



SYLLABI AND COURSES OF STUDIES IN M.Phil EXAMINATION

- Anatomy
- Biochemistry
- Immunology
- Microbiology
- Morbid Anatomy & Histopathology
- Pharmacology
- Physiology

UNIVERSITY OF HEALTH SCIENCES, LAHORE

Postgraduate degree courses in medical disciplines were first introduced in the year 1914-1915 by University of the Punjab, Lahore. After the establishment of the University of Health Sciences (UHS), Lahore in 2002, it became the responsibility of UHS to conduct both the undergraduate as well as postgraduate examinations in all medical disciplines. Since the UHS, initially did not have its own curriculum and also the rules and regulations for conducting the above mentioned examinations were not available, so as a stop-gap arrangement, the rules of the University of the Punjab were adopted. But soon it was realized that the curriculum used for teaching the postgraduate medical courses was devoid of the recent advances and also the rules governing the examinations in medical disciplines were almost outdated and obsolete. The research components of medical courses were weak and less innovative that would not allow the students to become useful contributors in their chosen field of specialization and also in basic medical sciences.

The UHS is a fast growing public health university and it believes in quality medical education. It is committed to produce highly qualified medical graduates and specialists through comprehensive career oriented programmes. It was therefore, decided that the curriculum of the postgraduate programmes should be thoroughly revised to include most recent advances in all medical disciplines and there should be a continuous process of revision of system to prepare the UHS medical graduates to meet the challenges of 21st century medicine. New rules and regulations for conducting the examination have been formulated to bring these at par with international standards.

By the grace of Allah Almighty, the curriculum in all the basic medical sciences have been revised and updated by the experts in the relevant disciplines. In addition the evaluation system has been totally revamped and brought at par with international standards by using the latest techniques and method of evaluation. A Research Culture in the university is being promoted and for the first time in the history. Examiners of International repute from foreign universities are involved in evaluation system. It is hoped that in near future, these efforts are going to produce experts of high quality, who will take up the responsibilities as teachers and researchers in the field of medicine in the country.

SYLLABI & COURSES OF STUDIES IN ANATOMY
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A. **Major (Compulsory) Course:**

MCOs Papers	150 Marks	150 Items	3 Hours
SEQs Papers	150 Marks	15 Items	3 Hours
Viva voce & Practical Examination	= 100 Marks		
Total	= 400 Marks		

Contents of Courses:

I Gross Anatomy

This course includes study of different parts of the body:

- 1) General Anatomy
- 2) Upper Limb
- 3) Lower Limb
- 4) Thorax
- 5) Abdomen
- 6) Pelvis
- 7) Head and Neck
- 8) Brain

II Gross Anatomy Lab

It will be taught in conjunction with Gross Anatomy and will constitute dissection of appropriate parts of human cadavers.

III Histology

The course will include principles and use of functioning of microscopes, preparation of tissues for light and electron microscopy and a survey of the microscopic structure of the tissue and organs of the body with special reference to their comparative aspects, organization, functions and developments. A laboratory course will be a requirement for this course. The laboratory work includes study of the cells, tissues and organs through the use of prepared slides and fresh tissues.

Practical tests are given for identification of microscopic structures. A more detail of the contents is listed below. This course is designed to teach the students of all disciplines of basic medical sciences in general and those who work with microscope in particular, for the effective use of techniques of tissue preparation.

By the use of various methods of fixation, processing sectioning and staining, the students learn some of the commonly used cytological, histological, neuroanatomical and embryological techniques of slide preparation. This course follows the course in microscopy and elementary microtechniques and trains the students in advance histological and pathological techniques. The course also introduces the students to the general principles of electron microscopy. It familiarizes them with some specific techniques of preparation of biological specimens for study with the electron microscope.

IV Histology Lab

This includes training and learning the preparation of tissues for light microscopic localization of chemical substances, in situ in tissues, including qualitative and quantitative demonstration of lipids, carbohydrates, nucleic acids and enzymes.

V Developmental Anatomy

The intrauterine development of the human individual is presented against the background of evolution of the human organism. Lower animal material is freely utilized in the study of appropriate stages of early development because of its easy availability and great teaching value. For the same reason early embryology of the chick has been included in the course. Special human embryology is studied with the aid of serial sections and whole mounts. Mammalian's embryos and also human material where available are used. Stress is laid on correlating this knowledge with adult anatomy and the genesis of the developmental anomalies. Students will also be conducted macroscopic examination of embryos at different selected developmental stages of human embryo.

VI Neuroanatomy

This course includes the dissection of the human brain. A complete and detailed survey is made of the gross and microscopic structure of the nervous system with particular reference to the functional aspects. Neurological case problems are discussed. Free use is made of the Nissl stained serial cross-sections of the human spinal cord and brain stem for localization of the fiber tracts and cell groups.

Practical

Lab Techniques for all the above subjects

B. **1st Minor (Elective) Course:**

1st Minor = 100 Marks 100 Items 2 Hours

Physiology

C. **2nd Minor (Elective) Course:**

2nd Minor = 100 Marks 100 Items 2 Hours

One elective course shall be selected from the following:

- i. Microbiology
- ii. Gen. Pathology
- iii. Immunology
- iv. Biochemistry
- v. Chemical Pathology
- vi. Cytogenetics and Molecular Biology

D. **Thesis**

Thesis Examination = 200 Marks

Suggested Readings:

- Last's Anatomy Regional and Applied by R.M.H McMinn (Churchill Livingstone)
- Clinically Oriented Anatomy by Keith L. Moore (Lippincott, Williams & Wilkins)
- Gray's Anatomy by Williams et al (Churchill Livingstone)
- The Developing Human by Keith L. Moore (Saunders)
- Medical Embryology by Jan Langman (William and Wilkins)
- Baily's Textbook of Histology by Wilfred M. (Coopenhaver, Kelly wood)
- Functional Histology by Borysenko, Bringer (Little Brown & Co.)
- Wheater Functional Histology by B. Young & H. Heath (Churchill Livingstone)
- Histology: A Text and an Atlas by M.H. Ross (Williams & Wilkins)
- Genetics in Medicine by J.S. Thompson & W.B. Saunders (M. W. Thompson)
- Human Neuroanatomy by J. Stuin & M. B. Carpenter (Williams & Wilkins)
- Clinical Neuroanatomy by Richard S. Snell (Williams & Wilkins)

