

4 th Semester	RBT4D002	Genetics	L-T-P 3-0-0	3 CREDITS
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Module-I: (10 Hrs.)

Mendel's law of Inheritance: Mendel's experiments—Mendel's materials, crossing technique, results of Mendel's experiments, phenomenon of dominance, variation in dominance relation, incomplete dominance, co-dominance, principle of segregation monohybrid cross, mechanism of segregation, monohybrid ratio, principle of independent assortment, Mendel's dihybrid cross, mechanism of independent assortment, dihybrid ratio, back cross and test cross, deviations from dihybrid phenotypic ratio, Interaction of Genes: Interaction of genes-combs in fowls, Epistasis, complementary genes, duplicate genes, additional interactions involving two gene pairs, interaction between more than two gene pairs.

Module-II: (10 Hrs.)

Linkage, crossing over and mapping: Linkage – coupling and repulsion hypothesis, Morgan's view on linkage, chromosome theory of linkage, kinds of linkage-complete linkage, incomplete linkage, linkage groups, significance of linkage, Crossing over – Types of crossing over - mitotic and meiotic crossing over, mechanism - synapsis, duplication of chromosomes, crossing over by breakage and union, terminalization, Molecular mechanism of recombination- Holiday model, cytological basis of crossing over; significance of crossing over, Construction of a genetic mapping: Two point and three point test crosses and gene mapping, interference and coincidence,

Module-III: (10 Hrs.)

Sex Determination : Genetically controlled sex determining mechanisms, sex chromosomal mechanism of sex determination, types-heterogenetic males, heterogenetic females, genic balance mechanism (X/A ratio in Drosophila), sex determination in man (TDF and SRY genes), sex determination in plants; Single gene control of sex; haploid males in hymenoptera; hormonal control of sex, environmental control of sex, dosage compensation (in man and Drosophila), Sex Linkage: Inheritance of sex linked (X-linked) traits-eye color in Drosophila, haemophilia and color blindness in human and barred plumage in poultry, inheritance of Ylinked genes, inheritance of XY-linked genes, primary and secondary non-disjunction of sex chromosomes, sex influenced and sex limited traits, sex linked disorders in human beings,

Module-IV: (08 Hrs.)

Cytoplasmic Inheritance : Maternal effects-shell coiling in snails, pigment in flour moth, cytoplasmic inheritance involving dispensable heredity units, kappa particles in Paramecium, cytoplasmic inheritance by cellular organelles, plastid inheritance in variegated four-o'clock plant, mitochondrial inheritance, male sterility in plants, uniparental inheritance in Chlamydomonas,

Module-V: (07 Hrs.)

Chromosomal variations: Origin, types and cytogenetic effects, Structural changes in chromosomes: Duplications, translocations, inversions (paracentric and pericentric cross over suppressors), Numerical changes in chromosomes: Aneuploidy (monosomy, nullisomy, trisomy, tetrasomy), euploidy (monoploidy, haploidy, polyploidy-autopolyploids and allopolyploids).

Books:

- “Genetics”, by P.K.Gupta, Rastogi Publications (2009)
- “Cell Biology, Genetics, Molecular Biology, Evolution and Ecology”, by P.S. Verma & V.K. Agarwal, S. Chand & Company S Chand; Reprint Edn. 2006 edition (2004)
- “Principles of Genetics”, by E.J. Gardner, M.J.Simmons & D.Peter Snustard, John Wiley & Sons, 8th edition (2006)
- Genetics- Strickberger,. Pearson Education India (2015)
- Watson, Hopkin, Roberts et al.: Molecular Biology of the Gene, 7 th ed. Pearson Education (2017)