



King Edward Medical University

Lahore

M.Phil

Pharmacology

COURSE CONTENTS

2007

Prologue

by

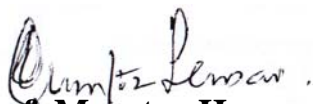
The Honorable Vice Chancellor KEMU

The Program Faculty Committee Members of all M. Phil Programs are guided and assisted in order to enable them to meet the minimum requirements and Standards to be achieved. Only principle areas are addressed giving freedom for the students to raise questions and arguments and for the teachers to include most recent and best guidance literature curriculum contents. It is clear that beyond the main framework there are greater challenges in the areas of selecting modern knowledge, translating information into skills, selecting best pedagogy, teaching in the light of different knowledge levels as determined by Blooms Taxonomy, effective communication, making use of best teaching aids, evaluations, counseling and role modeling. Moreover teachers of Postgraduate M. Phil programs have additional responsibilities of keeping into view the community heeds in terms of health care problems in their respective fields. The students in this modern curriculum have more responsibilities to improve their knowledge beyond textbooks and visit libraries and World Wide Web as frequently as possible. Their logical arguments will serve as the backbone of learning process.

The whole curriculum is divided into semesters to facilitate, knowledge delivery and absorption, more effective. Each semester is further subdivided into modules. This will further make the education process smooth.

I remain confident that both faculty and students would enjoy during this program.

I congratulate Chairman Diploma Coordination Committee, Professor Dr. - ----- and his dedicated team members / Program Directors, who have put in lot of hard work to bring these framework guidelines in its present shape.



Prof. Mumtaz Hassan (S.I.)

MBBS (Pb.) B.Sc. (Pb.) MRCP (UK), DTM&H (Edin)
FCPS (Pak.), FRCP (Lond.), FRCP (Edin), FRCP (Glasg.),
FRCP (Ireland), DM (USA), FACP (USA), FACIP (USA),
FCCP (USA), FAFCA (USA)

Vice Chancellor

King Edward Medical University,
Lahore

Prologue

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The Honorable Pro-Vice-Chancellor

KEMU

M.Phil Programs in Basic Medical and Dental Sciences were introduced in Pakistan to create Scientist and Teachers. In absence of PhD programs these programs were equivalent to major qualifications of the Universities. These programs before 2001 were spread over four years, two (2) years of experience of teaching in same subject in recognized medical teaching institution, one (1) year of course work and one (1) year of lab work and research. In 2001 curriculum were revised and all four (4) years were included into the body of the program.

Now PhD programs are promoted, supported, encouraged and funded by Higher Education Commission, largely as M.Phil leading to PhD programs, the M.Phil programs are made equivalent to M.Phil in Engineering, Hard Sciences, Biological Sciences and Social Sciences.

The M.Phil programs based on this framework will have duration of two (2) years at postgraduate level (Level 7 according to the European Education Levels) and will be credit based, modularized, Semesterized during first year and research work during second year. The qualification of M.Phil will be "Medium Qualification" according to "PMDC Criteria" and "Masters (M) qualification according to QAA-UK criteria.



Prof. Dr. Syed Muhammad Awais
(*Sitara-e-Imtiaz*)

M.B.B.S.(Pb), M.C.P.S.(Surg),
M.Sc. Bio-eng. (Dun.), M.S. (Orth)
Pro-Vice Chancellor &
Prof. Orthopaedic Surgery
King Edward Medical University &
Mayo Hospital & University,
Lahore.

Prologue

by

The Chairman M. Phil Program

Committee KEMU

M.Phil programs at KEMU not only provide students with an outstanding education but also encourage them to self-directed, theoretical and practical learning. These above mentioned attributes are at the forefront of knowledge in every specialized field that provides a basis for originality in developing and/or applying ideas, often within a research context. The aim of this exercise is to develop conceptual understanding that enables the student; to evaluate critically current research and advanced scholarship in the discipline; and to evaluate methodologies and develop critiques of them and, where appropriate, and to propose new hypotheses.

M.Phil programs at KEMU also recognize and reinforce the ability of students to integrate knowledge and formulate judgments. Students are also directed to take account of social and ethical issues and responsibilities and also reflect experience of managing change in a complex environment. The learning process at this level is associated with independent working with other people at the same level or higher. All feasible efforts will be made by the departments to provide students an opportunity to develop the work or learning according to student's scholastic interest.

During the course of M.Phil training, students will be presented with unfamiliar learning situations and will be required to solve problems that involve many obscure and interacting factors. Many such factors are typically variable, making the learning context complex and unpredictable. The overall impact of these exercises is to; ensure a highly specialized education and its application in problem solving to ensure access to employment requiring decision-making in complex and unpredictable situations and Nurture independent learning ability required for continuing professional development Career progression within the respective field.

Foreword

Seeking the remedy for the suffering from any ailment has been the main struggle of human being since his creation on earth. Observation, hit and try, herbal medication, minerals application and modern methods of development of drug are the evolutionary steps in the field of pharmacology, No drug is safe. This reality gave birth to toxicology. In modern era i.e. 21st century molecular and cellular research have put pharmacology on highly advanced and interesting fields of medicine. Experimental pharmacology on animals is basis of development of new drugs. Clinical trials and post-marketing surveillance have created a lot of thrill in the field of medicine.

With the rapid increase of population of human being the number of diseases is also increasing as a result of social problems, like economics and sanitation . There is intense need for the development of new safer drugs and surveillance of side effects of presently used common and uncommon drugs. This is only possible when we have proper research centers and educational institutes. For this objective King Edward Medical University is starting postgraduate research and educational degree programmes like M. Phil Pharmacology. This will help in outstanding research and educational activities and hence help the field of medicine to achieve its goal of better health for all.

