

## LSC 402 - GENETICS

1. Introduction and scope of Genetics, Historical perspectives, Understanding the heredity, and variation.
2. DNA as genetic material, Basic structure of DNA and RNA.
3. Bacterial Genetics, Transformation, Conjugation, and Transduction.
4. DNA replication, Messelson and Stahl Experiment, Carins Experiment, Okazaki Experiment, Basic mechanism of DNA replication.
5. Chromosome structure, Centromeres, Telomeres.
6. Cell division, Mitosis, Meiosis, Chromosomal basis of inheritance.
7. Basic Principles of Mendelian Inheritance, Segregation and Independent Assortment, Alleles and Multiple Alleles, Human pedigrees and inheritance.
8. Gene Interaction, Sex-determination and Sex-linked inheritance, Chromosomal basis of Sex-determination in animals and plants, Sex-linked genes and dosage compensation of X-linked genes. Human pedigree analysis.
9. Linkage analysis and gene mapping in eukaryotes, Coupling and repulsion phases, Crossover and recombination
10. Concept of gene, Fine structure of rII locus – Benzer's experiments, complementation analysis and fine structure of gene, Complementation and recombination, concept of cistron
11. Chloroplast and Mitochondrial inheritance: Yeast, *Chlamydomonas*/ *Neurospora* and higher plants.
12. Changes in chromosome structure, Properties of chromosomes for detection of structural changes, Main type of changes– deletions, duplications, inversions and translocations, Somatic vs germinal mutation. Spontaneous and induced mutations, Chromosomal aberrations, Change in chromosome number. Evolutionary history of bread wheat, Somatic aneuploids. Selection and mutation
13. Population genetics: application of Mendel's laws to whole population, Calculation of allele frequencies, Hardy Weinberg principal for calculating recessive gene frequency, calculating frequency of sex –linked alleles.
14. Concept of genetic selection and molecular breeding, hybrid vigour, Basic principal of genetic engineering.

### Suggested Readings

1. Introduction to Genetic Analysis - by Griffiths *et al.*
2. Concepts of Genetics - by Klug *et al*
3. Principles of Genetics - by Snustad *et al.*