UNIVERSITY OF HEALTH SCIENCES, LAHORE

NOTIFICATION

The Vice Chancellor, on the recommendation of Advanced Studies & Research Board, in anticipation of the approval of the Syndicate, has approved the Curriculum and Syllabi prescribed for M.Phil / Ph.D. in the subjects of Basic Medical Sciences for the session 2006 and onwards (Annex 'A').

REGISTRAR

No: UHS/REG-05/464 Dated: 26-12-2005

Copy forwarded for information to:

- Additional Secretary (I), Governor's Secretariat Punjab
- Secretary Health, Civil Secretariat, Government of Punjab
- PS to Chief Minister, Punjab
- All Heads of University Teaching Departments, UHS
- All Heads of Affiliated Institutions
- Controller of Examinations
- Director (Admin & Coord)
- Director, IT
- Deputy Registrar
- PSO to Chairman BoG
- SO to Vice Chancellor
- PS to Registrar

(Prof. Dr. Muhammad Zafar Iqbal)
S.I., T.I.,
REGISTRAR

University of Health Sciences, Lahore

M.Phil. / Ph.D. Curricula

DEPARTMENT OF ANATOMY

Outline of Curriculum

Department of Anatomy is located in the premises of University of Health Sciences, Lahore. It has a purpose built fully equipped histology laboratory, a dissection hall and museum and offices. The main objective of the Department is to train graduate students for research and teaching.

Courses

The Department of Anatomy is offering M.Phil. and Ph.D. programs.

Admissions

Admissions in M.Phil. leading to Ph.D. programs are made as per policy of the UHS through advertisement in national newspapers. The basic criteria for admission is that the candidate must be medical / dental graduate i.e. MBBS / BDS. Preference is given to the candidate holding teaching / practical experience.

M.Phil. Program

Courses and Credit Requirements

This is a two years full time duration program. The students are expected to take the following listed courses. All students must complete courser work (30 credit hr) before beginning their research project. Also during the 1st year, students should collect information related to their topic of research interest and discuss it with prospective faculty supervisor and prepare a synopsis for the approval of Advanced Studies & Research Board. The outline of these courses will be as follows.

1st Year

Outline of Courses

Term 1	
ANAT701	Gross Anatomy (6 credit hr)
ANAT701L	Gross Anatomy Lab (2 credit hr)
ANAT702	Histology (4 credit hr)
ANAT702L	Histology (4 credit hr)
Term 2	
ANAT703	Development Anatomy (3.5 credit hr)
ANAT704	Medical Neuroscience (4.5 credit hr)
	Elective (3 credit hr)
	Elective (3 credit hr)
TOTAL	**30 credit hr**

Electives

Students can select elective(s) from the following list of the courses. All courses are subject to the offering by the concerned department(s) and minimum number of 5 students enrolled for the course. Students will be required to take specified numbers of electives from among those listed below before M.Phil. / Ph.D. degree in Anatomy is awarded.

a. Physiology
b. Cell Biology
c. Microbiology
d. Gen. Pathology
e. Immunology
f. Biochemistry
g. Chemical Pathology
h. Molecular Biology

The exact sequence of courses may change, depending on their availability, at the discretion of the head of department.

2nd Year

- ANAT801: Research Thesis (6 credit hr)
- Research Project
- Duration of the research Project will be at least one full year. An independent research project chosen by the student and directed by a full-time faculty member in the Department is required of all students in this program.
- The research project plays a key role for the students in developing a deeper understanding of the subject involved and builds skill necessary to work independently and communicate the results of the work to other scientists.
- The research work of each student will be reviewed periodically by the supervisor/ Head of Department to ensure that objectives laid down for study are being met.
- The progress of the research work of each student will be carefully monitored. No research thesis can be submitted for presentation / approval without the consent of the Head of Department. All students should present and defend their research work before the committee of examiners.

Contents of Courses offered by the Department of Anatomy

ANAT701: Gross Anatomy (6 credit hr)

Gross Anatomy will be as a full minor subject within the Department of Anatomy. M.Phil students of Anatomy with previous experience in medical Gross Anatomy may be exempted to take this course as a substitute for one of the minor subjects. The courses offered are as follows:

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

Students taking this course will be required to take ANAT701L.

ANAT701L Gross Anatomy Lab (2 credit hr)

It will be taught with conjunction with ANAT701 and will constitute dissection of appropriate parts of human cadavers.