**Prof. Dr. A. Shabbir Ali Bhatti,
Chairman Department of Pharmacology
K.E.Medical University, Lahore.**

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Introduction

King Edward Medical University (KEMU) is committed to excellence in promoting biomedical education at all levels and has robust programs at both undergraduate and postgraduate levels. KEMU has the distinction of being the first institute in the country to offer an M.Phil program in Pharmacology, KEMU has philosophy of not only enhancing the depth of knowledge of its students but also the breadth. Therefore during the first semester students will be required to take some multidisciplinary classes, which are compulsory for all M.Phil Students regardless of their area of specialization. Following is the content of the courses of the M.Phil program in Pharmacology, which is offered through Pharmacology department.

M. Phil Program Faculty

Prof. Dr.A. Shabbir Ali Bhatti
Director M. Phil Program
Pharmacology Department

Dr. Sadia Chirgah
Faculty M. Phil Program
Pharmacology Department

Dr.Muhammad Zahid
Faculty M. Phil Program
Pharmacology Department

Dr. Zujaja Zaheer
Faculty M. Phil Program
Pharmacology Department

Dr. Ahmed Fawad
Faculty M. Phil Program
Pharmacology Department

Dr.Rafique Ahmed
Faculty M. Phil Program
Pharmacology Department

Dr. Rubina Iqbal
Faculty M. Phil Program
Pharmacology Department

Program Outline

Duration of the Program: 02 Years (Full Time)

Entry Qualifications: MBBS/BDS/BS.c Hons/MS.c
(minimum 16 years of education).

Entry Procedure; GRE Type Entry Test (MCQ Based)
Written Test at Faculty of Basic Sciences Level
Interview at Department of the Program Level

Phase of Studies in Basic Curriculum:

<u>Entry</u> ↓		
Year	Semester 1 (18 weeks)	Semester 2 (18 weeks)
1	Semester Evaluation (02 weeks)	Semester Evaluation (02 weeks)
	Comprehensive Evaluation (02 weeks)	
Year	Research & Dissertation (Lab. Work) 48 weeks	
2	Project Synopsis Writing (4 weeks)	
	Research Project (42 weeks)	
	Dissertation Defense (02 weeks)	
	<u>Exit</u> ↓	

Year 1 is semesterized into two Semesters of twenty (20) weeks each whereas year two (2) is annual of forty eight (48) weeks. Each module and the whole program is made credit based according to the following criteria.

Credit Accumulation and Transfer System (CATS)

As defined by European Credits Transfer system, the CATS – KEMU is defined as follows

1. Contact Hours 1500 – 1800 hrs/year
2. 25 – 30 Contact Hours = 1 Credit Point
3. Number of Credit Point Required in a Year = 60
4. Number of Credit Point Required in a Semester = 30

Admissions

Candidates applying for M.Phil program will be selected on open merit. Departments will set the criteria for selection within following guidelines.

Admissions Criteria (Adopted from HEC):

Sixteen years of schooling or 4 year education (MBBS/BDS/B.Sc Hons/Equivalent) after F.A. /F.Sc. (130 credit hours) will be compulsory for admission in MPhil Program.

Admissions Procedure:

- 1) A test equivalent to GRE test will be necessary for admission to M.Phil program. (This test will be conducted on behalf of the “Basic Science Faculty” by the “M.Phil Program Coordination Committee, of KEMU, and will comprise of MCQ as per HEC guidelines).

Sr. No.	01 Subject	Weight
1.	Anatomy	5%
2	Physiology	5%
3	Biochemistry	5%
4	Pharmacology	5%
5	Forensic	5%
6	Molecular Biology	5%
7	Microbiology	5%
8	Histopathology	5%
9	Hematology	5%
10	Chemical Pathology	5%
11	Oral Anatomy & Dental Morphology	5%
12	Oral Pathology	5%
13	Major Subject	40%
	Total Questions & Marks	200
	Pass Marks	50%

- 2) Candidates will also have to demonstrate excellence in their verbal and personal skills in an interview. (The interviews will be conducted by the “Program Faculty Committee”, of the program in which student will apply.

Curriculum Outline and Learning Schedule

First Year

First Semester (January 15th – May 28th):

Teaching	18 weeks
Review and Evaluation	02 weeks
Total	20 weeks

Summer Recess (May 29th – July 30th)

Second Semester (August 1st – December 20th):

Teaching	18 weeks
Review and Evaluation	02 weeks
Total	20 weeks

Winter Recess (December 21st – January 14th)

Second Year

January 15th – December 20th

Teaching / Lab Work	46 weeks
Dissertation Defense	02 weeks

Year 1 Semester 1

Class Schedule

Module N.o							
	701	702	703	704	1 week	705	706
Duration	2 weeks	2 weeks	2 weeks	2 weeks		5 weeks	5 weeks
Title of Module	Introduction to Principles of Pharmacology	Research Methods & Biostatistics	Molecular Biology & Genetics	Basic Science	Midterm Evaluation	Drugs used in Neuro Transmitter Disorders (ANS)	Drugs used in Neuro Transmitter Disorders (CNS)
Module Coordinator	Prof. A. Shabbir Ali Bhatti	Prof. Syed Muhammad Awais	Prof. Fridoon			Prof. Dr. A. Shabbir Ali Bhatti	Prof. Dr. A. Shabbir Ali Bhatti
Place of Learning	Pharmacology Department	Patiala Block	Patiala Block	Department Lecture Room		Pharmacology Department	Pharmacology Department

