

**M.PHIL. CURRICULUM
OF
HUMAN GENETICS & MOLECULAR BIOLOGY**

UNIVERSITY OF HEALTH SCIENCES LAHORE

M.Phil. Degree in Human Genetics & Molecular Biology is a 2 years course consisting of Part-1 and Part-2. Candidates having aptitude for research and possessing M.B., B.S, (with 1 year house job) or B.D.S. (with 1 year house job) or M.Sc. Biological Sciences (e.g., Biochemistry, Zoology, Microbiology, Biotechnology, Molecular Biology), with research thesis, are eligible for enrollment after entry test and interview.

Part-1 consists of one major and one minor paper and Part-2 consists of one minor paper and research thesis. The subjects of minor paper are as follow:

1. Behavioural Genetics
2. Biochemical genetics (Biochemistry)
3. Clinical Genetics
4. Community Genetics
5. Cytogenetics
6. Developmental Genetics
7. Immunogenetics (Immunology)
8. Molecular Genetics
9. Pharmacogenetics (Pharmacology)
10. Population Genetics
11. Pathogenetics
12. Reproductive Genetics

Curriculum for major paper in Human Genetics & Molecular Biology.

1. The Cells:

The Components of Cells.
Cell Division and Death.
Cell-Cell Interactions.
Stem Cells and Cell Specialization.

2. Meiosis and Development :

The Reproductive System.
Meiosis.
Gamete Maturation.
Prenatal Development.
Birth Defects.
Maturation and Aging.

3. Mendelian Inheritance:

The Inheritance of One Gene-Segregation

Mendelian Single-Gene Inheritance in Humans.
The Inheritance of Two Genes-Independent Assortment.
Pedigree Analysis.

4. Non-Mendelian Inheritance:

Alteration of Mendelian Ratios.
Maternal Inheritance and Mitochondrial Genes.
Linkage.

5. Inheritance of Sexual Development:

Sexual Development.
Traits Inherited on Sex Chromosomes.
X Inactivation
Genomic Imprinting.

6. Multifactorial Traits:

Genes and the Environment.
Investigating Multifactorial Traits.
Two Multifactorial Traits.

7. Genetics of Behavior:

Genes Contribute to Most Behavioral Traits.
Eating Disorders.
Sleep.
Intelligence.
Drug Addiction.
Mood Disorders.
Schizophrenia.

8. Molecular Basis of Inheritance:

Experiments Identify and Describe the Genetic Material
DNA Structure.
DNA Replication - Maintaining Genetic Information

9. Gene Action

Transcription.
Translation of a Protein.
Protein Folding.

10. Control of Gene Expression and Genome Architecture:

Gene Expression Through Time and Tissue.
Mechanisms of Gene Expression
Proteins Outnumber Genes.

11. Gene Mutation:

Causes Of Mutation

Types of Mutations.
The Importance of Position
Factor That Lessen the Effects of Mutation.
DNA Repair.

12. Chromosomes:

Portrait of a Chromosome.
Visualizing Chromosomes.
Abnormal Chromosome Number.
Abnormal Chromosome Structure.
Uniparental Disomy.

13. Population Genetics:

The Importance of Knowing Allele Frequencies.
Constant Allele Frequencies.
Applying Hardy-Weinberg Equilibrium.
DNA Profiling and Hardy-Weinberg Assumptions.
Genetic Privacy.

14. Changing Allele Frequencies:

Nonrandom Mating.
Migration.
Genetic Drift.
Mutation.
Natural Selection.

15. Human Ancestry and Eugenics:

Molecular Evolution
Molecular Clock.
Eugenics.

16. Immunogenetics:

The Importance of Cell Surfaces.
The Human Immune System.
Abnormal Immunity.
Altering Immune Function
A Genomic View Of Immunity-The Pathogen's Perspective.

17. Genetics of Cancer:

Cancer Is Genetic.
Characteristic of Cancer Cells.
Origins of Cancer Cells.
Cancer Genes.
Environmental Causes of Cancer.

18. Amplify, Modifying And Monitoring DNA:

Patenting DNA.
Amplifying DNA.
Modifying DNA.
Monitoring Gene Function.

19. Genetic Testing and Treatment:

Genetic Counseling.
Genetic Testing.
Treating Genetic Disease.

20. Reproductive Technologies:

Infertility and Sub Fertility.
Assisted Reproductive Technologies.

21. Genomics:

The Human Genome Project.
Comparative Genomics.