- Histochemistry, Theoretical and Applied by Anthony Guy Everson. Pearse (Churchill Livingstone)
- Histopathologic Technic & Prac. Histochemistry by Ralph Dougall, Lillie
- Biological Microtechnique by Sanderson J (1994)
- British Journal of Anatomy
- American Journal of Anatomy
- Journal of Ultrastructural Research
- Anatomical Records
- Acta Anatomica
- Journal of Medical Genetics

Web site for Anatomy:

<http://www.uhs.edu.pk/Academics/anatomy.html>

SYLLABI & COURSES OF STUDIES IN BIOCHEMISTRY

E. **Major (Compulsory) Course:**

MCOs Papers	150 Marks	150 Items	3 Hours
SEQs Papers	150 Marks	15 Items	3 Hours
Viva voce & Practical Examination	= 100 Marks		
Total	= 400 Marks		

Contents of Courses:

VII General Biochemistry

This comprehensive study of biologically active compounds and their metabolism, biosynthesis and relationship to biological system includes a detailed presentation of bioenergetics enzyme kinetics and buffer systems.

VIII Advanced Biochemistry

This course offers advanced insight into major areas of Biochemistry. Hypothesis and theories are viewed with an orientation to application in modern medicine and clinical research.

This course presents a biochemical approach to integration and correlating the analytical determinations performed in clinical biochemistry laboratory with physiological and pathological processes. The topics includes disorders related to carbohydrate, lipid and protein metabolism, fluid and electrolyte balance, acid-base physiology, pathophysiology of blood gases, Renal and urinary system, hepatobiliary system, the endocrine system, cardiac markers in myocardial infraction, diagnostic enzymology, body fluids, body chemical analysis, tumor markers and therapeutic drug monitoring.

IX Medical Genetics

This course considers the basic principles of inheritance and pattern of single inheritance human genome structure and function techniques of gene analysis genetic variation in individuals and

populations, gene mapping and human genome project, principles of clinical cytogenetics, the molecular and biomedical basis of genetic disorders with complex inheritance, cancer genetics, developmental genetics, prenatal diagnosis, genetic counseling and its implications to society at large together with ethical issues.

X Research in Biochemistry

The students are required to do original research on a topic to be selected in consultation with their supervisors. Selection of the research problem must be made early enough to allow a minimum of 12 months of work for the M.Phil. students. The study must demonstrate their skill in review of the literature and organization and conduction of research. The thesis must be written in such a manner that it meets international standards for scientific articles. There are no fixed restrictions on the length or brevity of the thesis.

Practical

Lab Techniques for all the above subjects

F. 1st Minor (Elective) Course:

1st Minor = 100 Marks 100 Items 2 Hours

Physiology

G. 2nd Minor (Elective) Course:

2nd Minor = 100 Marks 100 Items 2 Hours

One elective course shall be selected from the following:

- i. Anatomy
- ii. Microbiology
- iii. Haematology
- iv. Histopathology
- v. Immunology
- vi. General Pathology
- vii. Cytogenetics and Molecular Biology

H. Thesis

Thesis Examination = 200 Marks

Suggested Readings:

- Biochemistry 3rd Edition by Donald Voet
- Biochemistry 3rd Edition by Donald Voet
- Clinical Chemistry 4th Edition by Carl A Burtis
- Clinical Chemistry 4th Edition by Carl A Burtis
- Analytical Chemistry 8th Edition by Douglas A. Skoog
- Biochemistry 3rd Edition by Pamela Champ
- Principal of Biochemistry 4th Edition by David L. Nelson
- Principal of Biochemistry 4th Edition by David L. Nelson
- Clinical Chemistry 5th Edition by Michel L. Bishop
- Clinical Chemistry 5th Edition by William J Marshall
- Modern Experimental Biochemistry by Rodney Boyer
- Basic & Clinical Biochemistry 4th Edition by Dawson Beth
- Cell and Molecular Biology 4th Edition by Gerald Karp
- Textbook of Medical Biochemistry by M. A. Hashmi
- Textbook of Medical Biochemistry by M. A. Hashmi
- Biochemistry 5th Edition by Berg J. M.
- Principal of Biochemistry 4th Edition by Nelson D. A.
- Cell and Molecular Biology 4th Edition by Gerald Karp
- Principal of Biochemistry 3rd Edition by Harton H.R.
- Biochemistry and Molecular Biology by Elliott D.C.
- Marks Basic Medical Biochemistry 2nd Edition by Smith Collen
- Essential of nutrition and diet therapy 5th Edition by Sue Rod Well Williance
- Marks Basic Medical Biochemistry 2nd Edition by Smith Collen
- Review of medical physiology 22nd Edition by William F. Ganong
- Review of medical physiology 22nd Edition by William F. Ganong

Web site for Biochemistry:

<http://www.uhs.edu.pk/Academics/Biochemistry.html>

SYLLABI & COURSES OF STUDIES IN IMMUNOLOGY

I. Major (Compulsory) Course:

MCOs Papers	150 Marks	150 Items	3 Hours
SEQs Papers	150 Marks	15 Items	3 Hours
Viva voce & Practical Examination	= 100 Marks		
Total	= 400 Marks		

Contents of Course

BASIC PRINCIPLES OF IMMUNOLOGY AND SEROLOGY

Including;

INNATE AND ADAPTIVE IMMUNITY:

- Introduction
- Components of non-specific immune system
 - Mechanical barriers to infection
 - Chemical and Biochemical inhibitors
 - Phagocytosis
 - Opsonization
 - Non-specific humoral factors
 - Lymphocytic-cells contributing to non-specific immunity

ANTIGENS AND IMMUNOGENICITY:

- Definitions
 - Antigens
 - Haptens
 - Epitopes
 - Adjuvants
- Properties of Immunogenicity:
 - General Considerations
 - Foreignness
 - Chemical complexity
 - Molecular size