ANAT701 Histology (4 credit hr)

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 (ANAT703L) 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, 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 techniques 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.

ANAT702L Histology Lab (4 credit hr)

It runs concurrently with and is a requirement for ANAT702 with appropriate 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.

ANAT703 Developmental Anatomy (3.5 credit hr)

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.

ANAT704 Medical Neuroscience (4.5 credit hr)

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 for localization of the fiber tracts and cell groups.

ANAT900 Research and Thesis for M.Phil.

The students are required to do original research on a topic to be selected in consultation with their Thesis Committee. 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.

Ph.D. Program

Duration of research project will be at least two years after acceptance into the program. All conditions laid down for M.Phil. degree will be applied. A student can submit the thesis within a specified period as per approved regulations of UHS.

The Ph.D. program is of at least two years duration for a candidate already possessing M.Phil. in the subject of Anatomy or equivalent qualification like FCPS (Anatomy). Candidate with outstanding performance in Bachelor program in Medicine (MBBS) may directly be admitted to Ph.D. program of at least three years duration. However, their registration shall be confirmed after one year on the basis of their performance in broad base courses in the field of Anatomy, research methodology and biostatistics.

Course Work

Candidate admitted in Ph.D. program after successful completion of M.Phil are required to take advance course in one of the following preferably related to their field of research.

1) Development Anatomy
2) Medical Neuroscience
3) Microtechniques
4) Electives

Thesis

All candidates seeking admission in Ph.D. program shall submit their research synopsis based on original work to Advanced Studies & Research Board. After approval of the synopsis the candidate shall execute research project and submit thesis not before two years and not later than six years from the date of approval of synopsis.

DEPARTMENT OF BIOCHEMISTRY

Consistent with the "University of Health Sciences" of Mission Statement, the UHS welcomes inquiries from serious students who are interested in Professional fields related to health sciences and Biochemistry in particular. All candidates should apply through proper channel who desire to be considered for M.Phil. / Ph.D. program by collecting application forms, prospectus and related information from the office of Registrar.

All completed applications together with the attested copies of testimonials should be delivered to the office of Registrar for further consideration of the admission committee and approval of the Head of Department of Biochemistry. Applicants can be asked to produce original testimonials. Last date for inviting applications for M.Phil. / Ph.D. program in Biochemsitry will be announced in local newspapers, but applications can be considered on Rolling Basis. However, the candidates can join the program at the beginning of the term only. All accepted candidates for M.Phil. / Ph.D. programme will be intimated well in advance enabling them to start the course at a specified date.

Courses

The Department of Biochemistry is offering M.Phil. and Ph.D. programs.

Admissions

Admissions in M.Phil. leading to Ph.D. programs are made as per policy of the UHS through advertisement in national newspapers. The basic criteria for admission is that the candidate must be medical / dental graduate i.e. MBBS / BDS. However, non medical graduates in relevant field are also eligible to apply. Preference is given to the candidate holding teaching / practical experience.

M.Phil Program

Courses and Credit Requirements

There is a two years full time duration program. The students are expected to take the following listed courses. All students must complete course work (30 credit hr) before taking up their research project. Also during the 1st year, students should collect information related to their topics of research interest and discuss it with prospective faculty supervisor and prepare a synopsis for the approval of Advanced Studies & Research Board.

1st Year

Outline of Courses

Term 1	
BCHM701	General Biochemistry (3 credit hr)
BCHM702	Advance Biochemistry (3 credit hr)
BCHM703	Research / Statistical Methods in Biomedical Sciences (3 credit hr)
Elective 1	(3 credit hr)
Elective 2	(3 credit hr)
Term 2	
BCHM704	Clinical Biochemistry (3 credit hr)
BCHM705	Medical Genetics (3 credit hr)
BCHM706	Understanding Nutrition (3 credit hr)
Elective 1	(3 credit hr)
Elective 2	(3 credit hr)
TOTAL	**30 credit hrs**

Electives

Students can select elective(s) from the following list of the courses. All courses are subject to the offering by the concerned department(s) and minimum number of 5 students enrolled for the course. Students will be required to take specified numbers of electives from among those listed below before M.Phil. / Ph.D. degree in Biochemistry is awarded.

a. Anatomy
b. Biotechnology
c. Cell Biology
d. Cell Physiology
e. General Microbiology
f. Haematology
g. Histopathology
h. Immunology
i. Molecular Genetics
j. Pathophysiology of Diseases
k. Pharmacology
l. Protein Biochemistry and Enzymology
m. Toxicology
n. Virology

2nd Year

- BCHM800: Research Thesis (6 credit hr)
- Duration of the research Project will be at least one full year. An independent research project chosen by the student and directed by a full-time faculty member in the Department is required of all students in this program.
- The research project plays a key role for the students in developing a deeper understanding of the subject involved and builds skill necessary to work independently and communicate the results of the work to other scientists.

