



Master of Philosophy

In

**MOLECULAR MEDICINE
2-4 YEARS PROGRAM**

ZIAUDDIN UNIVERSITY

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ZIAUDDIN UNIVERSITY

CLIFTON CAMPUS: ST-4/B, BLOCK '6', CLIFTON, KARACHI- 75600

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1. ACT/CHARTER OF THE UNIVERSITY

Ziauddin University is a chartered University given by Govt of Sindh that can offer education in the field of Medical Sciences, Law, Arts, Engineering, Business Administration and Fine Arts. The Charter copy is attached as Annexure- I

2. APPROVAL FROM STATUTORY BODY

The M.Phil program of Molecular Medicine was approved by the Board of Advanced Studies & Research and confirmed by Academic Council, Ziauddin University. BASR meeting minutes and resolution of Academic Council is attached as Annexure- II.

4. CURRICULUM OF THE PROGRAM

Model of the M.Phil Program

Year 1		Year 2-4
1st semester	2nd semester	
Molecular Biology & Genetics	Laboratory Techniques	<ul style="list-style-type: none"> • Submission of synopsis with approval • Research Work • Thesis in Molecular Medicine • Presentation & Thesis Defense
Epidemiology	Educational Methodology	
Biostatistics	Elective III- Cellular & Molecular Pathology	
Research Methodology	Elective IV- Molecular Pharmacology	
Elective I- Introduction to Molecular Medicine	Elective V- Immunology & Microbiology	
Elective II- Molecular Cell Biology & Physiology		

The student must have passed all examinations in compulsory and elective courses before he/she can submit the thesis.

Modules with Credit Hours

Semester	Title of Course	Course Code	Credit Hrs.
I	Molecular Biology & Genetics	ZU-801	2 (2 + 0)
	Epidemiology	ZU-891	1 (1 + 0)
	Biostatistics	ZU- 892	2 (2 + 0)
	Research Methodology	ZU-894	1 (1 + 0)
	Elective I- Introduction to Molecular Medicine	ZU-820	3 (3 + 0)
	Elective II- Molecular Cell Biology & Physiology	ZU-821	3 (3 + 0)
II	Laboratory Techniques	ZU-810	2 (1 + 1)
	Educational Methodology	ZU-895	1 (1 + 0)
	Elective III- Cellular & Molecular Pathology	ZU- 822	3 (3 + 0)
	Elective IV- Molecular Pharmacology	ZU-823	3 (3 + 0)
	Elective V- Immunology & Microbiology -	ZU-824	3 (3 + 0)

ZIAUDDIN UNIVERSITY
M.Phil. Molecular Medicine
1st Semester

Credit Hours : 02

Course Code : ZU- 801 (2+ 0)

Course Title : Molecular Biology & Genetics

Coordinator : Dr. Ambreena Khatoon

Facilitators : Dr. Rehan Ahmed Siddiqui

Dr. Rehan Imad

Dr. Shumaila Usman

Objectives of the Course

To enhance concept building in understanding the molecular processes in a living cell.

To understand central dogma of molecular genetics

Course Contents:

Chromosome & Cell Division, Human Chromosomes

Methods of chromosomal analysis, molecular cytogenetics, chromosome nomenclature, chromosome abnormalities

Basic Processes of Molecular Biology

Central dogma of life

DNA replication and recombination (prokaryotes and eukaryotes), DNA repair

Transcription (prokaryotes and eukaryotes) and post transcription modifications

Translation (prokaryotes and eukaryotes) and post-translational modification

Reverse transcription (retroviruses)

Mutations, SNP, polymorphism

Central principles and examples in cancer genetics, including sporadic and hereditary cancers

Gain-of-function and loss-of-function mutations

Fundamentals of Genetics

The Mendelian approach; Mendel's laws, principles of autosomal dominant inheritance,

principles of autosomal recessive inheritance

Punnett square (monohybrid & dihybrid cross)

