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

Programme	BS Zoology	**Course Code**	**ZOOL-316**	**Credit Hours**	2
Course Title	**Genetics-II**				

Course Introduction

The course provides an introduction to the basic principles of the molecular genetics of prokaryotic and eukaryotic organisms. The course covers a wide array of genetic concepts, including classical and modern concept of gene, transposons, mutation and DNA repair mechanism, techniques of molecular genetics, gene regulation in prokaryotes and eukaryotes, recombinant DNA technology, genetics of viruses and bacteria, genetic control of animal development and immune system. This course will also cover Hardy-Weinberg law to understand population genetics.

Learning Outcomes

On the completion of the course, the students will:

- **Identify** the parts, structure, and dimensions of DNA molecules, RNA molecules, and chromosomes, and be able to categorize DNA as well as describe how DNA is stored
- **Describe** what causes and consequences of DNA sequence changes and how cells prevent these changes, as well as make predictions about the causes and effects of changes in DNA.
- **Describe** the processes of gene regulation and predict how a gene will be expressed under specific circumstances.
- **Learn** and practice common genetics laboratory techniques.
- **Describe** applications and techniques of modern genetic technology, as well as select the correct techniques to solve practical genetic problems
- **Carry** out genetics laboratory and research techniques.
- **Able** to solve problem related to population genetics

Course Content		**Assignments/Readings**
Week 1	**Unit-1 (Molecular Genetics)** • Introduction, scope and importance • Classical and modern concept of Gene	
Week 2	• Transposons (classification, mechanism of transposition and their role in human diseases).	
Week 3	• Mutation (Mutagens and types of mutations) • DNA repair mechanism	
Week 4	• Molecular Genetic Analysis • Southern blot, • Northern blot,	
Week 5	• Western blot • DNA sequencing	
Week 6	• Regulation of Gene Expression in Prokaryotes • Lac Operon and Tryptophan operon	
Week 7	• Gene Regulation in Eukaryotes,	
Week 8	• Genetic basis of diseases, like cancer,	
Week 9	• Genetic control of animal development.	

Week 10	• The genetic control of the Vertebrate Immune System	
Week 11	**Unit-2 (Recombinant DNA Technology)** • Elements (Restriction endonucleases, vectors, host cells) and procedure of genetic engineering	
Week 12	• Gene **therapy** • **Transgenic and genetically modified organisms** • **PCR**	
Week 13	Unit-3 (Genetics of Viruses and Bacteria) • Structure and life cycle of Bacteriophages • Transformation in Bacteria	
Week 14	• Conjugation in Bacteria • Transduction in Bacteria	
Week 15	**Unit-4 (Population Genetics)** • Hardy-Wienberg equilibrium • Allele frequency and genotype frequency	
Week 16	• Systematic and Dispersive pressures, Inbreeding and heterosis	

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. 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

As per University rules