- The research work of each student will be reviewed periodically by the supervisor/ Head of Department to ensure that objectives laid down for study are being met.
- The progress of the research work of each student will be carefully monitored. No research thesis can be submitted for presentation / approval without the consent of Head of the Department. All students should present and defend their research work before the committee of examiners.

Workshops / Seminars

The students will also be required to attend special workshops and seminars on special topics as they are scheduled in both years one and two.

Contents of Courses offered by the Department of Biochemistry

BCHM701: General Biochemistry (3 credit hr)

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.

BCHM702: Advanced Biochemistry (3 credit hr)

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.

BCHM703: Research/Statistical Methods in Biomedical Sciences (3 credit hr)

Students learn basic principles of research in biomedical sciences and preparation of proposal for a research project.

BCHM704: Clinical Biochemistry (3 credit hr)

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, meal function, hepatobiliary system, the endocrine system, cardiac markers in myocardial infraction, diagnostic enzymologym, aminotic fluid chemical analysis, tumor markers and therapeutic drug monitoring.

BCHM705: Medical Genetics (3 credit hr)

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, parenatal diagnosis, genetic counseling and its implications to society in large together ethical issues.

BCHM706: Understanding Nutrition (3 credit hr)

Good dietary habits are essential component of lasting health. Poor nutrition leads to an increased risk of health problems, such as obesity, diabetes, high blood pressure and heart diseases. This concise course examines in depth the qualitative and quantitative requirements of nutrients (macro and micro) necessary to maintain human health.

BCHM707: Biotechnology (3 credit hr)

This course addresses the isolation, growth, genetic manipulation and use of organisms (commonly genetically modified) or their products, fermented food production, agriculture, pharmaceutical discovery and production, molecular diagnosis, vaccine production, transgenic animal formation and human gene therapy, forensic applications, microbial-based bioprocessing pharming, bioterrorism and the future of biotechnology (optional).

BCHM900: Dissertation Research in Biochemistry

The students are required to do original research on a topic to be selected in consultation with their Thesis Committee. 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.

Ph.D. Program

All conditions laid down for M.Phil. degree will be applied. A students can submit the thesis within a specified period as per approved regulations of UHS. Duration of research project will be at least two years after acceptance into the program. The Ph.D. program is at least two years duration for candidates possessing M.Phil. in the subject of Biochemistry or equivalent qualification like FCPS (Biochemistry).

Course Work

Candidate admitted in Ph.D. program after successful competition of M.Phil are required to take an advance course in the area of Biochemistry / Molecular Biology / Genetics as decided by the research supervisor and approved by the Head of the Department e.g.

- Bioinformatics
- Proteomics
- Biotechnology

Thesis

All candidates seeking admission in Ph.D. program shall submit their research synopsis based on original works to Advanced Studies & Research Board. After approval of the synopsis the candidate shall execute research project and submit thesis not before two years and not later than six years from the date of approval of synopsis.

DEPARTMENT OF MICROBIOLOGY & IMMUNOLOGY

Outline of Curriculum

Department of Microbiology & Immunology is located in the premises of University of Health Sciences, Lahore. It has a purpose built fully equipped laboratory. The main objective of the Department is to train graduate students for research and teaching.

Courses

The Department of Microbiology & Immunology is offering M.Phil. and Ph.D. programs.

Admissions

Admissions in M.Phil. leading to Ph.D. programs are made as per policy of the UHS through advertisement in national newspapers. The basic criteria for admission is that the candidate must be medical / dental graduate i.e. MBBS / BDS. Preference is given to the candidate holding teaching / practical experience. The department may have some additional requirements for admission.

M.Phil. Program

Courses and Credit Requirements

This is a program requiring a minimum of two year's full time training. The students are expected to take the following listed courses. All students must complete course work (30 credit hr) before beginning their research project. Also during the 1st year, students should collect information related to their topic of research interest and discuss it with prospective faculty supervisor and prepare a synopsis for approval by the Advanced Studies & Research Board. The outline of these courses will be as follows.