Multiple alleles & complex traits, anticipation, mosaicism, uniparental disomy

Indication for Genetic Analysis

Molecular diagnosis of copy number abnormalities, direct detection of DNA mutations by polymerase chain reaction, linkage analysis & genome wide association studies

Cytogenetic methods as karyotyping, fluorescence in situ hybridization (FISH) &

Comparative genome hybridization (CGH), and their applications in diagnosis of chromosome disorders

Epigenetics

Epigenetic fundamentals, DNA methylation, chromatin remodeling, histone modification, epigenetic –clinical applications; epigenetic disease

Pediatric syndromes

Neuropsychiatric disorders

Immunity & related disorders

Genomic imprinting

Genome sequence analysis & annotation

Therapeutic Implication

Conventional approaches

Therapeutic applications of recombinant DNA technology

Gene therapy

RNA modification

Targeted gene correction

Stem cell therapy

Teaching Methods

Lectures

Group Discussion

ZIAUDDIN UNIVERSITY
M.Phil. Molecular Medicine
1st Semester

Credit Hours : 01
Course Code : ZU-891
Course Title : Epidemiology
Coordinator : Dr. Farah Ahmad
Facilitator : Dr. Danish Hasan

Objectives of the Course

This course seeks to help students to apply the concepts, principles and methods of epidemiology to public health practice and research.

Course Contents:

Introduction to epidemiology
Measures of morbidity
Hills criteria
Demography
Vital statistics
Population pyramid
Time, place & person
Introduction to study design
Descriptive study design
Case control study
Cohort study
Clinical trials
Screening measures
Bias of confounders
Types of epidemics
Critical reading

Recommended Books

1. Epidemiology: An Introduction Kenneth J. Rothman

Teaching Methods

Lectures
Group Discussions

ZIAUDDIN UNIVERSITY

M.Phil. Molecular Medicine

1st Semester

Credit Hours : 02
Course Code : ZU-892
Course Title : Biostatistics
Coordinator : Dr. Farah Ahmad
Facilitator : Dr. Danish Hasan

Objectives of the Course

The course is intended to provide a solid conceptual framework of biostatistics. This course seeks to help students to apply the concepts, principles and methods of biostatistics in research

Course Contents:

Statistics and its Usage
Organizing & Displaying Data
Summarizing Data
Probability
Binomial Distribution
Normal Distribution I
Normal Distribution II
Sampling Distribution of Means
One Sample Significance Testing
Confidence Interval of means
Types of Error, P value & Power of the test
T tests
Tests of Proportion
Chi square test
Correlation and Regression
Non-Parametric Test

Teaching Method

Lectures
Group Discussions

Recommended Books

1. Kuzma J W, Bohnenblust S E. Basic Statistics for the Health Sciences. 5th Edition. New York: McGraw Hill; 2004
2. Daniel W W. Biostatistics: A Foundation for Analysis in the Health Sciences. 9th Edition. Wiley Publishers; 2008

ZIAUDDIN UNIVERSITY

M.Phil. Molecular Medicine

1st Semester

Credit Hours : 01
Course Code : ZU-891
Course Title : Research Methodology
Coordinator : Dr. Farah Ahmad
Facilitator : Dr. Danish Hasan

Objectives of the Course

To provide an opportunity for participants to establish or advance their understanding of research through critical exploration and integration of Biostatistics, Epidemiology and Research methodology. This course seeks to help students to apply the concepts, principles and methods of biostatistics and epidemiology to research.

Course Contents:

Introduction to research subject
Literature search/ review
Topic selection
Objective writing
Introduction writing
Materials and methods
Sample size calculations
Sampling techniques
Questionnaire designing
Validity and reliability of a questionnaire
Data collection methods
Data analysis
Reference writing
Endnote
Ethical issues in research
Critical reading research protocol, synopsis and manuscript writing
Budgeting

Recommended Books

1. CR Kothari. Research Methodology: Methods and Techniques. Second Edition. New Age International Printers
2. Mark Saunders. Research Methods for Business Students. Fourth Edition. Prentice Hall

ZIAUDDIN UNIVERSITY

M.Phil. Molecular Medicine

1st Semester

Credit Hours : 03 (3 +0)

Course Code : ZU- 820

Course Title : Introduction to Molecular Medicine (Elective I)

Coordinator : Dr. Shumaila Usman

Facilitators : Dr. Rehan Imad

Dr. Rehan Ahmed Siddiqui

Dr. Ambrina Khatoon

Objectives of the Course

To obtain a basic understanding of molecular mechanisms in development of disease and how molecular/cellular biology may be used to characterize cellular processes.

