

# **COURSE OF STUDIES**

for  
Doctor of Philosophy  
in  
Pharmacology



**UNIVERSITY OF HEALTH SCIENCES, LAHORE PAKISTAN**

## **Program Rationale:**

Rational of the program is to acquire new knowledge in Pharmacology and Toxicology by conducting and promoting innovative research. The final aim of this research is to establish the efficacy, safety and effectiveness of medications in humans, to discover new lead compounds and to understand the mechanisms of action of drugs.

## **Mission Statement:**

Our mission is to disseminate knowledge to medical, pharmacist, nursing, dietician, physiotherapist, veterinary, and graduate students through quality teaching. Moreover, to contribute to the development of our country through our expertise, and participate in government and community organizations or activities related to Pharmacology, Toxicology and drugs in general. The purpose of teaching is to impart relevant information to the students in a manner that allows them to develop their analytical and intellectual capabilities, thus instructing them in the methods by which knowledge is acquired, with emphasis on self-reliance and continued self-education.

## **Program Educational Objectives:**

- Promote academic excellence through quality teaching and knowledge dissemination.
- To provide solid understanding of basic Pharmacology and to prepare our postgraduates with up to date knowledge of Pharmacology to pursue careers as independent scientists, pharmacologists and as good research oriented teachers
- To organize monthly Departmental seminars on proposal writing, publication review, draft publications, result dissemination etc.
- Promote interdepartmental, interfaculty and international collaborative research.
- Increase rate of publications from senior members.
- To provide an environment conducive to learning all aspects of Pharmacology: the ethical and legal, the technical, the cognitive, the interpersonal and the compassionate.

- Encourage fund raising activities (writing for research funding).
- To enable the graduates to present their research findings effectively at National/international journals.
- To use the latest knowledge and modern techniques by students/researchers in the field of clinical and basic research for the benefit of local populations in collaboration with other universities in the field of medical education.
- To develop the department as a center of excellence for safety and efficacy assessment of medicines by establishing bioavailability and bioequivalence research center (BABE-RC)
- To ensure the department's activities impact strongly on industry, the nation's drug policies/regulations and quality of life of patients.
- Continuously upgrade the state-of-the-art Pharmacology laboratory for more productive research especially in asthma and chronic lung disease and neuro-pharmacological research.
- To establish effective collaboration with other institutes and research centers for the benefit of the graduates to harness new technologies and to increase their vision
- The Department will serve the profession of Pharmacology by developing programs and processes that continuously advance practice and improve research.

### **Program Learning Outcomes:**

- Graduates will have access to modern equipment and can learn new techniques.
- Graduates will be equipped with the required up to date knowledge of their subject. Graduates with improved teaching skills with proper subject understanding will be produced.
- Regular practical and research work will help graduates to have access to modern equipment's and techniques. Graduates will be able to produce high quality research with reliable research findings.
- Graduates will be able to have access new technologies not available locally and thus can enhance their vision. Research articles with high impact factor can be produced as a result of National/ International collaboration.
- By publishing research findings, department faculty will be able to win many research projects from National/International funding agencies. As a result of quality education and research work, university fame and ranking will be improved significantly.

## SCHEME OF STUDIES (3-Year)

### PhD\_Pharmacology

Semester #	Course code	Course title	Credit hours		
			Theory	Practical	Total
1	ARM-801	Research Methodology	2	0	02
	ABS-802	Advance Biostatistics	2	0	02
	PHAR-801 PHAR-802	Subject Specific Courses (1-2 Courses) Advance Pharmacology, Pharmacological Techniques	3+2	0	05
2	ALT-803	Advanced Laboratory Techniques	2	0	02
	PHAR-803 PHAR-804	Subject Specific Courses (2-3 Courses) Complementary and Alternative Medicine, Critical Thinking and Scientific Writing	4+3	0	07
3	Research (thesis)		30		30
(Total: 48)					

## **Subject Specific Courses (Advance Pharmacology, Pharmacological Techniques)**

### **UHS-PHAR-801 Advance Pharmacology**

#### **Teaching methods**

It consists of Lectures, Seminars, Group discussions, interactive sessions, PowerPoint presentations,

#### **Assessment methods**

Interactive Sessions, Assignments, class Quizzes, Written exams, Viva voce.

#### **Course Objective**

- 1) Introduction to basic concepts of Pharmacology.
- 2) It will enable students to possess a comprehensive understanding of general field of Pharmacology.
- 3) Build on their knowledge of pharmacology so that they able to think critically about specific area of pharmacology.

#### **Learning Outcomes:**

- 1- Graduates will be equipped with required up to date knowledge of their subject.
- 2- Graduates with improved teaching skills, proper subject understanding as well as with professional ethics will be produced which will transform them into good teachers.