1st Year

Outline of Courses

Term 1	
MBIM701	Basic Immunology (3 credit hr)
MBIM702	Laboratory Exercises in Immunology (3 credit hr)
MBIM703	Bacteriology (3 credit hr)
MBIM704	Laboratory Exercises in Bacteriology (3 credit hr)
MBIM705	Virology (3 credit hr)
Term 2	
MBIM706	Advanced Immunology (4 credit hr)
MBIM707	Special Topics in Microbiology & Immunology (1-3 credit hr)
MBIM708	Research Topics in Microbiology & Immunology (1-3 credit hr)
	Biochemistry (3 credit hr)
	Cell Biology (3 credit hr)
TOTAL	**30 credit hr**

Electives

Students can select elective(s) from the following list of the courses. All courses are subject to the offering by the concerned department(s) and minimum number of 5 students enrolled for the course. Students will be required to take specified numbers of electives from among those listed below before M.Phil. / Ph.D. degree in Microbiology & Immunology is awarded.

a. Advanced Immunology
b. Special topics in Microbiology
c. Biostatistics
d. Molecular Biology
e. Cell Physiology
f. Haematology
g. Histopathology
h. Pathophysiology of Diseases
i. Protein Biochemistry & Enzymology
j. Toxicology

The sequence of these courses will be determined by their availability, at the discretion of the head of department.

2nd Year

- MBIM801: Research Thesis (6 credit hr)
- Research Project
- Duration of the research Project will be at least one full year. An independent research project chosen by the student and directed by a full-time faculty member in the Department is required of all students in this program.
- The research project plays a key role for the students in developing a deeper understanding of the subject involved and builds skill necessary to work independently and communicate the results of the work to other scientists.
- The research work of each student will be reviewed periodically by the supervisor/ Head of Department to ensure that objectives laid down for study are being met.
- The progress of the research work of each student will be carefully monitored. No research thesis can be submitted for presentation / approval without the consent of the Head of Department. All students should present and defend their research work before the committee of examiners.

Contents of the Courses offered by the Department of Microbiology & Immunology

MBIM701: Basic Immunology (3 credit hr)

Nonspecific Immunity, Complement, Antigens, Immunolobulins: Structure and Function, Immunoglobulins: Isotypes, Allotypes and Idiotypes, Immunoglobulins: Genetics, Antigen-Antibody Reactions and Selected Tests, Antibody Formation, Lymphocytes and Antigen recognitions, Major Histocompatibility: structure, genetics and functions, Cell-Cell Interactions in Specific Immune Response, Cell Mediated Immunity, Immunization, Tolerance, Immunopathology: Hypersensitivity states and autoimmunity.

MBIM702: Laboratory Exercises in Immunology (3 credit hr)

Selected laboratory exercises in Immunology.

MBIM703: Bacteriology (3 credit hr)

Bacterial Cell, Culture and Identification of infectious agents, Nutrition growth and metabolism, External layers of vegetative cells and spores, Antibiotics affecting cell Envelope, Antibiotics: Protein Synthesis, Nucleic Acid Synthesis and Metabolism, Exchange of Genetic Information I, Genetic Regulatory Mechanisms, General Aspects of Bacterial Pathogenesis, Enterobacteriaceae, Vibrio and Campylobacter, Streptococci, Streptococcus Pneumonia and Staphylococci, Neisseria and Spriochetes, Anaerobes and Pseudomonas, Mycobacteria, Corynebacteria and Legionella, Bordetella and Haemophilus, Brucella, Francisella and Yersinia, Bacillus, Listeria and Eryseplothrix Organisms of Bioterrorism, Mycoplasma and Ureaplasma, Chlamydia, Rickettsia, Ehrlichia, Coxiella and Bartonella, etc.

MBIM704: Laboratory Exercises in Bacteriology (3 credit hr)

Selected laboratory exercises in Bacteriology.

MBIM705: Virology (3 credit hr)

Viral Structure and Classification, General Strategies of virus Replication, DNA Virus Replication strategies, RNA Virus Replication Strategies, Viral Genetics, Influenza virus, Mumps Virus, Measles Virus, Rubella Virus, Picornaviruses, Enteroviruses, Herpesviruses, Parainfluenza Virus, Respiratory Syncitial Virus, Adeno Virus, Oncogenic Viruses, Human Immunodeficiency Virus, Hepatitis Viruses, Viral Zoonoses, Slow viruses of CNS-Diseases, Viral Chemotherapy, etc.