To enhance concept building in understanding the molecular therapeutic approaches.

Course Contents:

Introduction

The Basics of Molecular Medicine

Stages of Drug Development

Cell Communication

Hormones & Neurotransmitters

Signal Transduction Pathways

Molecular Oncology

Tumor biology

Cancer related genes (including oncogenes and tumor suppressor genes)

Tumor microenvironment

Hallmarks of cancer

Deregulated metabolism in cancer

Genomic instability in cancer

Molecular biology of breast, liver, lung, oral and prostate cancers

Molecular Virology

The basics of virology

RNA & DNA viruses

Human immunodeficiency virus

Hepatitis B & C virus

Corona, influenza & respiratory viruses

Vaccination

Live and inactivated virus vaccines

Recombinant virus vaccines

Subunit vaccines
DNA vaccines
HIV vaccines
Detection of viruses
Prions

Gene Therapy

Types of gene therapy
Methods of gene transfer
Retroviral vectors
Adenoviral vectors
Adeno-associated virus vectors
Nonviral gene transfer
Tissue specificity of gene transfer and gene expression
Applications of gene therapy
Gene therapy of monogenic diseases
Gene therapy of cancer
Future prospects
Applications of genetic engineering & nanotechnology in medicine

Cellular Therapy

Cellular therapy & regenerative medicine
Stem cells- its sources, types and classification
Advantages & disadvantages of different types of stem cells
Stem cells characterization
Stem cells applications in degenerative diseases
The definition and derivation of adult stem cells for therapy
Concept of induced pluripotent stem cells and its application
Cellular reprogramming
Regulatory and ethical issues that concern the derivation of embryonic stem cells
Clinical trials of stem cell therapy
Regenerative medicine approach for degenerative disorders
Cell/Tissue transplantation
Challenges of cellular therapy
Tissue rejection

Antisense, Ribozyme, and RNA Interference Strategies

Antisense oligonucleotides
Mechanism of action of antisense oligonucleotides
Development and stabilization of antisense oligonucleotides
Clinical applications
Ribozymes
Classification of ribozymes
Development of ribozymes for medical applications
Clinical applications of ribozymes
RNA interference

Mechanism of RNA interference
MicroRNAs
The biology of microRNAs
MicroRNAs and disease

Bioinformatics

Basic computational methods
Biological network influence & classification
PPI networks

Ethics in Molecular Medicine

The Basis of Bioethics
Fields of Application
Genetic Testing and the Right “Not to Know”
Stem Cell Research
Preimplantation Genetic Diagnosis

ZIAUDDIN UNIVERSITY

M.Phil. Molecular Medicine

1st Semester

Credit Hours : 03 (3+0)
Course Code : ZU-821
Course Title : Molecular Cell Biology & Physiology (Elective- II)
Coordinator : Dr. Rehan Imad
Facilitators : Dr. Rehan Ahmed
Dr. Shumaila Usman

Objectives of the Course

To have an understanding of cell biology mechanisms on a molecular level, and of the regulation of such mechanisms.