Course Content

Semester 1

MODULE 701

INTRODUCTION TO BASIC PRINCIPLES OF PHARMACOLOGY

Duration 02 weeks

Credit Hours 03

Learning Objectives: By the end of this module the students should be able to:

- * Common routes of administration & excretion of drugs
- * Compare efficacy & potency
- * Types of antagonism
- * Mechanism of hepatic enzyme induction
- * Major phase I & phase II metabolic reactions

Course Contents:

- * Sources & Active Principles of Drugs
- * Routes of Administration
- * Transport across cell-membranes
- * Absorptions & factors effecting drug absorptions
- * Bio-availability
- * Distribution of Drugs
- * Volume of distribution
- * Metabolism (Zero order & 1st order kinetics)
- * Elimination / excretion of drugs
- * Plasma half life
- * Pharmacodynamics
- * Mode of drug actions
- * Signalling-m echanism (Receptors, Channels & 2nd messenger)
- * Dose response curves (Graded & Quantal curves)
- * Agonist, Partial agonist, Inverse agonist & Antagonist
- * Types of drugs antagonism
- * Pharmacogenics
- * Drug Interactions
- * Adverse Drug Reactions (Allergy & Toxicity)

- * Factors modifying actions and doses of drugs
- * Tolerance
- * Tachyphylaxis

- * Cummulation
- * Bio-assay/ Bio-equivalence
- * Geriatric Pharmacology
- * Peadiatric Pharmacology
- * Herbal Pharmacology

Lab. Work

Dose response curves
Calculate the dosage adjustment required for a patient with
Impaired renal function

Tutorial / Assignment:

Bio-transformation
Drug interaction
Drug Allergy

Self study :

Internet / Library

Recommended Books
The Pharmacological Basis of Therapeutics (Goodman & Gilman)
Basic & Clinical Pharmacology (Bertram G. Katzung)
Clinical Pharmacology (Lawrence & Benett)
Pharmacology (Rang & Dale)
Text book of Physiology (Guyton)

Module 702 **Research Methods & Biostatistics**
(2 Weeks/3 Credit Hours)

Course Description and Learning Objectives:

- To help participants to formulate ideas that can be tested in a scientific manner
- To give participants a basic understanding of epidemiological methods and biostatistics.
- To develop the critical faculties of participants for evaluation of their own and other people's work.
- To give practical experience of development of study protocols and applications for research funding.
- To give practical experience of use of computers for word processing, database manipulation, use of spreadsheets, statistical analysis, preparation of slides and overheads, internet communication and video conferencing and report writing.

Course Contents:

1. Research Methods
 - Philosophy, language, types and structure of Research
 - Conceptualizing research, problem formulation, research objectives
 - Review of literature, sources of knowledge
 - The Planning-Evaluation Cycle
 - Sampling terminology, Probability sampling, Non-probability sampling, Bias and Error
 - Time in Research, Types of Relationships
 - Variables, Hypotheses, Types of Data
 - Introduction to Design, Types of Designs
 - Experimental Design
 - Survey Research, Types of Surveys
 - Qualitative research, Qualitative Data
 - Introduction to Design, Types of Designs, Experimental Design
 - Questionnaires
2. Biostatistics
 - Data display and summary, mean and standard deviation
 - Populations and samples
 - Statements of probability and confidence intervals
 - Differences between means: type I and type II errors and power
 - Differences between percentages and paired alternatives
 - The t tests and the chi-squared tests
 - Correlation and regression
 - Study design and choosing a statistical test

3. Epidemiology
 - What is epidemiology?
 - Quantifying disease in populations
 - Comparing disease rates
 - Measurement error and bias
 - Planning and conducting a survey
 - Ecological studies, Longitudinal studies, Case-control, cross sectional studies and experimental studies
4. Technical Writing
 - Synopsis writing
 - Grant proposal writing
 - Research paper writing
 - Thesis outline
 - Thesis writing

Module 703**Molecular Cell Biology
(3 Credit Hours)****Course Description and Learning Objectives:**

- This course is the second in the series of two courses designed to introduce both classical and contemporary topics in biology to the students.
- This course is structured to entertain students irrespective of their major.
- After taking this course students will be expected to have a basic understanding of the following fundamental concepts
 1. The role of cellular and molecular biology in medicine.
 2. Immunology.
 3. Molecular and cellular developmental biology (“miracle of life” formation of a complex organism from a single cell).
 4. Evolution with a molecular perspective (natural force and their effect in transformation of life).

Course Contents:

1. Recombinant DNA and Biotechnology
2. Molecular Biology and Medicine
3. Natural Defenses against Disease
4. Differential Gene Expression in Development
5. Animal Development: From Genes to Organism
6. Development and Evolutionary Change
7. The History of Life on Earth
8. The Mechanisms of Evolution
9. Species and Their Formation
10. Reconstructing and Using Phylogenies
11. Molecular and Genomic Evolution

Seminar Topics:

- Genes and Development
- Recombinant Biotechnology
- Molecular and Genomic Evolution
- Molecular Evolution
- Molecular Immunology

Book Recommended:

1. Life, 'The Science of Biology' by Craig Heller

Module 704

Basic Science

(2 Weeks/3 Credit Hours)

Course Description and Learning Objectives:

- This is a multidisciplinary course that in two weeks gives students basic knowledge of the five pillars of basic medical sciences i.e. Anatomy Physiology Pathology Biochemistry And Course Pharmacology.
- Student taking this course will be able to understand