MBIM706: Advanced Immunology (4 credit hr)

Research papers establishing the various basic concepts in immunology including ontogeny and traffic of lymphoid cells, MHC and its role in immune functions, T & B Cell antigen recognition, cell-cell interactions, immunoregulation, tolerance and autoimmunity, etc.

MBIM707: Special Topics in Microbiology and Immunology (1-3 credit hr)

MBIM708: Research Topics in Microbiology and Immunology (1-3 credit hr)

MBIM900: Thesis (6 credit hr)

The students are required to do original research on a topic to be selected in consultation with their Thesis Committee. 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.

Ph.D. Program

Duration of research project will be at least two years after acceptance into the program. All conditions laid down for M.Phil. degree will be applied. A student can submit the thesis within a specified period as per approved regulations of UHS.

The Ph.D. program is of at least two years duration for a candidate already possessing M.Phill. in the subject of Microbiology & Immunology or equivalent qualification like FCPS (Microbiology & Immunology). Candidate with outstanding performance in Bachelor program in Medicine (MBBS) may directly be admitted to Ph.D. program of at least three years duration. However, their registration shall be confirmed after one year on the basis of their performance in broad base courses in the field of Microbiology & Immunology, research methodology and biostatistics. The students will also be required to take advanced level courses in the related field.

Thesis

All candidates seeking admission in Ph.D. program shall submit their research synopsis based on original work to Advanced Studies & Research Board. After approval of the synopsis the candidate shall execute research project and submit thesis not before two years and not later than six years from the date of approval of synopsis.

DEPARTMENT OF PATHOLOGY

Outline of Curriculum

Department of Pathology is located in the premises of University of Health Sciences, Lahore. It has a purpose built fully equipped laboratory. The main objective of the Department is to train graduate students for research services and teaching.

Courses

The Department of Pathology is offering M.Phil. and Ph.D. programs.

Admissions

Admissions in M.Phil. leading to Ph.D. programs are made as per policy of the UHS through advertisement in national newspapers. The basic criteria for admission is that the candidate must be medical / dental graduate i.e. MBBS / BDS. Preference is given to the candidate holding teaching / practical experience.

M.Phil. Program

Courses and Credit Requirements

This is a program requiring a minimum of two year's full time training. The students are expected to take the following listed courses. All students must complete course work (30 credit hr) before beginning their research project. Also during the 1st year, students should collect information related to their topic of research interest and discuss it with prospective faculty supervisor and prepare a synopsis for approval by the Advanced Studies & Research Board. The outline of these courses will be as follows.

1st Year

Outline of Courses

Term 1	
PATH701	General Pathology (3 credit hr)
PATH702	Systemic Pathology I (3 credit hr)
PATH703	Systemic Pathology II (3 credit hr)

PATH704	Systemic Pathology III (3 credit hr)
PATH706	Journal Club (1 credit hr)
PATH707	Surgical Pathology I (3 credit hr)
Term 2	
PATH705	Systemic Pathology IV (4 credit hr)
PATH709	Slide Seminar (2 credit hr)
PATH708	Surgical Pathology II (3 credit hr)
PATH710	Biostatistics (1 credit hr)
	Elective (4 credit hr)
TOTAL	**30 credit hr**

2nd Year

During 2nd year, the student is required to take one of the following as elective:

a. Cytopathology
b. Microbiology
c. Hematology
d. Chemical Pathology

The exact sequence of courses may change, depending on their availability, at the discretion of the head of department.

- PATH800: Research Thesis (6 credit hr)
- Duration of the research Project will be at least one full year. An independent research project chosen by the student and directed by a full-time faculty member in the Department is required of all students in this program.
- The research project plays a key role for the students in developing a deeper understanding of the subject involved and builds skill necessary to work independently and communicate the results of the work to other scientists.
- The research work of each student will be reviewed periodically by the supervisor/ Head of Department to ensure that objectives laid down for study are being met.
- The progress of the research work of each student will be carefully monitored. No research thesis can be submitted for presentation / approval without the consent of the Head Department of Pathology. All students should present and defend their research work before the committee of examiners.

Contents of Courses offered by Department of Pathology

PATH701: General Pathology (3 credit hr)

The course introduces the general principles of Pathology with special emphasis on cell injury and cell death, cell adaptation and accumulation, inflammation and repair, homodynamic disorders, diseases based on immunity and genetics, neoplasia.

