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

Programme	BS Zoology	**Course Code**	**ZOOL-317**	**Credit Hours**	1
Course Title	**Lab. Genetics-II**				

Course Introduction

This laboratory course is designed to equip students with hands-on skills in the molecular methods and tools employed in molecular genetics research. The labs will introduce students to Primer designing and PCR analysis, Gel electrophoresis, extraction of DNA, screening of transformed bacteria using antibiotics, study of bar body using different staining methods and study of qualitative traits in human. Moreover, this course will introduce students to calculated genotype and allele frequencies using Hardy-Weinberg law. The course is composed of lab exercises and assignments that are designed to teach students how to run experiments, problem solve, critically evaluate and communicate their experimental results.

Learning Outcomes

On the completion of the course, the students will:

- **Able** to use mathematical tools to make predictions of frequencies of phenotypic change
- **Describe** the processes of gene regulation and predict how a gene will be expressed under specific circumstances.
- **Learn** and practice common genetics laboratory techniques.
- **Able** to solve problem related to population genetics
- **Able** to conduct basic research in molecular genetics

Course Content		**Assignments/Readings**
Week 1	• Extraction of genomic DNA from whole blood (lymphocytes)	
Week 2	• Separation of heterogeneous population of biomolecules through electrophoresis (SDS-PAGE preparation)-continue	
Week 3	• Separation of heterogeneous population of biomolecules through electrophoresis	
Week 4	• Study of quantitative traits in humans: finger prints as model of polygenic traits	
Week 5	• Study of Barr bodies in human cell nucleus	
Week 6	• Dermatoglyphics in normal and mentally retarded subjects	
Week 7	• Probability problems. Tossing of coins. X2 test	
Week 8	• Study of transformed bacteria on the basis of antibiotic resistance	
Week 9	• PCR Primer designing	
Week 10	• PCR- continue	
Week 11	• PCR- product analysis using Agarose gel electrophoresis	
Week 12	• Problems associated with Hardy-Wienberg equilibrium	

Week 13	• Determination of allele frequencies for given traits (Tongue rolling and folding, earlobe attachment)	
Week 14	Determination of allele frequencies for a given traits (Widows peak, , Hitch hiker's thumb, Hallux)	
Week 15	• Determination of allele frequencies for PTC taster and non-tasters in class of students	
Week 16	• Determination of allele frequency and genotype frequency of Red-Green color blindness in students of given class	

Textbooks and Reading Material

Books Recommended:

1. Snustad, D.P., Simmons, M.J. 2003. Principles of Genetics. 3rd Ed., John Wiley and Sons Ins. New York, USA.
2. Tamarin, R.H. 2001.Principles of Genetics. 7th Ed., WCB publishers USA.
3. Lewin, B. 2013. GENE-VIII. Oxford University Press. UK.
4. Gardener, E.J., Simmons, M.J., Snustad, D.P. 1991. Principles of Genetics. John Wiley and Sons Ins. New York, USA.
5. Strickberger, M.W. 2015. Genetics. McMillan, New York. USA.(9780024181206)
6. PRINCIPALS OF GENETICS Gardner E.J., Simmons M.J. and Snistad
7. A.P. (Latest available Addition)
8. Reference Books. Concepts of Genetics By Klug, W.S and Cummings M.R.
9. Willium S. Klug, 2014. Concept of Genetics, ISBN-11: 978-0321948915
10. Lewin's Gene XI BY Jocelyn E.Krebs et al. 2013, isbn-13:978-1449659851,ISBN-10:1449659853
11. 10. Gene- XI by Lewin's,2013,ISBN:978-1449659851
12. Concepts of genetics 11th edition, William S.Klug,2014,ISBN-13:978- 0321948915

Teaching Learning Strategies

Teaching will be a combination of class lectures, class discussions, and group work. Short videos/films will be shown on occasion.

Assignments: Types and Number with Calendar

The sessional work will be a combination of written assignments, class quizzes, presentation, and class participation/attendance

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.