Course Contents:**Anatomy**

1. Embryology
 - Fertilization, Zygote, Morula, Blastula, Gastrula, Embryonic period Derivatives of germ layers
 - Brief account of Amnion, Chorion, Placenta
 - Out line of development of Heart and its Anomalies
 - Brief account of development of Urogenital, Digestive systems
2. Histology
 - Cell,
 - Tissue (Epithelial tissue, Muscular tissue, Connective tissue and Nervous tissue)
 - General plan of microscopic structure of CVS
 - Systems (Respiratory, Urogenital, Digestive systems)
3. General Anatomy
 - Classification of bones, their blood supply and ossification
 - Classification of Joints Nerve Supply and Blood supply
 - Types and Nerve supply of Muscles

- Definition of Neuron and Peripheral and Central nervous system
 - Surface marking of Heart, Lungs, Abdominal viscera
4. Thorax
 - Thoracic cage movements
 - Heart and its External and Internal features and Blood supply
 - Lungs, Pleura, Mediastinum (Name of contents)
 5. Abdomen
 - Disposition of Abdominal and Pelvic viscera
 - Outline of Blood supply
 - Nerve supply and Lymphatic drainage and Peritoneal relation of viscera
 6. Head & Neck
 - Bones, Foramina of skull
 - Names of Cranial nerves, Brief outline of 5th & 7th Cranial nerves
 - Dural venous sinuses, Blood supply and Nerve supply (brief account)
 - Nose, Pharynx and Larynx. (Blood supply and Nerve supply)

Physiology

1. Functional organization of the human body and control of the internal environment
2. Extra cellular fluid
3. Homeostasis
4. Dehydration and Rehydration and K⁺ Homeostasis
5. Anemia, Polycythemia
6. Resistance of body to infection-the leukocytes, tissue macrophage system and inflammation
7. Immunity and allergy
8. Hemostasis and blood coagulation
9. Cardiovascular system properties of cardiac output CCF test cardiac function & Hypertension Normal ECG Acid Base Balance urine formation
10. Respiration Spirometry Regulation Real Electrocardiogram.
11. Body fluids & kidneys; regulation of acid-base balance
12. Pulmonary blood flow
13. The nervous system and special senses
14. The gastrointestinal tract
15. Metabolism and temperature regulation
16. Endocrinology and reproduction
17. Sports Physiology
18. Ovarian and testicular function tests
19. Thyroid Parathyroid Adrenal pancreas endocrine hypothalamus

Pathology

1. Structure and functions of normal human cell inflammatory reaction, chemical mediators primary and secondary wound healing. Factors affecting the process of healing. Healing in fractured long bone.
2. Gram + Ve organisms and lesions produced by them. Gram- Ve organisms and lesions produced by them. Mycobacterial infections, lesions and laboratory diagnosis. Viral infections like Hepatitis, AIDS, Polio, Measles etc.

- Fungal infections-superficial deep seated and opportunistic. Parasites of medial importance and their lab. Diagnosis such as protozoa, tape worms and round worms
3. Etiology and pathogenesis of thrombosis, complications and diagnosis thrombosis, type, mechanisms of change of various emboli, infarction and its diagnosis.
 4. Nomenclature etiology of tumors, benign and malignant tumour , route of spread of malignant Tumour, effects of tumors, oncogens, Tumour suppress genes, tumour markers, and their diagnostic significance, some prototype specific Tumour.
 5. Pathologic calcifications. Its types and lesions, various exogenous and endogenous pigments and lesions. Deficiency diseases and lesions.
 6. Physical irritants and lesions produced by them. Ionizing Radiations and lesions produced by them. Chemical agents as a cause of tissue injury.
 7. Rheumatic, ischemic and congenital Heart disease, Endocarditis. Antheroma-its etiology, lesions and complications.
 8. Glomerulonephritis, pyelonephritis, stones renal tumours diabetic Nephropathy.
 9. Bronchiectasis, emphysema, pneumonias, tumours, tuberculosis pneumoconiosis.
 10. Oesophageal lesions, peptic ulcer, gastritis, tumours of stomach, inflammatory bowel diseases, tuberculosis of intestine, tumours of intestine.
 11. Tumours of bones, inflammation of bones and joints, muscle dystrophy important skin lesions and their diagnosis, inflammations and tumours in oral cavity including teeth and jaws.
 12. Tumours of C.N.S inflammations of meninges and their lab diagnosis demyelinating diseases.
 13. Tumours of lymph nodes and leukemias, multiple myeloma- lesions and lab diagnosis.

Biochemistry

1. Fluid & Electrolyte & Acid Base Balance in Human Body with select Clinical Scenarios.
 - Constitution of Extra & Intracellular Fluids.
 - Extracellular Fluid Compartments; Select Dehydration & Oedema Development & Management.
 - Intracellular Fluid Compartments; Select Dehydration & Oedema Development & Management.
2. Metabolic Cross Talk in Glycomics. Health & Disease Scenarios.
 - Site, Pathway Dynamics, Key & Regulatory Enzymes, Nutritional & Endocrine Command, Outcome & Clinical Complications in Glycolysis, Hexose Shunt Pathway, Glycogenesis & Glycogenolysis, Krebs's Pathway & Glucuronic Acid Pathway.
3. Metabolic Cross Talk in Lipomics. Health & Disease Scenarios.
 - Site, pathway Dynamics, Key & Regulatory Enzymes, Nutritional & Endocrine Command, Outcome & clinical Complications in Fatty Acid Oxidation & Biosynthesis, Ketosis, Cholesterologenesis & Lipoproteins.
4. Metabolic Cross Talk in Proteomics. Health & Disease Scenarios.
 - Site, pathway Dynamics, Key & Regulatory Enzymes, Nutritional & Endocrine Command, Outcome & clinical Complications in Urea Cycle, Protein Biosynthesis & Select Amino acid Metabolism with Genetic Disorders.