- Use of immunogens in vaccination
- Basis of antigen specificity
- Forces of antigen-antibody attraction
- Thymus dependence and Immunogenicity

IMMUNOGLOBULINS:

- Introduction
- Immunoglobulin structure
- Biological and Chemical properties of Immunoglobulins
- Antibody Diversity

COMPLEMENT SYSTEM:

- Introduction
- Pathways of complement activation
 - Overview
 - Classic pathway
 - The alternative pathway
 - Regulatory Mechanisms
 - Biological consequences of complement activation

THE IMMUNE RESPONSE SYSTEM/SPECIFIC ACQUIRED IMMUNITY:

- Introduction
- The Lymphoid system
- Cells involved in the immune response
 - Antigen presenting cells
 - T Lymphocytes
 - B Lymphocytes
 - Introduction to the Immune response
 - Antigen processing and presentation
 - Collaboration between cells
 - Epitope recognition
 - MHC restriction
 - T cell activation
 - B cell activation and antibody synthesis
 - Phases of Humoral Immune responses
 - Principle of Vaccination
 - Cell mediated component if Immunity
 - Immunopathology

TECHNIQUES IN IMMUNOLOGY AND SEROLOGY

SPECIMEN COLLECTION AND HANDLING:

- Blood collection techniques
- Use of anticoagulants and preservatives
- Sample processing. Separation, storage
- Preservation of samples during transit
- Requirements for transport of sample to referral laboratories
- Result Interpretation and reporting
- Quality control and laboratory management in immunodiagnosis

LABORATORY HAZARDS:

- Biological hazards
- Precautions against infectious diseases e.g. Hepatitis, AIDS etc.
- Handling of toxic, corrosive and radioactive materials
- Disposal of hazardous waste materials

IMMUNOLOGICAL AND SEROLOGICAL TECHNIQUES:

- General considerations
- Agglutination reactions
- Precipitation reactions
- Immunodiffusion techniques:
 - Double diffusion
 - Single radial immunodiffusion
 - Immunoelectrophoresis
- Complement Fixation test
- Immunofluorescence
 - Direct
 - Indirect
- Enzyme Immunoassay (EIA)
- Radio immunoassay
 - General considerations
 - Liquid Phase RIA
 - Solid Phase RIA

ADVANCED PROFESSIONAL EDUCATION IN IMMUNOLOGY AND SEROLOGY:

THEORETICAL COMPONENT

- Introduction to Medical Immunology
- Molecular Immunology
- Cellular Immunology
- Autoimmunity and disease
- Arthritis, nephritis and vasculitis
- Infectious diseases
- Extrinsic allergic disease
- Immunodeficiency
- Transplantation Immunology
- Cancer
- Immunodiagnosis, quality control and laboratory management

COMPULSORY PRACTICAL WORK: Content

Students will carry out a syllabus of practical work designed to cover the major techniques of Medical Immunology. Each student is expected to keep a proper record of the practical work and to have the record scrutinized and approved by the University supervisor to whom he is attached.

The following syllabus of practical work is undertaken:

IMMUNOCHEMICAL TECHNIQUES:

- i. Quantitation of IgG, IgA, IgM, IgD, and IgE in serum and other body fluids
- ii. Immunoelectrophoretic analysis of serum immunoglobulin abnormalities and detection/quantitation of Bence-Jones protein in the urine.
- iii. Cryoglobulin determination and analysis
- iv. Tests for circulating immune complexes by immunochemical methods
- v. Immunochemical and electrophoretic analysis of CSF
- vi. Measurement of overall complement function (Total haemolytic and alternative pathway titrations); of complement components (especially C3, C4, Factor B and C1 esterase inhibitor); electrophoretic examination for altered complement components.

- vii. Other serum protein determinations including acute phase proteins (CRP etc.), carcinoembryonic antigen, α -fetoprotein; and protein clearance ratios and pregnancy tests on urine.

SEROLOGICAL TECHNIQUES:

- i. Tests for circulating antibodies to autoantigens in tissue sections by indirect immunofluorescence and enzyme-labelled techniques
- ii. Tests for antibodies to other autoantigens by agglutination, precipitation, complement fixation and radioimmunoassay
- iii. Tests for antibodies to non-microbial environment and food allergens
- iv. Tests for antibodies to selected microbiological antigens

IMMUNOHISTOLOGICAL TESTS:

Detection of antigens, antibodies, Immunoglobulins and complement components deposited in pathological lesions, particularly in the kidney and skin; characterization of plasma cells and lymphocyte types in relevant tissue biopsies, using immunofluorescent and enzyme-labelled techniques.

LYMPHOCYTES AND LEUKOCYTE FUNCTION TESTS:

- i. Characterization of normal and neoplastic lymphocytes sub-populations in peripheral blood, and in tissues where appropriate.
- ii. Assessment of in vitro functional responses of lymphocytes, e.g lymphocyte transformation to mitogens and antigens, mixed lymphocyte responses, lymphokine secretion in response to antigens and mitogens, etc.
- iii. Assessment of mobility or particle uptake, specific enzyme activity (e.g NBT reduction) and microbiological killing activity of granulocytes and monocytes, and assessment of serum co-factors necessary for such functions – principally in the evaluation of patients with suspected immunodeficiency.