Course Contents:

Cell Structure & Function

Specialized cells of human body,
cellular organization (cell membranes, proteins and cholesterol, active & passive transport across the cell membrane),
Modes of transport across cell membrane
Membrane proteins-pumps, transporters & ion channels
cell junctions,
Supramolecular complexes
Function of the cytoskeleton
Membrane biophysics
Membrane proteins structure, sorting & trafficking
Cell signaling pathways
Cell to cell adhesion.
Structure, synthesis, degradation and functions of the components of extra-cellular matrix.
Cell to cell communications.
Cell death (apoptosis, autophagy, necrosis etc)

Cell Building Block

Structure, assembly, organization, and biomedical importance of small molecules (amino acids, monosaccharides, nucleotides and fatty acids) & Macromolecules (nucleic acids, polysaccharides, proteins, and complex lipids)

Cell Metabolism

Metabolic pathways of carbohydrates & their regulation: glycolysis, TCA, gluconeogenesis, HMP shunt, glycogenesis & glycogenolysis, advanced glycation end products (AGES), glycogen storage diseases

Bioenergetics

Oxidative Phosphorylation including Electron transport chain (ATPs calculations)

Introduction

The Basics of Molecular Medicine

Stages of Drug Development

Cell Communication

Hormones & Neurotransmitters

Signal Transduction Pathways

Teaching Methods

Lectures

Group Discussion

ZIAUDDIN UNIVERSITY
M.Phil. Molecular Medicine
2nd Semester

Credit Hours : 02
Course Code : ZU-810 (1+1)
Course Title : Laboratory Techniques
Coordinator : Dr. Shumaila Usman
Facilitators : Dr. Shamim Mushtaq
: Dr. Rehan Ahmed
: Dr. Ambrina
: Dr. Rehan Imad
: Mr. Moazzam

Objectives of the Course

The course emphasizes the practical application of cellular and molecular technology with clear explanations of the rationale behind differing approaches.

The major objective of the course is to provide the students a comprehensive theoretical background to Molecular Biology Techniques

To transfer extensive knowledge and practical skills through the lectures, video sessions (virtual lab) & interactive sessions

Course Contents:

General Laboratory Techniques and Procedures

Laboratory hazards, Types of hazards, Identification of hazards
Safety program, Safety equipment, Safety inspections, Safety plans
Chemicals used in lab and general laboratory equipment.
Type of glassware, pipet's, uses and cleaning
Basic laboratory calculations
Waste disposal
Waste disposal regulations
BSL levels

Genomics Techniques

DNA /RNA extraction & quantification
cDNA synthesis
Primer designing
Conventional PCR & its types
q-PCR and its variations
Agarose gel electrophoresis

Cloning & recombinant DNA technology
DNA manipulation (RFLP)
DNA sequencing (Sanger Sequencing & NGS)
Bioinformatics tools
DNA/RNA microarray
Southern & Northern blotting
Gene editing tool (Crisper Cas9)

Proteomics Techniques

Overview of quantitative & qualitative proteomics techniques
Techniques for purification of proteins
Protein expressions by SDS- PAGE
Immunoblotting and western blotting
Mass spectrometry
Two dimension electrophoresis
ELISA
HPLC
In Silico tools for functional analysis for protein- protein
Interaction study (STRING software)
Flowcytometry
Immunocytochemistry/Immunohistochemistry

Cell Culture Techniques

Introduction to cell culture facility
Mammalian cell culture
Types of cell culture
Isolation of cells
Preparation of cell culture media
Subculturing of cells
Cell seeding & quantification
Cryopreservation
Resuscitation of frozen Cells
Management of infection

Microbiology & Immunology

Microbiological techniques
Collection and transport
Staining methods
Culture media & their preparation
Methods for anaerobic culture
Common culture methods
Biochemical testing of microorganisms
Antimicrobial susceptibility testing

Immunological Techniques

Types of immunoassays
Agglutination

Precipitation
ELISA & molecular diagnostic techniques
RIA
Complement fixation
Immunofluorescence

Physiology

Power lab Instrument

Record and analyze data from experiments using isolated tissues.

Real-time example of how the equipment works, how to troubleshoot problems, and how to analyze the data collected.

Recording and analyzing autonomic pharmacology of the effects of drugs on isolated mammalian tissues.