5. The Liver & Biliary System.

- Liver Functions & Liver Function Tests, Biliary Stasis, Cholecystitis & Pancreatitis, Jaundice.

6. Nutrition & Endocrines Modalities.

- Basic Nutritional Principles & Calorific Requirements. Diet in health & Disease.
- Biosynthesis, Storage, Mechanism of Release, Transport, Binding to Receptor, Mode of Activity, Biochemical Functions & Abnormalities in Vitamin A, D, K, C & B Complex.
- Biosynthesis, Storage, Mechanism of Release, Transport, Binding to Receptor, Mode of Activity, Biochemical Functions & Abnormalities in Insulin, Glucagon, Thyroid Hormones, Para thyroid Hormones, Calcitonin, Growth Hormone, Aldosterone, Cortisol & Catecholamines.

Course Pharmacology

1. Basic principles: Drug receptors and pharmacodynamics, pharmacokinetics, drug biotransformation
2. Autonomic drugs
3. Cardiovascular drugs
4. Renal drugs
5. Drugs with action on smooth muscles
6. Drugs that act in the central nervous system
7. Drugs used to treat diseases of blood, inflammation and gout
8. Endocrine drugs
9. Chemotherapeutic drugs
10. Special aspects of perinatal, pediatric and geriatric pharmacology
11. Drugs used in gastrointestinal diseases
12. Therapeutic and toxic potential of over the counter drugs. Local acting Drugs.

MODULE 705

DRUGS USED IN NEURO TRANSMITTERS DISORDERS (ANS)

Duration 05 weeks Credit Hours 09

Learning Objectives : By the end of this module the students should be able to describe

- * Steps in synthesis, storage, release and termination of action of major autonomic neuro-transmitters
- * Major types of autonomic receptors
- * Organ system effects of stimulation of para-sympathetic and sympathetic system.
- * Effects of acetylcholine on major organs
- * Clinical uses of cholinomimetic agonists
- * Effects of atropine on major organs
- * Sign, symptoms & treatment of atropine poisoning
- * Major Clinical application of adrenoceptor agonists
- * Clinical indications & toxicities of alpha & beta blockers

Course Contents

- * Physiological anatomy of ANS
- * Neurotransmitters and their effects on organs
- * Autonomic reflexes
- * Ocular physiology
- * Nerve conduction
- * Neuromuscular transmission
- * Excitation contraction coupling
- * Acetylcholine
- * Cholinoceptor agonists
- * Anticholinesterases and alkaloids
- * Anti-cholinesterase poisoning
- * Signs, Symptoms & treatment
- * Cholinoceptor antagonists
- * Ophthalmic Pharmacology
- * Agents acting at autonomic Ganglia
- * Agents acting at myoneural junctions

- * Adrenergic NS introduction
- * Endogenous Catecholamines

- * Non-catecholamines
- * Indirect sympathomimetics
- * Alpha-agonists
- * Beta-agonists
- * Alpha-blockers
- * Beta-blockers
- * Central sympathoplegics
- * Adrenergic Neuron blockers
- * Adrenergic NS introduction
- * Endogenous Catecholamines
- * Non-catecholamines
- * Indirect sympathomimetics
- * Alpha-agonists
- * Beta-agonists
- * Alpha-blockers
- * Beta-blockers
- * Central sympathoplegics
- * Adrenergic Neuron blockers

Lab.work

To study the effects of Acetylcholine & Atropine on isolated piece of rabbits ileum

Scheme for unknown drug to find out stimulatory effects on rabbits ileum

Scheme for unknown drug to find out inhibitory effects on rabbits ileum

Tutorial / Assignment:

Organophosphorus compound poisoning

Symptoms, signs and treatment

Clinical uses of Beta-blockers

Self study:

Internet / Library

Recommended Books

The Pharmacological Basis of Therapeutics (Goodman & Gilman)
Basic & Clinical Pharmacology (Bertram G. Katzung)
Clinical Pharmacology (Lawrence & Benett)
Pharmacology (Rang & Dale)
Text book of Physiology (Guyton)

MODULE 706

DRUGS USED IN NEURO TRANSMITTERS DISORDERS (C.N.S)

Duration 05 weeks Credit Hours 09

Learning Objectives : By the end of this module the students
should be able to describe

- * Major excitatory & Inhibitory CNS Neurotransmitters in CNS
- * Difference between voltage – gated and ligand- gated Ion channels
- * Pharmacodynamic actions of major sedative – hypnotics in terms of their clinical uses and adverse effects.
- * Drug of choice for partial seizures, generalized tonic- clonic seizures & myoclonic seizures.
- * Distinctive toxicity of new anti-seizures drugs
- * Blood – Gas partition co-efficient
- * Minimum alveolar anaesthetic concentration
- * Mechanism of action of local anaesthetics
- * Toxic effects of local anaesthetics
- * Difference between depolarizing and non-depolarizing blockers
- * Therapeutic and toxic effects of major anti-parkinsonism agents

Course Contents

- * Organization of CNS
- * Sensory Receptors
- * Somatic & visceral sensation
- * Motor functions of Spinal cord
- * Spinal Reflexes
- * Centers of Motor function
- * Cerebellum
- * Basal Ganglia
- * Cerebral Cortex
- * Upper and lower motor neuron lesions
- * Behavioral functions
- * Limbic system
- * Thalamus
- * Hypothalamus
- * Sleep – Brain waves
- * Cerebro spinal fluid
- * Cerebral blood flow
- * Neurotransmitters, Receptors & Ion channels.