PATH702: Systemic Pathology I (3 credit hr)

The course includes diseases of blood vessels and heart with special emphasis on atherosclerosis, medical calcification, hypertension, anenrysm, myocardial infarction, Rheumatic heart disease, endocarditis and cardiomyopathus. It also includes diseases of hemopopoitic and lymphoid system with special emphasis on anaemics, leukemias, lymphoma, multiple myeloma, blood groups and its related disease. 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, pneumoconiosis, malignancies. Immunological diseases, thrombo embolism and pulmonary hypertension.

PATH703: Systemic Pathology II (3 credit hr)

The course includes diseases of the oral cavity, slavery glands and gastrointestinal tract with special emphasis on leukoplakia, oral malignancies, tumor of slavery glands. Oesophagitis, Barrett's oesophagus, gastritis, peptic ulcer, Hirsch sprung's disease, celiac diseases, tropical sprue, ischaemic bowl disease, ulcero inflammatory bowl disease, of appendix, clinico pathological features of amoebasis, typhoid and tuberculosis, and tumors of gastrointestinal tract. Also 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, hepatitis A, B, C, D, E, G, liver absess with clinical and morphological features, drug induced liver injury, alcoholic liver diseases, haemochromatosis, wilson's disease, biliary cirrhosis tumors of hepatobiliary system, pancreatitis and tumors of pancreas. The course includes urinary system with special emphasis on azotemia, uraemia renal failure, polycystic renal disease, glomerulonephritides, nephritic and nephritic syndrome, pyelonephiritis, tubular

necrosis, nephrosclerosis, tumors of the kidney and pelvis, tumors and inflammation of the bladder.

PATH704: Systemic Pathology III (3 credit hr)

The course includes 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 at tumors of testes and epididymus, male infertility. Also includes urinary system with special emphasis on sexually transmitted diseases, cervical inhaepilhelied neoplasia odenomyosis and endometriosis, endometrial hyperplasia and dysfunctional uterine bleeding placental and gestational hophoblastic disease ectopic pregnancy and toxemia of pregnancy, tumors like lesions of female genital tract. The course includes diseases of the breast with special emphasis on causes of the lump in breast, its FNA cytology, nipple discharge gynaeleomostia, etiology, pathogenesis, morphology and clinical features of natural history of mastitis, fibrocystic diseases, benign tumors and malignancies of the breast.

PATH705: Systemic Pathology IV (4 credit hr)

The course includes musculoskeletal system with special emphasis on etiology pathogenesis and clinico morphological features of osteoporosis, achondroplasia, osteogenesis, osteomyelitus, pagets disease, oespeoarthritis, rheumatoid arthritis, muscular dystrophies, myopathies, myasthenia gravis and tumors of musculoskeletal system. Also includes diseases of the 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 lab diagnosis of diseases of adrenals, thyroid and parathyroid goiter and its types, causes of solitary thyroid module and its diagnostic approach, MEN syndrome, different types of thyroids primary secondary and tertiary hyper para thyroids calcium homeostasis, hyper and hypo calcaemia 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, trythematous lesions, psoriasis, pamphigus, bullous lesions, pre-malignant epithelial lesions various types of warts and tumors of the skin. Will also discuss 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 polyneuropatihies, toxic neuropathies and tumors of the nervous system.

Ph.D. Program

Duration of research project will be at least two years after acceptance into the program. All conditions laid down for M.Phil. degree will be applied. A student can submit the thesis within a specified period as per approved regulations of UHS.

The Ph.D. program is of at least two years duration for a candidate already possessing M.Phill. in the subject of Pathology or equivalent qualification like FCPS (Pathology) etc. Candidate with outstanding performance in Bachelor program in Medicine (MBBS) may directly be admitted to Ph.D. program of at least three years duration. However, their registration shall be confirmed after one year on the basis of their performance in broad base courses in the field of Pathology, research methodology and biostatistics.

Thesis

All candidates seeking admission in Ph.D. program shall submit their research synopsis based on original works to Advanced Studies & Research Board. After approval of the synopsis the candidate shall execute research project and submit thesis not before two years and not later than six years from the date of approval of synopsis.

