



University of Management and Technology, Lahore
School of Science
Department of Life Sciences
Certificate Course

Course Title:

“Experimental Methods in Molecular Biology”

Resource Person: Dr. Imran Tipu

Starting Date: June 02-03, 2023

Duration: Two days (Whole days)

Fee: UMT Students 3000, Faculty 5000, Others 5000.

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Introduction:

Molecular biology is an important field of study because it provides a fundamental understanding of the molecular mechanisms that underlie biological processes. This knowledge is essential for the development of new drugs and therapies, the diagnosis and treatment of diseases, and the genetic engineering of organisms. Some of the key areas where molecular biology has made significant contributions including, but not limited to:

Genetic diseases: Molecular biology has helped to identify the genetic basis of many diseases, including cancer, cystic fibrosis, and sickle cell anemia. This knowledge has led to the development of new diagnostic tests and treatments,

Drug development: Molecular biology has played a key role in the development of new drugs, including biologics such as monoclonal antibodies and gene therapies,

Agriculture: Molecular biology has been used to develop genetically modified crops that are more resistant to pests and diseases, and that have improved nutritional content,

Evolutionary biology: Molecular biology has provided insights into the evolutionary history of organisms, and has helped to reconstruct the relationships between different species.

Overall, molecular biology is a critical field of study that has had a profound impact on our understanding of biology and our ability to improve human health and well-being.



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Objectives:

1. *Understanding of the basic principles of molecular biology:* A course may aim to provide participants with a fundamental understanding of the principles and concepts that underlie molecular biology.
2. *Familiarity with laboratory techniques:* A course may teach participants a variety of laboratory techniques commonly used in molecular biology research, such as DNA extraction, PCR, gel electrophoresis, cloning, and sequencing.
3. *Knowledge of current research topics:* A course may cover current topics and trends in molecular biology research, such as gene editing, epigenetics, or personalized medicine.

Overall, the main objective of a molecular biology certificate course is to provide participants with the knowledge and skills necessary to perform molecular biology research and to contribute to the advancement of the field.

Learning Outcomes:

1. *Knowledge of basic molecular biology concepts:* Students should be able to demonstrate an understanding of the basic principles and concepts of molecular biology, such as DNA replication, transcription, translation, gene regulation, and genetic engineering.
2. *Laboratory skills:* Students should be able to perform common molecular biology laboratory techniques, such as PCR, gel electrophoresis, DNA sequencing, and cloning.
3. *Data analysis:* Students should be able to analyze and interpret data generated from molecular biology experiments, including DNA sequence analysis, gel electrophoresis results, and gene expression analysis.
4. *Research skills:* Depending on the level of the course, students may also be expected to develop research skills, such as experimental design, data interpretation, and literature review.

Duration:

Number of Days: 02

Number of hours/day: 05



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Total Contact Hours: 10

Eligibility Criteria:

The course is designed for the large group of audience including graduate students (Currently enrolled in 4th semester and above), research scholars, and faculty members those have interest to work at molecular level in related fields of molecular biology.

Course Outline:

1. Genomic DNA extraction
2. Polymerase Chain Reaction
3. Plasmid Extraction
4. Agarose Gel Electrophoresis
5. Gene Clean
6. Restriction Digestion & Ligation
7. Competent Cell Preparation
8. Transformation & Screening
9. SDS-PAGE analysis

Evaluation Criteria:

Class Participation/Attendance/Quiz