SOFT CORE COURSES
BSS404 GENETICS

Course Outcomes:

Upon successful completion of the course, students will be able to:

CO 1. Gain in-depth knowledge in Genetics
CO 2. Understand principles governing the inheritance and variations
CO 3. Comprehend recombination in bacteria and development of rDNA technology.
CO 4. Understand the phenomenon of mutation and learn skills to detectmutations

Unit I (13 hours)

Historical perspectives and scope of Genetics; Principles of Mendelian inheritance; Modifications of Mendelian monohybrid and dihybrid ratios-Incomplete dominance, Codominance, Lethal genes and Multiple alleles. Applications of Mendel's principles- the punnet square method, forked-line method, probability method; Formulating and testing genetic hypothesis-the chi-square-test, linkage and crossing over. Cytological basis of inheritance: Linkage and crossing over; Genetic mapping of chromosomes. Sex determination, Dosage compensation in mammals and drosophila. Sex linked inheritance (*Drosophila* and Human). Sex related traits, genetic disorders.

Unit II (13 hours)

Genetics of Bacteria: Transformation, transduction, Conjugation - Plasmids. Extra chromosomal inheritance with examples; Genomic organization in prokaryotes and eukaryotes; Laws of DNA constancy and C - value paradox.Mutations: Classification, types of mutations-deletion, duplication, translocation and inversion,spontaneous and induced mutations, molecular mechanisms of mutations. Biochemical basis for mutations; Detection of mutations – mutagenicity testing - Ames test, tests in drosophila (DLT, ClB, SLRL, SMART, ARLT) and mouse (DLT, MNT, Mitotic and meiotic, specific locus test, HMA)

Unit III (13 hours)

Genetic recombination at Molecular level: Reciprocal recombination, site specific recombination, models of recombination (Holliday model), Role of Rec A in Recombination. Transposable genetic elements: Bacterial transposons, Is elements, Composite transposons, Tn3 elements, Eukaryotic transposons-Ac and Ds elements in maize; P elements and Hybrid dysgenesis, Retrotransposons. Alusequences. Human genetics: Human chromosomes, Chromosomal abnormalities-Sex chromosomal and autosomal; Genetic diseases, Pedigree analysis and genetic counseling, gene therapy.

References:

1. Gardner, E.J., Simmons M.J. & Snustad, D.P.(1991). Principles of Genetics. 8thEd. John Wiley and Sons, Inc., NewYork.
2. Hartl, D. L., Freifelder D. and Snyder, L.A.(1988). Basic Genetics. Jones andBartlettPublishers,Boston.
3. Hollaender A. (Ed.). (1971-76). Chemical Mutagens.PrinciplesandMethods for their Detection. Vols. 1, 2 & 3. Plenum Press, NewYork
4. Jha, A.P. (1993). Genes and Evolution. MacMillanIndiaLtd.,NewDelhi.
5. Lewin, B. (1997). Genes VI, Oxford University Press, NewYork
6. Marther, K. andJinks, J.L. (1977). Introduction to Biometrical Genetics. Chapman andHall.
7. Russell P.J. (1998). Genetics. The BenjaminCummings Publ.Co.Inc.