To investigate the effects on isolated tissue by recording and analyzing data from experiments using physiological stimulus and a number of pharmacological agents

Virtual Lab

Scientific Database /literature search

E-Databases - HEC - National Digital Library - Available Resources

Teaching Methods

Lectures

Demonstration

Virtual Lab

Hands on Training

ZIAUDDIN UNIVERSITY
M.Phil. Molecular Medicine
2nd Semester

Credit Hours : 01 (1+0)
Course Code : ZU-895
Course Title : Educational Methodology
Coordinator : Dr. Syeda Rakhshanda Kaukab

Objectives of the Course

Develop SMART leaning objectives
Discuss teaching strategies used in Health care profession for effective learning
Discuss diverse roles of healthcare teacher

Course Contents:

Adult Teaching and learning
Writing learning objectives
Teaching Strategies
Developing MCQs
Feedback-1
Feedback-2

Books

NBME IEM-WRITING GUIDE
Constructing writing test questions for the health sciences

ZIAUDDIN UNIVERSITY

M.Phil. Molecular Medicine

2nd Semester

Credit Hours : 03 (3+0)
Course Code : ZU-822
Course Title : Cellular & Molecular Pathology
Coordinator : Dr. Rehan Imad
Facilitator : Prof. Dr. Talat Mirza

Objectives of the Course

To understand the etiopathogenetic mechanisms and various cellular pathways involved in diseases with relevance to morphological changes and laboratory diagnostics.

Course Contents:

Cellular Adaptations & Injury:

Cell cycle (cell division), cell-cell interaction, growth and their control, cellular adaptations, causes of cell injury, reversible & irreversible injury, patterns of tissue necrosis, mechanisms of cell injury, ischemic & hypoxic injury, ischemia-reperfusion injury, apoptosis, intracellular accumulations, pathologic calcification, cellular aging.

Inflammation & Tissue Repair:

Acute inflammation, mediators of inflammation, outcomes & morphologic patterns of acute inflammation, chronic inflammation, systemic effects of inflammation, growth factors & signaling mechanisms in cell growth, regeneration, healing by repair, scarring & fibrosis.

Hemodynamic Disorders, Thromboembolism & Shock:

Edema, hyperemia & congestion, hemorrhage, hemostasis & thrombosis, embolism, infarction & shock.

Neoplasia:

Nomenclature, characteristics of benign & malignant tumors, molecular basis of cancer, carcinogenic agents (chemical, radiation & microbial), host defense against tumors, effects of tumor on host, paraneoplastic syndromes, grading & staging of tumors, laboratory diagnosis of cancer.

ZIAUDDIN UNIVERSITY
M.Phil. Molecular Medicine
2nd Semester

Credit Hours : 03 (3+0)
Course Code : ZU- 823
Course Title : Molecular Pharmacology
Coordinator : Dr. Rehan Imad
Facilitators : Prof. Dr. Owais
Dr. Shehla Shaheen
Dr. Kauser Moin

Objectives of the Course

Understand the cellular and molecular basis of drug therapy in the treatment of infectious diseases

Course Contents:

1) General Pharmacology

- Pharmacokinetics
 - Dosage forms
 - Routes of Drug Administration
 - Absorption
 - Bioavailability
 - Distribution
 - Metabolism
 - Elimination
- Pharmacodynamics
 - Drug Receptor Interaction
 - Dose-Response Phenomenon
 - Signal Transduction
 - G-protein coupled receptors and second messenger system
 - Adverse drug reactions and drug-drug interactions.

2) Chemotherapeutic drugs

A) Antimicrobial chemotherapy

Antibacterial Drugs

- General principles of antimicrobial therapy and various drug resistance mechanisms
- Classification, Pharmacokinetics, mechanism of action, clinical uses and adverse effects of the following:

- a. Beta lactam antibiotics
- b. Macrolide antibiotics
- c. Aminoglycoside antibiotics
- d. Fluoroquinolone antibiotics
- e. Miscellaneous antibiotics and antibacterials

- **Antiviral Drugs**

- Classification
- Pharmacokinetics
- Mechanism of action
- Clinical uses
- Adverse effects
- Contraindications

B) Anticancer Chemotherapy:

- Classification of anticancer drugs
- General principles and resistance mechanisms of anticancer drugs
- Genetic basis of variable drug responses in cancer chemotherapy.