TISSUE TYPING FOR HLA-ANTIGENS: SEROLOGICAL AND DNA BASED

Principles of **QUALITY CONTROL** and the use of reference preparations as laboratory standards

COMPULSORY ROTATION:

In the following disciplines:

1. Histocompatibility and Immunogenetics
2. Immuno Haematology
3. Virology
4. Microbiology
5. Allergy and Asthma

J. 1st Minor (Elective) Course:

1st Minor = 100 Marks 100 Items 2 Hours

General Pathology

K. 2nd Minor (Elective) Course:

2nd Minor = 100 Marks 100 Items 2 Hours

One elective course shall be selected from the following:

- (i) Microbiology
- (ii) Chemical Pathology
- (iii) Hematology
- (iv) Histopathology
- (v) Biochemistry
- (vi) Cytogenetics & Molecular Biology

L. Thesis Examination:

Thesis Examination = 200 Marks

Suggested Readings

Text Books

1. Immunology by Roih, Brostoff and Male (6th Edition)
2. Immunobiology (The immune system in health & disease by Janeway, Travers, Walport & Shlomchik (6th Edition)
3. Immunology by Abbas

Reference Books

1. Fundamental Immunology (5th Edition) by William E. Paul

Web site for Immunology:

<http://www.uhs.edu.pk/Academics/Immunology.html>



<p>SYLLABI & COURSES OF STUDIES IN</p> <p>MICROBIOLOGY</p>
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M. **Major (Compulsory) Course:**

MCOs Papers	150 Marks	150 Items	3 Hours
SEQs Papers	150 Marks	15 Items	3 Hours
Viva voce & Practical Examination	= 100 Marks		
Total	= 400 Marks		

Contents of Courses:

XI Basic Bacteriology

Classification & Nomenclature of bacteria, Bacterial anatomy & physiology, Bacterial growth & Culture media, Bacterial genetics, Normal human flora, Bacterial virulence & Pathogenicity, Sterilization & disinfection, Mechanism of host resistance, Mechanism for action of antibiotics, Bacterial resistance to antimicrobial agents Antimicrobial susceptibility testing, Lab guidance of antimicrobial therapy, Bacterial vaccines.

XII Clinical Bacteriology

Gram positive cocci ; Staphylococci & related organisms, Gram positive cocci ; Streptococci & Enterococci, Aerobic Gram positive bacilli, Gram negative cocci ; Neisseria, Moraxella, Enterobacteraceae, Yersinia, Vibrionaceae, Pseudomonas, Anaerobic bacteria ; bacilli & cocci, Parvobacteria ; (Brucella, Bordetella, Haemophilus, Pasteurella) Spirochaetes ; (Treponema, Borrelia, Leptospira), Rickettsiae, Mycobacteria, Chlamydiae & Mycoplasma.

XIII Immunology – Serology

Immunity; Cell mediated, Humoral, Hypersensitivity, Complement System, antigens, antibodies. Various antigen-antibody reactions and their clinical applications. Agglutination, Precipitation, ELISA (Enzyme linked immunosorbent assay), RIA (Radioimmunoassay), Complement fixation.

XIV Virology

Introduction to the viruses, Viral taxonomy & classification, Structure of viruses & replication of viruses, Pathogenesis & Host defence mechanisms, Diagnosis of viral infections, Antiviral drugs & vaccines, DNA viruses, RNA viruses, HIV, Hepatitis viruses, Oncogenic viruses.

XV Parasitology

Introduction & relationship of medically important parasites, Risks & prevention of parasitic infections, Collection, transport & processing of specimens, Identification & differentiation of parasites, Intestinal, Nematodes, cestodes, Blood & tissue parasites, Serological diagnosis of parasitic infections, Drugs commonly used in the treatment of parasitic infections.

XVI Mycology

Classification & Taxonomy of human mycosis, Lab diagnosis of fungal infections, dermatophytes & candida, Lab & clinical characteristics of specific groups of filamentous molds, Antifungal susceptibility testing, Serological diagnosis of fungal diseases, Mycosis; Cutaneous/sub-cutaneous, Systemic, Opportunistic

Practical

Lab Techniques for all the above subjects

N. 1st Minor (Elective) Course:

1st Minor = 100 Marks 100 Items 2 Hours

General Pathology

O. 2nd Minor (Elective) Course:

2nd Minor = 100 Marks 100 Items 2 Hours

One elective course shall be selected from the following:

- (vii) Chemical Pathology
- (viii) Hematology
- (ix) Histopathology
- (x) Immunology/Serology

P. Thesis

Thesis Examination = 200 Marks

Suggested Readings:

- Medical Microbiology & Immunology (Examination & Board Review)
- by Warren Levinson & Earnest Jawetz
- Medical Microbiology by Topley & Wilson
- Diagnostic Microbiology by Elmer W. Koneman
- Medical Microbiology by David Greenwood
- Medical Microbiology (Practical) by Macky Macartney
- General Pathology by Kumar, Cotran and Robins
- WALTER'S General Pathology
- Microbiology by Zinsser
- Clinical Parasitology by Craig Faust
- Clinical Bacteriology by Joan Stokes
- Manual for identification of Medical Bacteria by Cowan & Steel
- Tropical Disease by Manson Bahar
- Oral Microbiology by Nolte
- Microbiology by Cruickshank Vol I & II

Web site for Microbiology:

<http://www.uhs.edu.pk/Academics/microbiology.html>

SYLLABI & COURSES OF STUDIES IN MORBID ANATOMY & HISTOPATHOLOGY
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Q. **Major (Compulsory) Course:**

MCOs Papers	150 Marks	150 Items	3 Hours
SEQs Papers	150 Marks	15 Items	3 Hours
Viva voce & Practical Examination	= 100 Marks		
Total	= 400 Marks		

Contents of Courses:

XVII Systemic Pathology

Blood, Haemopoetic and Lymphoid System

This course includes diseases of hemopoietic and lymphoid system with special emphasis on anaemias, leukemias, lymphoma, multiple myeloma, bleeding disorders, blood groups and its related diseases.

Diseases of respiratory system

With special emphasis on infections of the respiratory tract including tuberculosis, benign and malignant effusions, atelectosis, restrictive and obstructive lung disease, asthma, pneumoconioses, Tumours, immunological diseases, thrombo-embolism and pulmonary hypertension.

Oral cavity and gastrointestinal tracts

With special emphasis on leukoplakia, oral malignancies, tumors of the salivary glands, oesophagitis, Barrett's oesophagus, gastritis, peptic ulcer, Hirschsprung's disease, celiac diseases, tropical sprue, ischaemic bowel disease, ulcero-inflammatory bowel disease, diseases of appendix, clinico-pathological features of amoebiasis, typhoid and tuberculosis, and tumors and tumor like lesions of gastrointestinal tract.

