LS 403A	**Genetics**	**3 Credits**
Prof. R. Muthuswami*, Dr. Bhupendra Chaudhary & Dr. Ekta Rai		
Sr. No.	**Topic**	**Faculty Name/ Contact Hours**
1.	Genes, Genomes, and Genetic Analysis: DNA as a genetic material: Historical perspective DNA structure and basics of DNA replication	RM/3
2.	Organization of eukaryotic and prokaryotic genomes, Genome size and complexity Polytene chromosomes, Repetitive elements Molecular structure of centromeres and telomeres	RM/3
3	Molecular genetics of Mitosis and meiosis	RM/2
4.	Changes in chromosome number and structure: Karyotyping, Polyploidy, Aneuploidy, Deletion, Inversion, Duplication, Translocation, and their consequences in plants and animals	RM/3
5.	Allelic and non-allelic interactions: Concept of alleles, types of dominance, lethal alleles, multiple alleles, test of allelism, complementation, epistasis	RM/2
6.	Linkage and recombination, gene mapping Two-point and three-point crossing in Drosophila Chi-Square test for linkage Genetic mapping in human pedigrees Mapping by tetrad analysis	RM/3
7.	Sex-linked inheritance and extrachromosomal inheritance, and sex linked and extrachromosomal inheritance diseases	RM/3
8.	Mutation: Types, mechanisms, and role in creating genetic variation/evolution, DNA repair	RM/3
9.	Human Genetics Organization of the human genome; Genetic basis of human diseases- Dominant, Recessive, autosomal, Trinucleotide repeat disorders, Genomic imprinting; Basics of gene therapy	ER/5
10.	Non-Mendelian/quantitative genetics: Genes and environment, heritability, penetrance, and expressivity	BC/3
11	Molecular markers, development of mapping populations, genome mapping, Mapping of QTLs to identify genes governing important traits, Genome-wide association studies in Plants, and Comparative genetics and synteny analysis.	BC/6
12	Population Genetics, Hardy-Weinberg law, calculation of gene and genotypic frequencies, forces influencing gene and genotypic frequencies in a population.	ER/4
13	Genome-wide association studies and haplotype (HapMap projects) analysis in humans and animals.	ER/2

Assessment will be based on two quizzes, one mid-semester exam, and one final exam.

Recommended books:

1. An introduction to Genetic Analysis by Griffiths et al.
2. Genetics: Analysis of Genes and Genomes by Hartl and Ruvolo
3. Genetics: A conceptual approach by Pierce et al.