DEPARTMENT OF PHYSIOLOGY & CELL BIOLOGY

Outline of Curriculum

M.Phil. Physiology & Cell Biology studies (leading to Ph.D.) is an interdisciplinary programme that attempts to integrate molecular, cell and system approaches to biomedical science. The Programme includes formal courses, seminars, discussions, laboratory work / tutorials. The Programme expects students to be engaged in the learning process, motivated, prepared for class, interact inside and outside of class with other students and faculty, and take responsibility for their own learning.

Courses

The Department of Physiology & Cell Biology is offering M.Phil. and Ph.D. programs.

Admissions

Admissions in M.Phil. leading to Ph.D. programs are made as per policy of the UHS through advertisement in national newspapers. The basic criteria for admission is that the candidate must be medical / dental graduate i.e. MBBS / BDS. Preference is given to the candidate holding teaching / practical experience.

M.Phil. Program

Courses and Credit Requirements

This is a program requiring a minimum of two year's full time training. The students are expected to take the following listed courses. All students must complete course work (30 credit hr) before beginning their research project. Also during the 1st year, students should collect information related to their topic of research interest and discuss it with prospective faculty supervisor and prepare a synopsis for approval by the Advanced Studies & Research Board. The outline of these courses will be as follows.

1st Year

Outline of Courses

Term 1	
PHYS701	Physiology Major (4 credit hr)
PHYS702	Physiology Major (4 credit hr)
PHYS703	Physiological Biochemistry (3 credit hr)
	Elective (3 credit hr)
Term 2	
PHYS704	Cell & Molecular Biology (3 credit hr)
PHYS705	Immunology (3 credit hr)
PHYS706	Physiology of Behaviour (3 credit hr)
PHYS707	Reproductive Endocrinology (4 credit hr)
	Elective (3 credit hr)
TOTAL	**30 credit hr**

The exact sequence of courses may change, due to availability of these courses, at the discretion of the Head of Department.

Electives

Students are required to select elective(s) from the courses offered by the Department to meet 36 credit hours requirement for M.Phil. degree.

2nd Year

- PHYS800: Research Thesis (6 credit hr)
- Duration of the research Project will be at least one full year. An independent research project chosen by the student and directed by a full-time faculty member in the Department is required of all students in this program.
- The research project plays a key role for the students in developing a deeper understanding of the subject involved and builds skill necessary to work independently and communicate the results of the work to other scientists.
- The research work of each student will be reviewed periodically by the supervisor/ Head of Department to ensure that objectives laid down for study are being met.

- The progress of the research work of each student will be carefully monitored. No research thesis can be submitted for presentation / approval without the consent of the Head Department of Physiology & Cell Biology. All students should present and defend their research work before the committee of examiners.

Contents of Courses offered by Department of Physiology & Cell Biology

PHYS701: Physiology Major (3 credit hr)

Introduction to Physiology: Functional organization of human body; homeostasis.

Cell and Molecular Biology: 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 Complex and Cell Secretion; Lysosomes and Endocytosis; Mitochondria and Oxidative PhosPhorylation: Ribosomes, The Nuceolus, 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 GI, S and G2 Phase: Mitosis: Meiosis; Programmed Cell Death.

Membrane Physiology, Nerve and Muscle: Transport of Substance through the cell membrane; Membrane potentials and Action Potential; Skeletal Muscle; Excitation and Contraction of Skeletal Muscle; NeuromuscularTransmission; Contraction and Excitation of Smooth Muscle.

Blood Cells and Clotting: Red Blood Cells; Anemia and Polycythemia; Leukocytes Granulocutes, the Monocyte-Macrophage system, and Inflammation; Immunity and Allergy; Blood groups and Transfusions; Heostasis and Blood Coagulation.

PHYS702: Compulsory

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 Urea; Glucose, Phosphate, Calcium, Magnesium, and Organic Solutes; 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 Carbondioxide 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 Nuerons; 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.

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.

PHYS703: Physiological Biochemistry

Proteins: Amino Acids & Peptides; Protein folding, dynamics and structural evolution; Amino Acid Metabolism; Urea Cycle.

Carbohydrates: Sugars and Polysaccharides; Glycolysis; Glycogen Metabolism; Citric Acid Cycle; The Pentose Phosphate Pathway; Electron Transport and Oxidative Phosphorylation; Gluconeogenesis. Lipids and Membranes; Lipid Metabolism Nucleic Acids: Nucleotides and Nucleic Acid Structure; DNA Replication; DNA Repair Recombination; The Role of RNA in Protein Synthesis; Transcription and Translation; Eukaryotic Gene Expression; Nucleotide Metabolism.

