacogenomics. It also deals with the qualitative aspects of the basic elements of pharmacokinetics (absorption, distribution, metabolism, excretion). It illustrates signaling mechanisms of drug action based on drug-receptor interaction theory. In addition, the current course focuses on the genomic basis of drug responses as well as the use of genomic information for targeted drug development.</p>			

Course Name	Credit Hours		Code No.
	L	P	
Data Analysis and Biostatistics	2	1	0602602
<p>Mastery of the field of pharmacogenomics is not possible without the essential data analysis toolkit. This course covers the general fundamentals of statistics and branches out into methods of defining a sample, testing a hypothesis, and comparing one, two or more groups. The course explains methods of comparison that are based on parametric assumptions (e.g., one-way ANOVA) as well as non-parametric tests (e.g., Mann Whitney test). This course involves experimental design, systematic reviews, and meta-analysis, and how to model collected data with linear or non-linear regression. Practical application of important statistical software, (for example, SPSS) will be covered.</p>			

Semester Two Courses (Total 14 cr.hr)

Course Name	Credit Hours		Code No.
	L	P	
Introduction to Pharmacogenomics	3	---	0608615
<p>This course will introduce to learners the concepts of pharmacogenetics and pharmacogenomics and provide a brief history of pharmacogenomics. It will cover examples of pharmacogenomic polymorphisms relevant to drug metabolism, drug transport, drug targets and immune complexes, and differentiate between somatic and germline variants in diseases such as cancer. Methods and ethical issues in pharmacogenomics will be discussed in addition to the pharmacogenomics of special diseases such as cystic fibrosis. The course will help learners understand pharmacogenomics data to potentially choose the appropriate drug or dose for a certain patient based on pharmacogenomic testing.</p>			

Course Name	Credit Hours		Code No.
	L	P	
Pharmacogenomics in Practice	3	---	0608616
<p>This course focuses on the application of pharmacogenomics in clinical practice. It enhances the student's capabilities to apply and implement the concepts of pharmacogenomics in real-life settings. Candidates will learn to interpret pharmacogenomic tests and use the data to choose the appropriate drug or dose for a certain patient using clinically-based case scenarios.</p>			

Course Name	Credit Hours		Code No.
	L	P	
Clinical Drug Safety	2	1	0602603
<p>This course covers the principles of individualization of drug therapy in different clinical setting, drug use in renal patients, special populations, and during idiosyncratic reactions. Pharmacogenetics, drug-drug interactions, and adverse drug reactions are covered in this context.</p>			

Course Name	Credit Hours		Code No.
	L	P	
Research project	2	---	0602604
During this course, the student submits a research project about certain point that is agreed upon with a committee from the departments of pharmaceutical biochemistry and pharmacology and toxicology, that deals with a discussion of one of the case studies or problems that is related to pharmacogenomics, throughout this course the student will conduct a comprehensive literature review related to that point and ends with appropriate recommendations. At the end of the project, the student submits a research paper or a presentation.			

Elective Courses:

Course Name	Credit Hours		Code No.
	L	P	
Human Genetics	3	---	0608617
The course describes the principles of human genetics, explain the essential components of inheritance, all the genetic components of the human genome, and discussion of human diseases from a genetic point of view.			

Course Name	Credit Hours		Code No.
	L	P	
Molecular Pharmacology	3	---	0602605
The course will study the molecular basis of drug action, protein structure-activity relationships, receptor-ligand interactions, signal transduction, different types of receptors from molecular point of view and their signaling mechanisms, quantitative aspects of ligand binding, receptor antagonism, functional selectivity, biologicals, mechanisms of drug resistance in cancer, consequences of genetic and epigenetic alteration in cancer, role of miRNA and its applications.			