Teaching Methods

Lectures
Group Discussion

ZIAUDDIN UNIVERSITY

M.Phil. Molecular Medicine

2nd Semester

Credit Hours : 03 (3+0)
Course Code : ZU-824
Course Title : Immunology & Microbiology
Coordinator : Dr. Shumaila Usman
Facilitator : Dr. Abdul Hameed
Dr. Rehan Imad

Objectives of the Course

Understand the Cellular differences between various classes of microbes
Provide basic principles involved in the mode of action of various anti-microbial drugs.
Understand various infectious diseases caused by microbes
To understand the salient features of the immune system/immune response and its application in various clinically relevant situations and development of immunotherapeutic/ pharmacotherapeutic agents

Course Contents:

Various Classes of Pathogenic Microorganisms

Prokaryotic Micro organisms

Gram +ve & Gram -ve Bacteria

Aerobes & Anaerobes

Mycobacteria

Spirochetes

Mycoplasma

Chlamydiae

Protozoa

Fungi

Viruses

Molecular Mechanisms of Pathogenicity

Overview of microbial virulent factors, that promotes microbial colonization and its contribution to the pathogenesis of the infection.

Current approaches for designing therapeutic agents against microbial virulent factors e.g. antitoxins

Major characteristics of the immune system

Organs constituting the immune system

Origin, cell surface antigens, populations and subpopulations of the immunocompetent cells

Types of Immune Mechanisms (Innate & Adaptive)

Chemical and cellular mediators of innate immunity

Mechanisms of specific host defense (Adaptive Immunity)

Humoral Immune response / antibody production and structure
Structure, types and functions of antibodies
Cells involved in the cellular sequence of events and functions of antibody
Major histocompatibility complex (MHC) molecules & their role in the Immune response

Disorders of Immune System

Immunological tolerance and autoimmunity
Hypersensitivity
Congenital and acquired immune deficiencies

Transplantation immunology

Types of transplantation
Tissue typing
Immunosuppression
Transplant rejection

Immunotherapy

Vaccines & Classification of vaccines

- a. Live attenuated vaccines
- b. Vaccines consisting of killed microorganisms
- c. Antitoxin
- d. Subunit vaccines (eg. peptide vaccines)
- e. Vectored vaccines
- f. Nucleic acid vaccines
- g. Edible vaccines.
- h. Use of adjuvants in vaccines

Hybridoma development technology

Overview of hybridoma development and its application in research

Teaching Methods

Lectures
Group Discussions
Virtual Demonstration

5. **TITLE OF THE PROGRAM TO BE APPEARED ON DEGREE**

The degree awarded to students completing the program will be:

MASTER OF PHILOSOPHY
IN
MOLECULAR MEDICINE

6. INTRODUCTION OF THE PROGRAM

The field of Molecular Medicine is often referred to as “tomorrow’s medicine”. It is a rapidly changing field which requires interdisciplinary insight and deals with the understanding of the molecular basis of diseases diagnosis, management & elimination. It aims to provide a molecular understanding of how normal cellular processes change, fail or are destroyed by disease as well as to develop knowledge and skills in cell and molecular biology. It has applications in both research and practical clinical work, and will contribute to an increased understanding of processes, diagnosis, and treatment of diseases.

Modern biomedical research uses a wide variety of different approaches to achieve a better understanding of the human organism in health and disease. These include the systems analysis of modern physiological studies, detailed microscopic anatomical techniques, and a large array of powerful methods expanding our knowledge at a molecular level. This Program in Molecular Medicine incorporates distinct tracks which represent complementary approaches to biomedical research.

This program with its multipronged approach would provide a wide coverage for development of knowledge based, skills & research to the trainees with medical, dental and background of science in general.

DATE OF COMMENCEMENT

Classes are planned to be commenced from Spring 2021 after getting the NOC for the program.