- * Alcohol
- * Sedative hypnotics
- * Antidepressants & mood stabilizers
- * Antipsychotics
- * Opioid analgesics
- * Drug abuse & dependence
- * Parkinsonism
- * Treatment of Parkinsonism
- * NSAIDS
- * DMARDS
- * Treatment of Rheumatoid Arthritis
- * Treatment of Gout
- * Epilepsy & Anti-epileptic medication
- * General Anaesthesia
- * Stages of Anaesthesia
- * Kinetics of Inhalational Anaesthesia
- * Pre-anaesthetic medication
- * Balanced anaesthesia
- * Inhalational Anaesthetic Agents
- * Intra-venous Anaesthetic Agents
- * Local Anaesthetics
- * Types of Local Anaesthesia
- * Long & Short Acting Anaesthetics
- * Skeletal Muscle relaxants (Central & Peripheral)

Lab.work

- To study the effects of drugs on CNS of frog
- To study the effects of known drugs on CNS of frog
- To study the effects of unknown drugs on CNS of frog

Tutorial / Assignment:

- Drugs used in treatment of parkinsonism .
- Drugs used in treatment of epilepsy

Self study:

Internet / Library

Recommended Books

- The Pharmacological Basis of Therapeutics (Goodman & Gilman)
- Basic & Clinical Pharmacology (Bertram G. Katzung)

Clinical Pharmacology (Lawrence & Benett)
Pharmacology (Rang & Dale)
Text book of Physiology (Guyton)

SEMESTER 2

Year 1 Semester 2

Class Schedule

Module N.o								
	707	708	709	1 week	710	711	712	
Duration	9 weeks	3 weeks	3 weeks			3 weeks	3 weeks	9 weeks
Title of Module	<u>Drugs used in Cardiovascular & Haemopoietic Disorders</u>	Drugs used in Airway Diseases	Drugs used in Electrolyte & Fluid imbalance	Midterm Evaluation	Drugs used in Secretory & Motility Disorders of gastrointestinal tract Autacoids	Drugs used in Endocrinal & Metabolic Disorders	Drugs used in infectious & Neoplastic Disorders	
Module Coordinator	Prof. A. Shabbir Ali Bhatti	Prof. A. Shabbir Ali Bhatti	Prof. A. Shabbir Ali Bhatti			Prof. A. Shabbir Ali Bhatti	Prof. A. Shabbir Ali Bhatti	Prof. A. Shabbir Ali Bhatti
Place of Learning	Pharmacology Department	Pharmacology Department	Pharmacology Department			Pharmacology Department	Pharmacology Department	Pharmacology Department

MODULE 707

DRUGS USED IN CARDIO-VASCULAR & HAEMOPOIETIC DISORDERS

Duration 05 weeks Credit Hours 09

Learning Objectives : By the end of this module the students should be able to describe

- * Major groups of anti-hypertensive drugs
- * Strategies for relief of anginal pain
- * Therapeutic and adverse effects of Nitrates, Beta-blockers & calcium channel blockers.
- * Strategies in treatment of heart failure.
- * Mechanism of digitalis toxic effects on heart.
- * Major classes of anti-arrhythmic drugs

Course Contents

- * Heart muscle
- * Rhythmic excitation of heart
- * ECG & its interpretation
- * Haemodynamics
- * Cardiac output & its regulation
- * Venous return & its regulation
- * Coronary & pulmonary circulation
- * BP Regulation
- * Cardiac failure
- * Circulatory shock
- * Haemostasis
- * Haematopoiesis
- * Drugs used in treatment of hypertension
- * Anti-anginals
- * Anti-arrhythmics
- * Drug treatment of acute & chronic heart Failure.
- * Anticoagulants (Oral and parenteral)
- * Antiplatelet Drugs
- * Fibrinolytics
- * Haemostatics
- * Anti Hyperlipidaemics

Lab.work

To study the effect of various drugs (Adrenaline, Propranolol, Acetylcholine & Atropine) on frogs heart.
Effect of Drugs on blood vessels of frog.

Tutorial / Assignment:

Drugs used in treatment of Hypertension
Drugs used in treatment of acute & chronic heart failure.

Self study:

Internet / Library

Recommended Books

The Pharmacological Basis of Therapeutics (Goodman & Gilman)
Basic & Clinical Pharmacology (Bertram G. Katzung)
Clinical Pharmacology (Lawrence & Benett)
Pharmacology (Rang & Dale)
Text book of Physiology (Guyton)

MODULE 708

DRUGS USED IN AIR-WAY DISEASES

Duration 02 weeks Credit Hours 03

Learning Objectives : By the end of this module the students should be able to describe

- * Major classes of drugs used in Asthma
- * Strategies of drug treatment of Asthma
- * Mechanism of action of drugs used in Asthma
- * Role of Mucolytics

Course Contents

- * Pulmonary ventilation
- * Gaseous exchange & transport
- * Regulation of respiration
- * Respiratory insufficiency
- * Pulmonary Edema / Pleural Fluid
- * Respiratory Adjustment in Health & Disease
- * Drugs used in Asthma & COPD
- * Bronchodilators
- * Corticosteroids
- * Mast Cell stabilizers
- * Leukotriene Antagonists
- * Anti-tussive
- * Expectorants
- * Mucolytics

Lab.work

Effect of different Bronchodilators on Guinea pig Trachea.

Tutorial / Assignment:

Patho-physiology of Asthma

Role of Leukotriene Antagonists.
Drugs used in period of remission

Self study:

Internet / Library

Recommended Books

The Pharmacological Basis of Therapeutics (Goodman & Gilman)

Basic & Clinical Pharmacology (Bertram G. Katzung)

Clinical Pharmacology (Lawrence & Benett)

Pharmacology (Rang & Dale)

Text book of Physiology (Guyton)

MODULE 709

DRUGS USED IN ELECTROLYTE & FLUID IMBALANCE

Duration 02 weeks Credit Hours 03

Learning Objectives : By the end of this module the students
should be able to

- * Describe formations of various body fluids and their imbalance
- * Describe renal physiology
- * List different diuretics and their clinical uses.

