

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



Programme	BS Zoology	Course Code	ZOOL-309	Credit Hours	2
Course Title	Genetics-I				
Course Introduction					
Classical Genetics deals with the basic principles of heredity and the mechanisms by which traits are passed from one generation to the next. The course covers a wide array of genetic concepts, including multiple alleles, gene interaction, genetic analysis, pedigree analysis chromosome structure and karyotyping, chromosomal aberrations, meiotic mechanisms, dosage compensation, sex determination, Sex-linked traits, somatic mutation and human genetics					
Learning Outcomes					
On the completion of the course, the students will:					
<ul style="list-style-type: none"> • Able to define terms of genetics and apply concepts of modern transmission • Identify and describe the process and purposes of the cell cycle, meiosis, and mitosis, as well as predict the outcomes of these processes. • Solve transmission genetics problems, make accurate predictions about inheritance of genetic traits, and map the locations of genes. • Identify the human traits and genetic diseases • Able to predict inheritance of genetic disorders from cousin marriages 					
Course Content					Assignments/Readings
Week 1	Unit-1 (Classical Genetics) <ul style="list-style-type: none"> • Introduction, scope and importance, Forward and Reverse genetics • The basic principles of Inheritance (Mendelism): Monohybrid and Dihybrid crosses (Definition - characteristics criss-cross inheritance). 				
Week 2	<ul style="list-style-type: none"> • Multiple Alleles: blood groups and coat color in rabbits. • Genetic basis of ABO and Rh blood groups 				
Week 3	<ul style="list-style-type: none"> • Blood transfusion, Rh incompatibility and Erythroblastosis Foetalis. 				
Week 4	<i>Unit-II (Chromosomal Basis of Inheritance)</i> <ul style="list-style-type: none"> • Chromosomal Theory of Inheritance • Epistasis 				
Week 5	<ul style="list-style-type: none"> • Lethal Alleles and lethality • Pleiotropic genes and pleiotropism 				
Week 6	Unit-III (Sex Determination and Sex Linkage) <ul style="list-style-type: none"> • Normal human chromosome complement; Karyotyping. • Sex determination in animals (Honey bee, Drosophila) 				
Week 7	<ul style="list-style-type: none"> • Sex determination in Human, Intersex (Androgen insensitivity syndrome, De La Chapelle syndrome, Swyer syndrome) • Sex linked (Hemophilia, muscular dystrophy, color blindness), sex influenced and sex limited traits, 				

Week 8	Unit-IV (Pedigree analysis) <ul style="list-style-type: none"> • Concept and importance of Pedigree • Pedigree analysis using pedigree charts 	
Week 9	<ul style="list-style-type: none"> • Prenatal Diagnosis: Amniocentesis and choriovillus sampling - Ultrasound scanning and Fetoscopy. Genetic counselling, Eugenics and Euthenics 	
Week 10	Unit-5 (Chromosomal Aberrations) <ul style="list-style-type: none"> • Euploidy, types of euploidy, applications of polyploidy • Aneuploidy, Basis of aneuploidy (non-disjunction), types of aneuploidy with examples (Klinefelters syndrome, and Turners syndrome, Down syndrome and Edwards syndrome, cat eye syndrome). 	
Week 11	<ul style="list-style-type: none"> • Structural changes, insertion, deletion (Cri du chat syndrome), duplication, Inversion and translocation 	
Week 12	Unit-6 Chromosome mapping/Gene mapping <ul style="list-style-type: none"> • Linkage • Crossing over 	
Week 13	<ul style="list-style-type: none"> • Construction of gene map • Determination of recombination frequency between two genes • Calculation of Interference 	
Week 14	Unit-7 (Human Genetics) <ul style="list-style-type: none"> • Single and Multifactorial Disorders: • Autosomal anomalies, Pseudoautosomal genes, 	
Week 15	<ul style="list-style-type: none"> • Single gene disorders: Gene mutation and disorders; Autosomal single gene disorders (Sickle cell anemia, Brachydactyly; Inborn errors of metabolism such as Phenylketonuria, alkaptonuria). 	
Week 16	<ul style="list-style-type: none"> • Complex Inheritance Patterns, Polygenic traits- Cleft lip and cleft palate 	

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. William 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.