Hepatobiliary System

The course includes diseases of liver and biliary system with special emphasis on bilirubin metabolism, pathophysiology of jaundice, its clinical features and lab diagnosis, biliary

obstruction, hepatic failure, various types of cirrhoses with pathogenesis and complications, different forms of hepatitis, liver abscess with clinical and morphological features, drug induced liver injury, alcoholic liver diseases, haemochromatosis, Wilson's disease , biliary cirrhosis, tumors and tumor like lesions of hepatobiliary system, pancreatitis and tumors and tumor like lesions of pancreas.

Urinary System

The course includes urinary system with special emphasis on azotemia, uraemia, renal failure, polycystic renal disease, glomerulonephritides, nephritic and nephrotic syndrome, pyelonephritis, tubular necrosis, nephrosclerosis, tumors and tumor like lesions of the kidney and pelvis, tumors, tumor like lesions and inflammations of the urinary bladder.

Male Genital System

Male genital system with special emphasis on congenital conditions, inflammatory lesions of the male genital system, prostate hyperplasia and carcinoma, scrotal swelling, diseases of testicular adnexa, inflammation and tumors of testis and epididymus, male infertility.

Gynecologic Pathology & Breast

Female urogenital system with special emphasis on sexually transmitted diseases, cervical intraepithelial neoplasia, adenomyosis and endometriosis, endometrial hyperplasia and dysfunctional uterine bleeding, placental and gestational trophoblastic disease, ectopic pregnancy and toxemia of pregnancy, tumors and tumor like lesions of female genital tract. The course includes diseases of the breast with special emphasis on causes of the lump in breast, dt FNA cytology, nipple discharge, gynaecomastia, etiology, pathogenesis, morphology and clinical features and natural history of mastitis, fibrocystic diseases, tumors and tumor like lesions of the breast.

Cardiovascular System

The course includes diseases of blood vessels and heart with special emphasis on atherosclerosis, hypertension, aneurysms, congenital heart disease, ischemic heart disease, myocardial infarction, rheumatic heart disease, endocarditis and cardiomyopathus.

Musculo-Skeletal System

This course includes musculoskeletal system with special emphasis of etiology pathogenesis and clinico-morphological features of osteoporosis, achondroplasia, osteogenesis, osteomyelitis, Pagets disease, oosteoarthritis, rheumatoid arthritis, muscular dystrophies, myopathies, myasthenia gravis and tumors and tumor like lesions of musculoskeletal system.

Endocrine System

Endocrine system with special emphasis on hyper- and hypo-pituitarism, acromagaly and gigantism, morphology and clinical features of pituitary adenomas, disturbances of ADH secretions, hyper- and hypo-function of adrenal cortex, medulla, thyroid and para-thyroid glands, lab diagnosis of diseases of adrenals, thyroid and parathyroid glands, goiter and its types, causes of solitary thyroid nodule and its diagnostic approach, MEN syndrome, different types of hyper- and hypothyroidisms, primary secondary and tertiary hyperparathyroidism, different types of hypoparathyroidisms, calcium homeostasis, hyper- and hypocalcaemia and tumors of the endocrine system. The course include diseases of the skin with special emphasis on terminology of skin lesions, different types of dermatitis, urticaria, erythematous lesions, psoriasis, pamphigus, bullous lesions, pre-malignant epithelial lesions, various types of warts and tumors of the skin. The course also includes diseases of the nervous system with special emphasis on hydrocephalus, cerebral oedema, herniation of brain, intracranial hemorrhage, meningitis, brain abscess, viral encephalitis, Guillian-Barre syndrome, infectious polyneuropathies, toxic neuropathies and tumors of the nervous system.

XVIII Surgical Pathology

This practical course deals with handling of surgical specimens received from clinical departments. Training in grossing, processing, cutting and staining methods are to be learnt. The objective of this course is to enable the candidate to report on surgical specimens independently.

Practical

Lab Techniques for all the above subjects

R. 1st Minor (Elective) Course:

1st Minor = 100 Marks 100 Items 2 Hours

General Pathology

The course introduces the general principles of Pathology with special emphasis on cell injury and cell death, cell adaptation and intracellular accumulations, inflammation and repair, hemodynamic disorders, and genetic disorders, neoplasia, general immunology & immunity, immune mediated diseases, immunology based lab. tests , immunoglobulins & cell mediated immunity, hypersensitivity, autoimmunity, immune deficiency, immunization, general bacteriology, important infections & infectious

agents. Communicable diseases, role of microbiology lab. in diagnosis of disease, parasitology, important parasites & their pathogenesis & diagnosis.

S. **2nd Minor (Elective) Course:**

2nd Minor = 100 Marks 100 Items 2 Hours

One elective course shall be selected from the following:

- (xi) Hematology
- (xii) Microbiology
- (xiii) Immunology/Serology
- (xiv) Chemical Pathology

T. **Thesis**

Thesis Examination = 200 Marks

Suggested Readings:

- Walters and Israel General pathology by Walters
- Robbins and Cotran Pathologic basis of disease by Kumar
- Lever's Histopathology of the skin by Elder
- Rosai and Ackerman's Surgical Pathology by Rosai
- Sternberg's Surgical Pathology by Mills
- Atlas of tumor pathology [Fascicles] by AFIP
- Principles and techniques of surgical pathology by Schmidt
- Theory and practice of histological techniques by Bancroft
- Geenenfields's neuropathology by Graham
- Surgical pathology of the GT tract, Liver, Biliary tract and Pancreas by Odze
- Histological typing of tumours [series] by WHO
- AFIP laboratory methods in histotechnology by Edna
- Advanced methods in histology and pathology by AFIP
- Essentials of pathophysiology by Porth
- Diagnostic cytopathology by Gray
- Dacie & Lewis Practical Haematology by Lewis
- Clinical pathology interpretations by Nagi
- Varley's Practical Clinical Biochemistry by Gowenlock
- Practical guide for Health Researchers by WHO

- Statistics at square one by Swinscow
- Thesis writing by Khan

Web site for Morbid Anatomy & Histopathology:

<http://www.uhs.edu.pk/Academics/pathology.html>

SYLLABI & COURSES OF STUDIES IN PHARMACOLOGY

U. **Major (Compulsory) Course:**

MCOs Papers	150 Marks	150 Items	3 Hours
SEQs Papers	150 Marks	15 Items	3 Hours
Viva voce & Practical Examination	= 100 Marks		
Total	= 400 Marks		

Contents of Courses:

XIX General Pharmacology

General Principles

Introduction to Pharmacology & its main subdivisions, What are Drugs? Sources & Active Principals of Drugs, Pharmacopaeias, Discovery, Development and Evaluation of new Drugs & Drug Regulations.