Course Contents

- * Body Fluids
- * Extracellular fluid
- * Intra-cellular fluid
- * Interstitial fluid
- * Osmosis & Osmolarity Edema
- * Renal Physiology
- * Renal Blood flow
- * Formation of Urine
- * GFR & its control
- * Formation of concentrated & dilute urine
- * Excretion of waste products
- * Acid-Base Balance
- * Urinary Alkalinization and Acidification
- * Nephrotoxicity of Drugs
- * Diuretics
- * Thiazides, Loop Diuretics, osmotic Diuretics
- * CA Inhibitors, K-sparing diuretics

Lab.work

To study nephrotoxicity of different drugs on rabbit kidney

Tutorial / Assignment:

Nephrotoxic drugs
Diuretics
Body fluids

Self study:

Internet / Library

Recommended Books

The Pharmacological Basis of Therapeutics (Goodman & Gilman)

Basic & Clinical Pharmacology (Bertram G. Katzung)

Clinical Pharmacology (Lawrence & Benett)

Pharmacology (Rang & Dale)

Text book of Physiology (Guyton)

MODULE 710
DRUGS USED IN SECRETORY & MOTILITY
DISORDERS OF GASTRO-INTESTINAL TRACT,
AUTACOIDS

Duration 02 weeks Credit Hours 03

Learning Objectives : By the end of this module the students should be able to

- * List the major organ system effects of histamine and serotonin
- * Describe the Pharmacology of H1 anti-histamine drugs
- * Describe the Pharmacology of H2 anti-histamine drugs
- * Describe the Pharmacology of Serotonin agonists and antagonists and their major applications.
- * List the major effects of prostaglandin and leukotrienes
- * List the important site of synthesis and effects of thromboxane and prostacyclin in the vascular system.
- * List the currently available therapeutic antagonists of leukotrienes and prostaglandins and their targets.
- * Explain the different effects of aspirin on prostaglandin synthesis and on leukotriene synthesis
- * Identify different groups of drugs used in peptic ulcer disease.
- * List different drugs used in emesis and their mechanism of action
- * Identify commonly used anti diarrheal drugs
- * Identify commonly used in purgatives
- * Describe the drugs used in management of inflammatory bowel disease

Course Contents.

- * Basic & Clinical Pharmacology of Histamine and its antagonists
- * Serotonin Agonists and Antagonist
- * Vasoactive Peptides (Renin Angiotensin system & Inhibition.
- * Prostaglandins
- * Motor functions of GIT
- * Secretory functions of GIT
- * Digestion
- * Absorption
- * Physiology of GIT disorders
- * Introduction
- * Emetics
- * Antiemetics

- * Drug for peptic ulcer
- * Antacids
- * Anti-secretory Agents
- * Mucosal Protective Agents
- * Anti diarrhoeals
- * Purgatives
- * Treatment of constipation
- * Role of dietary fibre in bowel regulation
- * Drugs used in hepatic disorders
- * Drugs used in biliary disorders

Lab.work

Scheme for unknown drugs to find out the stimulatory effects on rabbit ileum

Scheme for unknown drugs to find out inhibitory effects on rabbit ileum.

Tutorial / Assignment:

Histamine

Anti-histamine

Prostaglandin

Drugs used for peptic ulcer

Anti-emetics

Role of dietary fiber in bowel regulation

Self study:

Internet / Library

Recommended Books

The Pharmacological Basis of Therapeutics (Goodman & Gilman)

Basic & Clinical Pharmacology (Bertram G. Katzung)

Clinical Pharmacology (Lawrence & Benett)

Pharmacology (Rang & Dale)

Text book of Physiology (Guyton)

MODULE 711
DRUGS USED IN ENDOCRINAL & METABOLIC
DISORDERS

Duration 02 weeks Credit Hours 03

Learning Objectives : By the end of this module the students
should be able to

- * Identify major anterior pituitary hormones and their effects
- * Identify major posterior pituitary hormones and their effects
- * Identify the drugs used for treatment of acromegaly & hyperprolactinemia
- * List and describe the principal drugs used in treatment of Hypothyroidism and hyperthyroidism.
- * List several natural and synthetic glucocorticoids and their actions
- * List the indications and contraindications of glucocorticoids
- * Name estrogen and progestins, describe their actions uses and Toxicity.
- * List the benefit and hazards of hormonal contraceptives and HRT
- * List the types of insulin preparation, their actions and adverse Effects
- * Describe major classes oral anti diabetic drugs

- * List the agents used in treatment of hypercalcemia and osteoporosis

Course Contents.

- * Introduction
- * Pituitary & hypothalamic hormones
- * Thyroid hormones
- * Adrenocorticoids
- * Insulin, glucagone & DM
- * Parathyroid hormones and calcium metabolism
- * Reproductive hormones
- * Pregnancy, parturition, Lactation

- * Pituitary Hormones
- * Thyroid & Anti thyroid drugs
- * Corticosteroids
- * Anti-diabetic drugs
- * Gonadal Hormones & Inhibitors
- * Agents affecting bone & mineral Metabolism

Lab.work

Hormonal assays in CENUM

Tutorial / Assignment:

Anti-thyroid drugs

Anti-diabetic drugs and management of diabetes mellitus

Self study:

Internet / Library

Recommended Books

The Pharmacological Basis of Therapeutics (Goodman & Gilman)

Basic & Clinical Pharmacology (Bertram G. Katzung)