#### **Course Outline:**

- I. Introduction to Pharmacology
- II. Pharmacokinetic
- III. Pharmacodynamics
  - Mechanisms of drug action – I
  - Mechanisms of drug action – II
  - Factors modifying actions & doses of drugs – I
  - Factors modifying actions & doses of drugs – II
  - Factors modifying actions & doses of drugs – III
  - Drug dependence
  - Adverse drug reactions
  - Metabolic Pathways involved in drug actions and structure activity relationship (SAR)

#### **Recommended Books:**



- 1 Goodman & Gilman's The Pharmacological Basis of Therapeutics 12<sup>th</sup> edition
- 2 Basic & Clinical Pharmacology, 12<sup>th</sup> edition Bertram G. Katzung, Susan B. Masters, Anthony J. Trevor

## **UHS-PHAR-802 Pharmacological Techniques**

### **Teaching methods:**

Lectures, Practical demonstration, Audio visual aids

### **Assessment methods:**

Written and practical examinations, viva voce, class quizzes

### **Course Objective:**

To understand various research methodologies and techniques and their appropriate application and expertise in particular area of interest.

### **Learning Outcomes:**

1. Regular practicals and research work will help graduates to have access to modern equipments and techniques which will make them competent and skilled professionals to win good jobs.
2. - Graduates will be able to produce high quality research with reliable research findings and will be able to supervise their students in future.

### **Course Outline:**

- Preparation of plant extracts (rotary evaporator, freeze dryer)
- Effect of drugs on Isolated tissues
- Effect of drugs on Experimental animals
- Column Chromatography
- Ultra-Pressure Liquid Chromatography-Diode Array detector- tandem Mass Spectrometry.
- Bioavailability and Bioequivalence Research Studies
- Soxhlet extraction

- Computational *in-silico* drug designing
- Hot Plate analgesia meter and Rota-rod techniques
- Power-LAB (Micro-Tip BP Foundation System)
- *In-vivo* Animal Model studies
- *In-vitro* assays (Hematology analyzer, Chemistry Analyzer)

### **Recommended Books:**

Micheal R, Green and Joseph Sambrook, 2012, Molecular Cloning: A Laboratory Manual 4rth edition, Cold Spring Harbour, NY; Cold Spring Harbour Laboratory Press

## **UHS-PHAR-803 Complementary and Alternative Medicine**

### **Teaching methods**

Lectures, Seminars, Group discussions, interactive sessions, PowerPoint presentations

### **Course Objective**

The objective is to define, through rigorous scientific investigation, the usefulness and safety of complementary and alternative medicine interventions and their roles in improving health and health care.

### **Assessment methods**

Interactive Sessions, Assignments, class Quizzes, Written exams, Viva voce

### **Learning Outcomes:**

1. Wide variety of research projects can be designed by utilizing this course knowledge.
2. Graduates will have access to modern Complementary and Alternative Medicine techniques.
3. Graduates will be equipped with required up to date knowledge of their subject.
4. Graduates with improved teaching skills, proper subject understanding as well as with professional ethics will be produced which will transform them into good teachers.

### **Course Outline:**

- Introduction to Complementary and Alternative Medicine Course
- Herbal Supplements and Medicine Course
- Nutrition and Health Course

### **Recommended Books:**

- Textbook of Complementary and Alternative Medicine, 2006, 2nd Edition,.Chun-Su Yuan, Eric J. Bieber, Brent Bauer.
- Fundamentals of Complementary, Alternative, and Integrative Medicine, 2018, Edition6 Publisher, Elsevier Health Sciences, ISBN 0323510825, 9780323510820, Marc S. Micozzi

### **PHAR-804 Critical Thinking and Scientific Writing**

#### **Teaching methods;**

PowerPoint presentations by students and Reading assignments in journals, class discussion conducted by teachers

#### **Assessment methods:**

Assessment is by evaluating the assigned task by the supervisor

#### **Course Objective**

To enable the graduate to show original, independent and critical thinking, and ability to develop theoretical concept

To learn the basic scientific writing such as synopsis, thesis, the analysis of published papers, publishing research and writing a research grant.

#### **Learning Outcomes:**

1. Graduates will be able to produce high quality research with reliable research findings.
2. Research articles with high impact factor can be produced as a result of this subject knowledge.

### **Course Outline:**

The purpose of this module is enable the students to analyze critically and evaluate one's finding and those of others, and to summarize, document, report and reflect on progress. The contents are:

- Seminars
- Journal club meeting



- Formulation of research project proposals
- Communications research papers and review publications
- Formulating a research project proposal
- Handling of Laboratory animals, equipment and chemicals
- An introduction to ethics of health research
- **Recommended Books:**
- 1. Writing Science Through Critical Thinking, Jones and Bartlett series in logic, critical thinking, and scientific method, Philosophy Series, Marilyn F. Moriarty, Publisher Jones & Bartlett Learning, ISBN 0867205105, 9780867205107

### **Compulsory Teaching Skills**

For a thorough evaluation of students' understanding and critical thinking abilities, all PhD students in their respective disciplines will;

1. Design a comprehensive set of 50 Multiple Choice Questions (MCQs) and 25 Short Essay Questions (SEQs) for M. Phil students.
2. Plan 20 observed lectures focusing on key topics.

These assessments will provide Ph.D. students valuable experience in educational design and delivery. These will also enhance their interactive learning with the provision of real-time feedback.