Pharmacokinetics

- Transport of Drugs across body membranes/transmembrane partitioning of drugs
- Physiochemical factors in transfer of drugs across body membrane
- Drug absorption & factors affecting it
- Apparent volume of distribution
- Multi compartment models & Steady state plasma concentration
- Kinetics of oral drugs and bioavailability, Plasma half life ($t_{1/2}$)
- Concept of clearance & excretion of drugs
- Nonlinear Pharmacokinetics
- Biotransformation of drugs
- Drugs and optimization of dosage regimens

Pharmacodynamics

- Macromolecular nature of drug receptors
- Drug receptor-effector coupling
- Agonists partial agonists and antagonists, Agonist-Antagonist, Inverse agonists

- Signalling mechanisms and drug action
- Ligand gated channels
- G. Protein linked receptors and second messengers
- Transmembrane receptors
- Intracellular receptors
- Receptor regulation, tolerance, tachyphylaxis etc
- Relationships between drug concentration and response (Dose-Response Curves)
- Safety margin of Drugs, Factors affecting doses & actions of drugs
- Adverse effects of drugs, Toxicities, Allergies and Idiosyncrasies etc.

Pharmacogenetics

- Introduction of Pharmacogenetics
- Influence of genetic factors on Pharmacological responses to drugs

XX Autonomic Pharmacology

- What is ANS?
- Neurotransmission in ANS, cholinergic, adrenergic, dopaminergic, & Non Cholinergic- Non Adrenergic Transmission in Enteric Nervous System
- Anatomy and general functions of the autonomic and somatic motor nervous systems
- Muscarinic receptor agonists, anticholinesterase agents, insecticides & Nerve gases cholinesterase regenerators. Treatment of Myasthenia Gravis & Treatment of Glaucoma.
- Parasympatholytics (Antimuscarinics)
- Agents acting at neuromuscular junctions and autonomic ganglia
- Sympathomimetic drugs (catecholamines & noncatecholamines) other adrenergic receptor agonists and indirectly acting sympathetic amines
- Adrenergic receptor blockers, adrenergic neuron blockers and central sympathoplegics

XXI Cardiovascular Pharmacology

- Drug therapy of hypertension
- Drug therapy of Cardiac failure and Cardiomyopathies
- Drug therapy of Cardiac arrhythmias
- Drug therapy of Coronary artery diseases (IHD, Angina & Myocardial Infarction)
- Drug therapy of Hyperlipidemias

XXII Renal Pharmacology (Diuretics)

- Carbonic-anhydrase inhibitors
- Loop diuretics
- Thiazide diuretics

- Potassium sparing diuretics
- Osmotic diuretics
- ADH antagonists

XXIII Gastro-intestinal Pharmacology

- Drugs used in acid-peptic disease & Gastro-esophageal Reflux Disease (GERD)
- Drugs affecting gastrointestinal motility
- Emetics & Anti-emetic agents
- Laxatives and purgatives
- Antispasmodics, antimotility agents and antidiarrhoeals
- Drugs used in the treatment of inflammatory bowel disease
- Drug therapy of irritable Bowel Syndrome (IBS)

XXIV Respiratory Pharmacology

- Bronchodilators and drugs used for COPD
- Anti-tussives
- Expectorants
- Mucolytic agents
- Drug therapy of allergic Rhinitis & other allergic disorders

XXV Drugs Acting on CNS

- Neurotransmitters in CNS and their receptors
- Pharmacotherapy of parkinsonism and other movement disorders.
- Drug therapy of spasticity and acute muscle spasms
- Drugs effective in the therapy of epilepsies
- Drug therapy of anxiety (anxiolytics)
- Drug therapy of insomnia
- Drug therapy of behavior disorders and antipsychotics
- Drug therapy of affective disorders-Antidepressants, antimanic and drugs used in Bipolar Affective Disorders.
- Moods stabilizing Drugs
- Pre-Anaesthetic medication
- General anesthetics
- Local anesthetics
- Pharmacological rationale for the management of migrainous headaches and ergot alkaloids.
- CNS Stimulants and psychotomimetics.

- Neuropharmacology of aging
- Pharmacology of analgesic drugs (Opioids)
- Pharmacology of Alcohol
- Pharmacotherapy of Appetite Disorders (Anorexia Nervosa and Bulimia Nervosa)
- Drug Dependence and Drug abuse

XXVI Toxicology

- Introduction of toxicology “occupational and environmental”
- Heavy metal intoxication and chelating agents
- Management of the poisoned patient

XXVII Pharmacology of Rheumatic Disease

- Non-steroidal anti-inflammatory drugs (NSAIDs) and Treatment of Rheumatoid Arthritis & Gout.
- Disease modifying anti rheumatic agents

XXVIII Endocrine Pharmacology

- The role of endocrine system and its function in the whole organ system
- Regulation and control of human endocrine system
- Mechanisms of hormonal control
- Drugs that modify the functions of adrenal gland
- Drugs that affect glucose metabolism and drug therapy of diabetes mellitus
- Drugs that modify growth hormone functions
- Drugs that modify anterior pituitary hormone functions
- Thyroid & Ant-thyroid Drugs
- Male sex hormones, anabolic steroids and inhibitors.
- Female sex hormones, contraceptives, ovulation inducing agents & Treatment of Infertility
- Corticosteroids & Antagonists
- Pharmacology of dopamine agonists and antagonists & treatment of hyperprolactinemia
- Labour inducing agents & drug therapy of PPH

XXIX Chemotherapeutic Agents

Antimicrobials

- General introduction
- Resistance to antibacterial, Biochemical mechanisms & How it spreads
- Beta-Lactam, Antibiotics. Penicillins, Cephalosporins, vancomycin, bacitracin etc. monobactams & other cell wall synthesis inhibitors.
- Aminoglycosides

