

B.Sc. Biotechnology: Semester-IV	
BST402: GENETICS	
<b>Teaching Scheme</b> Lectures: 3 hrs/Week Tutorials: 1 hrs/Week  Credits: 4	<b>Examination Scheme</b> Class Test - 12Marks  Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

**Prerequisite:** - BST103: cell biology, BST102: Introduction to biotechnology, BST302 Molecular Biology

**Course Objectives:**

1. To give Overview of a Genetics and Scientific Methods
2. To give complete knowledge of Mendelian principle: Principles of segregation, monoclinal cross, dominance, co dominance
3. Meiosis and Mendel's principles, Probability & Statistics
4. To describe Sex determination and linkage
5. To explain balanced concept of sex determination in *Drosophila*
6. To explain Principles of linkage; Crossing over
7. To explain Cytological demonstration of crossing over

**Course Outcomes:**

After completing the course, students will be able to:

- CO1: Students will understand the basic concept of the chromosome structure, chromatin organization and variation
- CO2: Students will be able to learn the concepts of Linkage concept of sex determination and sex linked inheritance
- CO3: Students will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems
- CO4: Students will be able to clearly communicate the results of scientific work in oral, written and electronic formats to both scientists and the public at large
- CO5: To gain knowledge about the organellar inheritance. And to understand the gene expression and regulation in Prokaryotes & Eukaryotes
- CO6: Students will gain the better knowledge in both Prokaryotes & Eukaryotes about the Gene Mutation, Repair Mechanisms, Nuclear Genome Organization, Genes and gene numbers
- CO7: Students will become familiar with the tools and techniques of genetic engineering DNA manipulation enzymes, genome and transcriptome analysis and manipulation tools, gene expression regulation, production and characterization of recombinant proteins



Head

Department of Biotechnology  
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Dean

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Registrar  
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**Detailed Syllabus:**

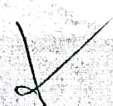
<b>UNIT-1 Genetics</b>
Genetics and Scientific Methods: History, Area; Mendelian principle: Principles of segregation, monoclinal cross, dominance, co dominance, semi-dominance, lethal genes. Principles of independent assortment: dihybrid ratios, Trihybrid ratios, gene interaction, epistasis, multiple alleles. Meiosis and Mendel's principles, Probability & Statistics.
<b>UNIT-2 Sex determination</b>
Sex determination and linkage: Mechanisms of sex determination: Simple mechanisms, One or a few genes, identification of sex Chromosomes, XX-XY mechanism, Y Chromosome and sex determination in mammals, balanced concept of sex determination in Drosophila, haploidy and sex determination in hymenoptera, Mosaics and gynandromorphy, environmental factors in sex determination, sex differentiation sex influenced dominance. Sex limited gene expression, sex linked inheritance, Pedigree Analysis: Penetrance & expressivity, Family tree etc.
<b>UNIT-3 Linkage</b>
Principles of linkage; Crossing over ,cytological basis of crossing over, Diploid Mapping: Two-three point cross, Cytological demonstration of crossing over, Haploid Mapping (Tetrads Analysis): Phenotypes of Fungi, Unorded Spores (Yeast), Ordered Spores ( <i>Neurospora</i> ), Somatic Crossing Over, Human Chromosomal Maps: X-Linkage, Autosomal Linkage.

**Text and Reference Books**

1. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons
2. Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. XI Edition. Benjamin Cummings.
3. Russell, P. J. (2009). iGenetics- A Molecular Approach. III Edition. Benjamin Cummings.

  
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