Clinical Pharmacology (Lawrence & Bennett)

Pharmacology (Rang & Dale)

Text book of Physiology (Guyton)

MODULE 712
DRUGS USED IN INFECTIOUS, NEOPLASTIC DISEASES &
TOXICOLOGY
Duration 05 weeks Credit Hours 09

Learning Objectives : By the end of this module the students should be able to

- * Describe Mechanism of anti-bacterial action of beta lactam Antibiotics.
- * Identify drugs in each subclass of penicillins
- * List the major adverse effects of penicillins and cephalosporin.
- * Describe Mechanism of action and clinical uses of aminoglycosides, tetracyclines and chloramphenicol.
- * List toxic effect of aminoglycosides, tetracyclines and chloramphenicol.
- * Describe mechanism of action of folate antagonists and their adverse effects.
- * Describe development of resistance against different antibiotics
- * Describe mechanism of action, clinical uses and toxicity of Quinolones.
- * Describe mechanism of action and uses of azoles and polyene Antifungal drugs.
- * Identify the main topical anti fungal agents.
- * Describe mechanism of action of anti-herpes drugs.
- * Describe mechanism of action of anti-HIV drugs.
- * Identify the drugs used against HBV and HCV.
- * Identify major urinary antiseptics and their adverse effects.
- * List various anti-mycobacterial drugs and their adverse effects
- * Describe different regimens for tuberculosis.
- * List different anti-amoebic drugs and their adverse effects.
- * List various anti-malarial drugs.
- * Explain life cycle of common parasites and drugs effective Against nematodes.
- * List drugs effective against trematodes, cestodes.
- * Describe the cell cycle kinetics to the modes of actions and Clinical uses of anti-cancer drugs.

- * Identify the major classes of Anti-cancer drugs, their mechanism Of action and toxic effects.
- * Understand the rationale underlying the strategies of combination drug chemotherapy
- * List immunosuppressants their mechanism of action and use.
- * List immunodepressants their mechanism of action and use.
- * Identify the clinically useful chelators and know their indications and adverse effects.

Course Contents

Gram-positive Cocci & Bacilli
 Gram-negative Cocci & Bacilli
 Anaerobes
 Principles of Chemotherapy
 Empiric and rational therapy
 Sensitivity testing
 Bactericidal and Bacteriostatic action
 Spectrum of activity
 Choice of Anti-microbial Agent
 Problems with the use of Anti-biotics
 Prophylactic use of Anti-biotics
 Combination therapy
 Cell wall inhibitors
 Pencillins, Cephalosporins & others
 Folate antagonists
 Sulphonamides, Trimethoprim , Co-trimoxazole
 Protein synthesis inhibitors
 Tetracyclines, Aminoglycosides, Chloramphenicol,
 Macrolides & miscellaneous
 Quinolones
 Types of virus
 Pathology of common viral diseases
 Anti-viral drugs
 Anti-herpes Agents
 Anti- Influenza Agents
 Anti-HIV Agents
 Anti-Hepatitis Drugs

Types of Fungi
 Common Fungal diseases

- Anti-Fungal Drugs
- For systemic Infections
- For Superficial Infections
- Urinary Anti-septics
- Anti-septics & Disinfectant
- Locally acting drugs
- Mycobacteria
- Staining & culture
- Diseases caused by mycobacteria
- Anti-mycobacterial Drugs
- Treatment of Pulmonary Tuberculosis
- Treatment of Leprosy
- Treatment of Atypical mycobacteria
- Introduction to protozoa
- Life cycle of Entamoeba histolytica
- Anti-amoebic drugs
- Life cycle of malarial parasites
- Anti-malarial drugs
- Introduction to parasitology
 - Life cycle of common parasites
 - Drugs acting against Nematodes
 - Drugs acting against Trematodes
 - Drugs acting against cestodes

- Cancer Chemotherapy
 - Cancer Cell kinetics
 - Alkylating Agents
 - Anti-metabolites
 - Anti-biotics
 - Antibodies
 - Plant Alkaloids
 - Hormonal Anticancer Agents
 - Miscellaneous

- Immuno-modulators
 - Immuno-suppressants
 - Immuno-stimulants

- Toxicology
 - Air-pollutants
 - Heavy metals
 - Agricultural Chemicals
 - Hydrocarbons

Management of poisoned patient

Lab.work

C/S of antibacterial

Pharmacokinetics of antibacterial drugs by C/S and blood levels

Cell culture

Tutorial / Assignment:

Prophylactic use of antibiotics

Problems with use of antibiotics

Misuse of antibiotics

Advances in Cancer chemotherapy

Self study:

Internet / Library

Recommended Books

The Pharmacological Basis of Therapeutics (Goodman & Gilman)

Basic & Clinical Pharmacology (Bertram G. Katzung)

Clinical Pharmacology (Lawrence & Benett)

Pharmacology (Rang & Dale)

Text book of Physiology (Guyton)

Course Content

Semester II

Year Two

<p>Research & Dissertation (Lab. Work)</p> <p>48 weeks</p> <p>Project Synopsis Writing</p> <p>(4 weeks)</p>
<p>Research Project</p> <p>(42 weeks)</p>
<p>Dissertation Defense</p> <p>(02 weeks)</p>

Annexure

Relevant Web Sites

Higher Education Commission Pakistan:

www.hec.gov.pk

Quality Assurance Agency for Higher Education-UK:

www.qaa.ac.uk

Higher Education in Europe;

http://ec.europa.eu/education/policies/educ/higher/higher_en.html

ECTS - European Credit Transfer and Accumulation System:

http://ec.europa.eu/education/programmes/socrates/ects/index_en.html