- Macrolides
- Streptogramins
- Tetracycline
- Chloramphenicol & Treatment of Enteric fevers
- Sulphonamides & Cotrimoxazole
- Quinolones & Fluoroquinolones
- Urinary Antiseptics
- Mis Agents
- Drug Interactions& Incompatibilities of Antibacterials
- Antimycobacterials (Anti T.B. Drugs, Antileprosy Drugs)
- Factors affecting antibiotic dosage & route of administration
- Use & misuse of Antibiotics/Antibacterial
- Clinical Pharmacology of antineoplastic agents
- Different groups of drugs used in cancer chemotherapy, their mechanism of action, pharmacokinetics, indications, contraindications, adverse effects, toxicities and drug interactions
- Immunotherapy of cancer
- Clinical application of anticancer agents
- Supportive care of cancer patient
- T cell markers & receptor-potential use in immune modulation
- Modulation of inflammatory and immune response by histamine and prostaglandins
- Immunoglobulins and drugs
- Mediators of immediate hypersensitivity
- Drug sensitivity, molecular & immunological aspects
- Chemical immunosuppressants
- Antibiotics as immunosuppressants
- Pharmacology of drugs used in fungal infections (local & systemic)
- Antiviral drugs and Drugs used in Hepatitis & AIDS.

XXX Antiparasitic Agents

- Chemotherapy of protozoan infection
- Chemotherapy of metazoan infection

XXXI Drugs affecting blood

- Treatment of hyperlipidemias
- Drugs affecting blood coagulation

- Drugs therapy of Anaemias

XXXII Autacoids

- Histamine & Anti-Histamines
- Serotonin, agonists & antagonists
- Prostaglandins, other Eicosanoids & Analogues
- Vasoactive Peptides

XXXIII Special Topics

- Special aspects of perinatal and pediatric pharmacology
- Special aspects of geriatric pharmacology
- Dermatologic pharmacology
- Important drug interactions and their mechanisms
- Any other topics

Practical

Lab Techniques for all the above subjects

V. 1st Minor (Elective) Course:

1st Minor = 100 Marks 100 Items 2 Hours

Physiology (Compulsory)

Introduction to Physiology: Functional organization of human body; Homeostasis. The Cell-Structural Organization; Cell Membrane and Permeability; Membrane potentials and Action Potential; Skeletal Muscle; Excitation and Contraction of Skeletal Muscle; Neuromuscular Transmission; Contraction and Excitation of Smooth Muscle. Blood Cells and Clotting: Red Blood Cells; Anemia and Polycythemia; Leukocytes, Granulocytes, the Monocyte-Macrophage system, and Inflammation; Immunity and Allergy; Hemostasis and Blood Coagulation. Cardiovascular System: Electrical Activity of the Heart; The Electrocardiogram; Mechanical Activity of the Heart; Capillary Exchange; Regulation of Circulation (humoral And nervous). Renal Physiology: Organization of Urinary System; Glomerular Filtration and Renal Blood Flow; Transport of Sodium and Chloride; Transport of Potassium; Transport of Acids and Bases; Integration of Salt and Water Balance. Respiratory System: Mechanics of Respiration; Acid Base Physiology; Transport of Oxygen and Carbon dioxide in the blood; Gas Exchange in the lungs. Gastrointestinal Physiology: Organization of Gastrointestinal System; Gastric Function; Pancreatic and Salivary Glands; Hepatobiliary Functions; Nutrient Digestion and Absorption; Intestinal Electrolyte and Water Transport. Central Nervous System: Physiology of Neurons; Synaptic Transmission in The Nervous

System; Sensory Receptors of the somatosensory system; Visual/Vestibular/Auditory systems; Neuronal Control of Mood, Emotion and State of Awareness; Learning and Memory. Endocrine Physiology: Introduction to Endocrine Physiology; Pituitary Gland; Thyroid Gland; Adrenal Gland; The Pancreatic Islets: Hormonal Regulation of Growth; Hormonal Control of Male Reproduction; Hormonal Control of Female Reproduction.

W. 2nd Minor (Elective) Course:

2nd Minor = 100 Marks 100 Items 2 Hours

One elective course shall be selected from the following:

- (xv) **Microbiology**
- (xvi) **Haematology**
- (xvii) **Histopathology**
- (xviii) **Immunology & Serology**
- (xix) **Biochemistry**
- (xx) **Cytogenetics and Molecular Biology**

X. Thesis

Thesis Examination = 200 Marks

Suggested Readings:

- Goodman Gillman Text Book of Pharmacology
- Basic and Clinical Pharmacology by Katzung & Treror
- Pharmacology by H.P Rang & Dale
- Clinical Pharmacology by J.M Ritles
- Clinical Pharmacology by Bemeff Brown
- Katzung & Treror's Pharmacology, Examination & Board Reviews
- Modern Pharmacology by Charles R. Craig & Robert E. Stitzel
- Principles of Pharmacology by David E. Golan
- Lippincott, review of Pharmacology
- British Journal of Pharmacology
- Journals of Clinical Pharmacology
- Clinical Pharmacology by K.D Tripathi

- Clinical Pharmacology by S.D Seth
- Clinical Pharmacology by Remington

Web site for Pharmacology:

<http://www.uhs.edu.pk/Academics/Pharmacology.html>

<p>SYLLABI & COURSES OF STUDIES IN</p> <p>PHYSIOLOGY</p>
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Y. **Major (Compulsory) Course:**

MCOs Papers	150 Marks	150 Items	3 Hours
SEQs Papers	150 Marks	15 Items	3 Hours
Viva voce & Practical Examination	= 100 Marks		
Total	= 400 Marks		

Contents of Courses:

XXXIV General Physiology and Cell Biology

Introduction to Physiology: Functional organization of human body; Homeostasis. *Molecular and Cell Physiology:* The Cell – Structural Organization; Cell Membrane and Permeability; Cellular Interactions; The Cytoplasm: The Cytoskeleton and Cell Motility; Endoplasmic Reticulum and Protein Segregation; Golgi Complex and Cell Secretion; Lysosomes and Endocytosis; Mitochondria and Oxidative Phosphorylation; Ribosomes, The Nucleolus, and Protein Synthesis: Transcription and Processing of RNA; The Nucleus: Chromatin and the Chromosome: DNA Replication: Gene expression and Regulation in Eukaryotes; The Cell Cycle: Interphase – The G₁, S and G₂ Phases: Mitosis: Meiosis; Programmed Cell Death. Excitable Tissues - Nerve and Muscle: Membrane potentials and Action Potential; Nerve cells – Excitation and Conduction; Skeletal Muscle; Excitation and Contraction of Skeletal Muscle; Neuromuscular Transmission; Contraction and Excitation of Smooth Muscle.

