Institute of Zoology,
Faculty of Life Sciences
University of the Punjab, Lahore
Course Outline

Programme	BS Zoology	**Course Code**	**ZOOL-409**	**Credit Hours**	1
Course Title	**Lab. Molecular Biology**				

Course Introduction

1. To impart working in the molecular biology laboratory with safety
2. To learn the use of different instruments handling and maintenance.
3. To understand how to run different procedure in wet lab to conduct experiments..

Learning Outcomes

On the completion of the course, the students will be able to:

1. EXPLAIN how to use the molecular biology related instruments, working in lab with safety
2. UNDERSTAND the importance of record keeping.
3. COMPARE & CONTRAST the application of different methods to verify the results.
4. APPLY molecular knowledge to identify human genetic disorders and to understand underlying molecular mechanism

	Course Content	**Assignments/Readings**
Week 1	**Lab 1:** • Purpose Lab Notebook and how to secure data.	Learn how to setup or submit a document in Google Classroom.
Week 2	**Lab 2:** • Lab Safety • Molecular Lab Instruments, handling and safety.	Reading about different safety levels. Familiarize with Manuals of instruments
Week 3	**Lab 3:** • Solutions • Stock Solutions • Working Solutions	Familiarize with MSDS of chemicals
Week 4	**Lab 4:** • Working with Dilutions • Parallel Dilutions • Serial Dilutions	Practice preparing serial dilutions using any colored solutions to understand the concept.
Week 5	**Lab 5:** • Preparation of Solutions for DNA Extraction.	Familiarize with concept of instrument sterilization, or autoclaving of glassware, plasticware or solutions.
Week 6	**Lab 6:** • Isolation of DNA from human blood.	
Week 7	**Lab 7:** • Quantification of DNA through spectrophotometer.	
Week 8	**Lab 8:** • DNA amplification through polymerase chain reaction (Demonstration).	
Week 9	**Lab 9:** • Demonstration of Total RNA extraction from	

	liver tissue.	
Week 10	**Lab 10:** • Quantification and Purification check of RNA through spectrophotometer.	Read about Universal Primers
Week 11	**Lab 11:** • Demonstration of cDNA Synthesis.	Read about Universal Primers
Week 12	**Lab 12:** • How to design Primers for PCR	Prepare the materials required to start PCR
Week 13	**Lab 13:** • Pre-Lab for PCR	Prepare the materials required to start PCR
Week 14	**Lab 14:** • Quantitative vs Qualitative PCR.	Understand the concept of Ct Value and DNA quantity
Week 15	**Lab 15:** • Preparation of Gel for Electrophoresis (Demonstration)	
Week 16	**Lab 16:** • Separation of different sized DNA fragments on agarose gel. (Demonstration)	Understand the use of vertical and horizontal electrophoresis.

Textbooks and Reading Material

Textbooks.

1. Karp G, Iwasa J, Marshall W. Karp's Cell Biology, Global Edition. John Wiley & Sons; 2018.

Suggested Readings

2. Alberts, B., Bray, D., Lewis, J., Raff, M., Roberts, K., Watson, J. D. 2017. Molecular Biology of the Cell. 6th Edition. Garland Publishing Inc., New York.
3. Lodish H., Berk A., Kaiser C., Krieger M., Bretscher A., Ploegh H., Martin K., Yaffe M., Amon A. 2021. Molecular Cell Biology. W. H. Freeman; 9th ed. edition (Jan. 27, 2021) 978-1319208523
4. Articles in different research Journals specified for methods.

Teaching Learning Strategies

1. Use of Technology resources.
2. Use of Google Classroom management and Tools Resources
3. Provision of Handouts
4. Demonstration of the concepts using animations of cellular processes
5. Group activity of the students for problem solving skills

Assignments: Types and Number with Calendar

Lab Manual/Notebook: Due before the week of Final Term Examination

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes, Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.