7. OBJECTIVES OF THE PROGRAM:

- To produce teachers and research scholars with in-depth knowledge of molecular genetic mechanisms of disease processes and diagnostics in molecular medicine.
- To provide training to the research scholars with skills in laboratory techniques pertaining to recent advances in molecular biology and genetics.
- To provide an open scientist and physician nurturing environment for understanding the basic molecular mechanisms involved in the investigation of clinical problems
- To conduct and publish high quality research in Scientific Journals.

8. SCOPE OF THE PROGRAM:

Error! Hyperlink reference not valid. is a collective application of molecular genetics and **Error! Hyperlink reference not valid.**biology which provides brief knowledge about the normal cellular processes and disease pathogenesis at the molecular level by utilization of modern molecular biology techniques. It emphasizes more on cellular and molecular phenomena and interventions rather than the previous conceptual and observational focus on patients and their organs. It is a comprehensive field which utilize biological, physical, chemical, bioinformatics and medical techniques & aims to provide an insight to researchers in regard to the development of molecular biology tools and identification of molecular targets for the diagnosis, prognosis and treatment of a diverse number of human diseases, and molecular interventions development to correct them therefore the acquired knowledge and skill has got wide spread applications in research and development (R & D) organizations, pharmaceutical and chemical industry, molecular biology laboratories, clinical labs and large number of subject areas in academic institutions as most of the basic and clinical subjects in medicine have recently narrowed down to the molecular genetic levels for teaching and trainings. The same program can further be extended to the level of Ph.D in Molecular Medicine with provision of induction to the clinical faculty in medicine and dentistry from various subjects to promote Ph.D in molecular medicine for the clinical faculty.

9. ADMISSION REQUIREMENTS OF THE PROGRAM

Candidates applying for admission to the Molecular Medicine M.Phil program should have minimum sixteen years of education or four years education after F.Sc. (with minimum 130 credit hours) in biomedical science, biotechnology, pharmacology, genetics, medical technology or MBBS/ BDS or equivalent degree from HEC recognized institutions with minimum cGPA of 2.50 on a scale of 4.00 in BS/M.Sc. on semester system or 60% marks in B.S/M.Sc. in annual system.

Foreign degrees equivalent to BS/M.Sc. is also acceptable for admission in Molecular Medicine M.Phil program

Admission in M.Phil will be confirmed only after passing the ZU M.Phil entry test (GAT) and interview conducted by ZU.

Final selection of candidates will be based on cumulative merit determined from the previous academic record, experience, entry test and interview.

M.Phil/MS degree program will be open for all those who qualify the admission criteria. However, serving candidates will have to submit N.O.C from their respective departments along with the application form. A study leave document from their respective employer for a period of two years has to be submitted at the time of admission

10. DURATION OF THE PROGRAM:

Minimum duration to complete M.Phil is 2-4 years with 30 credit hours

Course work of 24 credit hours in the core and elective subjects.

Research/Thesis work of 6 credit hours on a research topic approved by the Board of Advanced Studies and Research

Two semesters of 12 credit hours each will be offered in the 1st year, where each semester will consist of 18 weeks including examinations.

Credit hour of a theory/lecture is of sixty minutes (60) duration (including 10 minutes break) per week during a Semester. However, in case of project/laboratory/research/project work, one credit hour may require two to three contact hours per week during a semester.

PROGRAM SPECIFICATION/ SEMESTER WISE BREAK UP

Program Title	M.Phil. in Molecular Medicine
Duration	2-4 years
Study System	Semester System
Total Credit Hours	24 + 6 = 30
Credit Hours Distribution - Semester Wise	Semester I = 12 Semester II = 12
Course Title with Study Hours Distribution	Course title = Appendix - I; Study per Semester = 16 weeks Examination = 2 weeks Semester Break = 2 weeks Working Days = 8:30am - 4:30pm (except Friday)
Teaching Hours Distribution	Lectures/ Virtual Labs/ Self Study /Labs training/ Assignments/ Presentations
Modules Detail with Credit Hours	Appendix – I
Degree Awarding Institution	Ziauddin University