XXXV Systemic Physiology

Cardio-vascular physiology; Blood Cells and Clotting; Respiration
Cardiovascular System: Electrical Activity of the Heart; The Electrocardiogram; Mechanical Activity of the Heart; Capillary Exchange; Regulation of Circulation (humoral and nervous). Blood Cells and Clotting: Red Blood Cells; Anemia and Polycythemia; Leukocytes, Granulocytes, the Monocyte-Macrophage system, and Inflammation; Immunity and Allergy; Blood groups and Transfusions; Hemostasis and Blood Coagulation.. Respiratory System: Mechanics of Respiration; Acid Base Physiology; Transport of Oxygen and Carbondioxide in the blood; Gas Exchange in the lungs.

XXXVI Systemic Physiology

Nervous System and Special Senses; Renal Physiology; Gastrointestinal Physiology

Central Nervous System: Physiology of Neurons; Synaptic Transmission in The Nervous System; Sensory Receptors of the somatosensory system; Circuits of the CNS (Somatic and Autonomic); The Visual/Vestibular/Auditory systems; Neuronal Control of Mood, Emotion and State of Awareness; Learning and Memory. Renal Physiology: Organization of Urinary System; Glomerular Filtration and Renal Blood Flow; Transport of Sodium and Chloride; Transport of Urea, Glucose, Phosphate, Calcium, Magnesium, and Organic Solutes; Transport of Potassium; Transport of Acids and Bases; Integration of Salt and Water Balance: Organization of Gastrointestinal System; Gastric Function; Pancreatic and Salivary Glands; Hepatobiliary Functions; Nutrient Digestion and Absorption; Intestinal Electrolyte and Water Transport; Nutrition; Dietary Balances; Physiology of Obesity and Starvation.

XXXVII Endocrine and Reproductive Physiology, Vitamins

Endocrine Physiology: Introduction to Endocrine Physiology; Pituitary Gland; Thyroid Gland; Adrenal Gland; The Pancreatic Islets; Hormonal Regulation of Growth; I Reproductive Physiology: Development and Morphology of the Reproductive Organs; Hormonal Control of Male Reproduction; Hormonal Control of Female Reproduction, Major Diseases of Endocrine System; Vitamins; Minerals and Mineral Metabolism.

XXXVIII Physiological Chemistry

Structures and Functions of Proteins and Enzymes: Amino Acids and Peptides; Protein Folding and Levels of Protein Structure, Urea Cycle; Myoglobin and Hemoglobin, Enzymes: Mechanisms of Action, Enzyme Kinetics, Enzymatic Regulation of Activities. Bioenergetics and Metabolism of Carbohydrates and Lipids: Biological Oxidation, Respiratory Chain and Oxidative Phosphorylation, Citric Acid Cycle, Glycolysis, Gluconeogenesis, Pentose Phosphate Pathway, Biosynthesis of Fatty Acids, Oxidation of Fatty Acids; Metabolism of Unsaturated Fatty Acids, Lipid Transport and Storage, Cholesterol Synthesis, Transport and Excretion; Metabolism of Proteins and Amino Acids; Nucleotides and Nucleic Acids: Metabolism of Purine and Pyrimidine Nucleotides, Nucleic Acid Structure and Function: DNA Replication, Role of RNA in Protein Synthesis, Transcription and Translation.

XXXIX Lab Exercises in Physiology and Cell Biology

Selected experiments based on Physiology and Cell Biology.

Practical

Lab Techniques for all the above subjects

Z. 1st Minor (Elective) Course:

1st Minor = 100 Marks 100 Items 2 Hours

Biochemistry

AA. 2nd Minor (Elective) Course:

2nd Minor = 100 Marks 100 Items 2 Hours

One elective course shall be selected from the following:

- (xxi) Immunology and Serology
- (xxii) Histology and Microanatomy
- (xxiii) General Pathology/Patho-physiology
- (xxiv) Cytogenetics and Molecular Biology

BB. Thesis

Thesis Examination = 200 Marks

Suggested Readings:

- Cell Biology by [T. D. Pollard](#), [W.C. Earnshaw](#), 2002 (Reprinted 2004) Saunders/Elsevier.
- Textbook Of Medical Physiology by [A.C. Guyton](#) and [J. E. Hall](#), 2005, 11th Edition, Saunders/Elsevier, Human Physiology.
- Biochemistry (Lippincott's Reviews) by [Pamela C. Champe](#) et al. 3rd Edition Lippincott Williams & Wilkins, 2004.
- Marks' Basic Medical Biochemistry: A Clinical approach by Colleen Smith 2004, 2nd Edition. Lippincott Williams & Wilkins.
- *Immunology*: Immunology by I. Roitt et al (Eds). 2001, 6th Edition 2001. C.V. Mosby (Elsevier).
- Immunobiology by [C. Janeway](#). 2004, 6th Edition. Garland Science, NY.
- *Cell and Molecular Biology*: Molecular Biology of the Cell by [Bruce Alberts](#) et al. 4th Edition, 2002. Garland Publishers Inc, NY.
- *Neuroendocrinology of Reproduction*: Textbook of Endocrine Physiology by James E. Griffin and Sergio R. Ojeda 2000, 4th Edition Oxford University Press.

Web site for Physiology:

<http://www.uhs.edu.pk/Academics/physiology.html>