Mechanisms of Enzyme Action: Introduction to Enzymes; Rates of Enzyme Reactions; Enzymatic Catalysis.

PHYS704: Cell and Molecular Biology

Membrane structure and function: Morphology and dynamics; Membrane pumps; Membrane carriers; Membrane channels.

Biogenesis and cellular membrane compartments: Proteins synthesis and folding; post translational targeting to organelles; biosynthetic processing into endoplasmic reticulum and golgi apparatus; Vesicular traffic from endoplasmic reticulum through golgi apparatus; Endocytosis; Degradation of cellular components.

Genetic Material: Chromosomal organization and DNA packaging; Gene expression; Processing of eukaryotic RNAs; Nuclear structure and dynamics

Reception and Transduction: Signaling pathways; Plasma membrane receptors; Proteins for signaling; Second messengers

Cellular interactions: Cells of extracellular matrix; Cellular adhesion; Intracellular adhesions; Specialized connective tissues.

Cytoskeleton and Motility: Action and actin-binding proteins; Microtubules and microtubule-associated proteins Intermediate flaments; Motor proteins; Cellular and intracellular motility.

Cell Cycle: G1 phase and regulation of cell proliferation; S phase and DNA replication; G2 phase and control of entry into mitosis; Mitosis; Meiosis; Programmed cell death.

PHYS705: Immunology

Innate (non-specific) immunity; Complement; Antibodies- the structure and function of immunoglobulins; Isotypes, allotypes and idiotypes; Antibody-antigen reactions and test for these reactions; Antibody formation; Major histocompatiility complex; Reasons to antigen Cell-mediated immunity; Immunoregulation; Immunization; Major histocompatibility complex-genetics and role in transplantation; Tolerance and autoimmunity; Hypersensitivity states; Tumor inmmunology; Immunodeficiencies.

PHYS706: Physiology of Behaviour

Introduction; Structure and Function of Cells of the Nervous System; Neural Basis of Instinctive Behaviour and Emotions: Anatomic Considerations; Limbic Functions: Sexual Behaviour; Other Emotions; Motivation and Addiction; Brain Chemistry and Behaviour-Psychopharmacology; Higher Functions of the Brain: Neopallium; Basic Mechanisms of Learning and Memory; Other Functions of Neocortex; Human Communication; Schizophrenia and the Affective Disorders; Anxiety and Stress Disorders, Autistic Disorder; Drug Abuse.

PHYS707: Reproductive Endocrinology

Neuroendocrinology of Reproduction; The Glycoprotein Hormones and their Receptors; Prolactin in Human Reproduction, The Synthesis and Metabolism of Steroid Hormones; Steroid Hormone Action; Prostaglandins and Lipid Mediators in Reproductive Medicine; Neuroendocrine Control of Menstrual Cycle; The Endocrinology of Human Pregnancy and Fetal-Placental Neuroendrocrine Development; The Testis and Male Accessory Organs; Reproductive Immunology and its Disorders; Menopause and Aging; Male Reproductive Aging; Disorders of Sexual Development; Puberty Gonadarche and Andernarche; Reproductive Failure Due to Central Nervous System-Hypothalamic-Pituitary Dysfunction; Polycystic Ovary Syndrome and Hyperendrogenic States; Female Infertility;

Male Infertility; Endometriosis; Cytogenetics in Reproduction; Assisted Reproduction; Gamete and embryo Manipulation; Contraception.

Ph.D. Program

Duration of research project will be at least two years after acceptance into the program. All conditions laid down for M.Phil. degree will be applied. A student can submit the thesis within a specified period as per approved regulations of UHS.

The Ph.D. program is of at least two years duration for a candidate already possessing M.Phill. in the subject of Physiology & Cell Biology or equivalent qualification like FCPS (Physiology & Cell Biology). Candidate with outstanding performance in Bachelor program in Medicine (MBBS) may directly be admitted to Ph.D. program of at least three years duration. However, their registration shall be confirmed after one year on the basis of their performance in broad base courses in the field of Physiology & Cell Biology, research methodology and biostatistics.

Thesis

All candidates seeking admission in Ph.D. program shall submit their research synopsis based on original work to Advanced Studies & Research Board. After approval of the synopsis the candidate shall execute research project and submit thesis not before two years and not later than six years from the date of approval of synopsis.