11. THESIS REVIEW POLICY

- a) The thesis should be a piece of work embodying either a discovery of new facts or a fresh interpretation of facts or theories. In either case, the work should show the candidate's capacity for critical assessment, interpretation and judgment.
- b) The supervisor will make sure that prior to submission, research work passes through anti-plagiarism software before it is sent for evaluation.
- c) The candidate will have the opportunity to defend his/her thesis before a panel of experts appointed by the BASR. If successful, the candidate will be recommended for the degree.

12. POLICY FOR RESEARCH PUBLICATION

- a) A student must have a minimum of 01 original research paper published/accepted for publication, in an ISI indexed journal in the relevant area.
- b) Only those publications related to the research work will be counted in which the student name appears as 1st author and supervisor or co-supervisor as 2nd or 3rd author and clearly mentions student affiliation with Ziauddin University

13. Ph.D FACULTY MEMBERS

The following faculty members are full time available at Ziauddin University in their respective departments. The details of relevant Ph.D faculty for the requested program is attached in Annexure III.

FACULTY OF MOLECULAR MEDICINE

- 1. Dr. Shumaila Usman**
Assistant Professor
B.S. (Biochemistry), UoK, Pakistan
Ph.D. (Molecular Medicine), PCMD, ICCBS, Pakistan
- 2. Dr. Rehan Ahmed Siddiqui**
Assistant Professor
BS.MT (Clinical Pathology), SIUT, Pakistan
Ph.D. (Molecular Medicine), PCMD, ICCBS, Pakistan
- 3. Dr. Rehan Imad**
Assistant Professor
BS.MT (Clinical Pathology), DUHS, Pakistan
Ph.D. (Molecular Medicine), PCMD, ICCBS, Pakistan

ADDITIONAL FACULTY AVAILABLE FOR COURSE WORK AND RESEARCH SUPPORT

DEPARTMENT OF PATHOLOGY

Prof. Dr. Talat Mirza
MBBS, M.Phil, Ph.D

Prof. Dr. Fouzia Shaikh
MBBS, M.Phil, Ph.D.

Dr. Faraz Baig
MBBS, M.Phil, Ph.D Research Fellow

DEPARTMENT OF PHARMACOLOGY

Prof. Dr. Zahida Memon,
MBBS, M.Phil, Ph.D

Dr. Shehla
MBBS, M.Phil, Ph.D Research Fellow

Dr. Kausar Moin Mirza
MBBS, M.Phil, Ph.D Research Fellow

DEPARTMENT OF BIOCHEMISTRY & PROTEOMICS

Prof. Dr. Saeeda Baig,
M.Sc., M.Phil, Ph.D

Prof. Dr. Zil-e-Rubab
MBBS, M.Phil, Ph.D

Dr. Shamim Mushtaq
M.Sc., Ph.D

Dr. Zaryab Ahmed
MBBS, M.Phil, Ph.D Research Fellow

Mr. Moazzam Ali Shahid
M.Sc., M.Phil, Ph.D Research Fellow

DEPARTMENT OF BIOTECHNOLOGY

Dr. Ambrina Khatoon
M.Sc., Ph.D

DEPARTMENT OF MICROBIOLOGY & IMMUNOLOGY

Prof. Dr. Qamar Jamal
MBBS, M.Phil, Ph.D.

Dr. Faisal Afridi
MBBS, FCPS, Ph.D Research Fellow

DEPARTMENT OF ANATOMY

Dr. Bushra Wasim
MBBS, FCPS, Ph.D

DEPARTMENT OF FORENSIC MEDICINE

Dr. Qudsia Hassan
MBBS, FCPS, Ph.D

DEPARTMENT OF COMMUNITY HEALTH SCIENCES

Dr. Farah Ahmed
MBBS, MCPS, MSBE

Dr. Hasan Danish
MBBS, MPH-(USA), (FCPS)