

Master's Degree in Pharmacology and Toxicology

Table (1): General Modules

Module Name	Module code	Credit hours	Semester
Research Methodology	PCL611	2	Semester 1
Instrumental analysis	PMC611	2	Semester 1
Total		4	

Table (2): Specialized Modules

Module Name	Module code	Credit hours	Semester
Advanced Pharmacology: cancer and immunopharmacology	PCL612	2	Semester 1
Clinical Pharmacology and Toxicology	PCL613	2	
Pharmacokinetics	PCL614	2	
Experimental Pharmacology	PCL615	2+1	Semester 2
Pharmacogenomics and Toxicogenomics	PCL616	2	
Pharmacology and drug discovery	PCL617	2	
Molecular Pharmacology	PCL618	2+1	
Total		16	

Description of General Courses

Research Methodology PCL611 (2 CH)

This module provides the student with the principles of experimental design, statistical analysis of data, numerical and graphical representation of data along with inferential statistics. Fundamentals of research, research ethics and scientific writing will also be introduced.

General Instrumental Analysis: PMC611 (2 CH)

The module aims to introduce the basic concepts, principles and the instrumentation of different analytical techniques such as spectroscopic techniques (including IR, NMR, spectrophotometry and spectrofluorimetry), electrochemistry and chromatography focusing on their applications in research.

Description of Specialized Courses

Advanced Pharmacology: cancer and immunopharmacology PCL612 (2 CH)

This module overviews the basics of immunopharmacology and cancer therapeutics. It will also cover the newest trends in pharmacology with a special emphasis on cancer immunotherapy including neoantigens, monoclonal antibodies, CAR T-cell therapies, immune checkpoint inhibitors and other non-specific immunotherapies.

Clinical Pharmacology and Toxicology PCL613 (2 CH)

This module covers the principles of pharmacodynamics and pharmacokinetics employed in the clinical setting. Individual variation, drug monitoring, and different types of adverse drug reactions recruiting interactive and problem-based clinical scenarios will be also covered. Students will learn about medication compliance and the different types of medication errors. Common clinical toxicological case scenarios including drugs of abuse will be also discussed where the students will learn how to develop analytical reasoning for diagnostic purposes alongside decision making. This module will also introduce the students to general principles in toxicological risk assessment focusing on the application of these principles for the protection of the environment and humans.

Pharmacokinetics PCL614 (2 CH)

This module covers pharmacokinetics principles that influence drug development aspects including dose, efficacy and safety. It will provide skills in the fundamentals of pharmacokinetic modeling and their application in decision making. Topics will include overview of the time-module of drugs in the body, calculation and interpretation of

pharmacokinetics parameters, pharmacokinetics processes of absorption, distribution and clearance and their physiological determinants. In addition, mechanisms for the genetic and environmental basis for inter-subject differences in the metabolism and transport of drugs which influence bioavailability and bioequivalence.

Experimental Pharmacology PCL615 (2+1 CH)

This module covers the different aspects of evaluating a drug, with emphasis on the use of experimental models. It will also provide the students with hands-on techniques used in pharmacological research for drug screening and bioassays.

Pharmacogenomics and Toxicogenomics PCL616 (2 CH)

This module covers the relationships between human genetic variability and drug/toxin responsiveness, susceptibility to disease and disease severity. The knowledge of the mechanisms involved in genetic and epigenetic modification, together with the identification of the genes modifying factors involved in response to xenobiotics including drugs will also be discussed. The module will highlight the importance of pharmacogenomics and toxicogenomics in the development of new therapeutic agents and in the application of more rational therapies.

Pharmacology and drug discovery PCL617 (2 CH)

This module explores the process of drug discovery and development starting from target identification to final drug registration. It will present the drug development process including target selection, lead discovery using high-throughput screening employed to rapidly identify active compounds, antibodies or genes which modulate a particular biomolecular pathway. This module will also deal with safety evaluation including the required preclinical experimental studies performed on new investigational drugs and chemicals. Bioavailability, clinical trials, and the essentials of patent law will also be discussed.

Molecular Pharmacology PCL618 (2+1 CH)

This module bridges molecular biology, biochemistry, genetics, and cell biology with pharmacology to explore the molecular basis of drug action on pharmacological cellular responses and signaling pathways. Protein structure-activity relationships, receptor-ligand interactions, upstream and downstream cellular signal transduction will be also covered. Applying basic cell signaling discoveries to develop new therapeutic modalities will be highlighted.