



# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

## B.Sc. (Life Science / Biotechnology / Chemistry)

### BSBT 204: Genetics and Molecular Biology

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		T <sub>1</sub>	T <sub>2</sub>	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSBT 204	DC	Genetics and Molecular Biology	60	20	20	30	20	4	1	2	7

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit,  
**\*Teacher Assessment shall be based following components: Quiz/Assignment/Project/Participation in Class, given that no component shall exceed more than 10 marks.**

#### Course Objectives:

1. To have the knowledge of principles of genetics
2. To have the knowledge of molecular biology and the role of macromolecules in transfer of genetic information

#### Course Outcomes:

1. Student will be able to understand the classical experiments of genetics that laid the foundations of genetic principles
2. Student will be able to understand the molecular nature of genes and techniques of transferring genes

#### A. Genetics

##### Unit - I

Mendelian Laws of genetics, Dominance, Segregation, Independent Assortment; Epistasis, Complementary ratio and supplementary ratio, Cytoplasmic inheritance; plastid and kappa particles.

Linkage and crossing over (Coupling and repulsion hypothesis) Mechanism of crossing over and its significance.

Mechanism of sex determination (Chromosomal theory), sex linked inheritance.

##### Unit - II

Structural and numerical chromosomal aberrations.

Chromosome related disorders: Klinefelter's syndrome, Turner's syndrome.

Down's syndrome and Cri-du-chat syndrome

Mutations- Spontaneous and induced, Chemical and physical mutagens.

Molecular basis of mutation.



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#### B. Molecular Biology

##### Unit-III

Transformation, Conjugation and transduction in bacteria; Gene mapping in bacteria; Transcription, Translation, Processing of m-RNA, Splicing, DNA and RNA polymerases Prokaryotic and Eukaryotic Translation - Mechanism of initiation, elongation and termination.

Gene regulation in eukaryotic system Promoters, enhancers elements and gene amplification.

##### Unit-IV

Genetic engineering: Isolation of genomic and plasmid DNA from bacteria, Isolation of genomicDNA from plant and animal cells.

Recombinant DNA technology – cloning vectors (pUC 19, phage  $\lambda$ , cosmid and M13); Restrictionenzymes, introduction of DNA into living cells, methods of gene transfer, expression and detectionof clones.

##### Unit – V

Introduction to blotting technique: Western , Southern and Northern Blots.

#### BSBTL 206 Practical:

1. Isolation of DNA from bacterial cell
2. Isolation of DNA from plant cell
3. Isolation of DNA from animal cell
4. Isolation of plasmid DNA from bacteria and determination of its molecular weight by agarose gel method
5. Isolation of RNA from bacterial cell
6. Analysis of DNA by gel electrophoresis
7. UV as a physical mutagen
8. Genetic transformation of *E.coli* with standard plasmids and calculation of transformation efficiency
9. Development of antibiotic resistant bacterial strains using conjugation
10. Restriction digestion of DNA and agarose gel electrophoresis of fragments
11. Ligation of cleaved DNA fragments by using ligase enzyme
12. Artificial transformation of bacterial cells
13. Blue-white screening of recombinants
14. Amplification of  $\beta$ -galactosidase gene in *E.coli* using PCR
15. RFLP and DNA finger printing
16. Steps in cloning using GFP (Green Fluorescent Protein) gene
17. Southern Blotting

#### Books

1. Lewin, B., Genes VII, Oxford University Press.
2. Strickberger M. W. [2002], Genetics – Prentice Hall, India.
3. Brown T. A., Genetics; a molecular approach – Chapman & Hall, London.
4. Erielfelder, D., Molecular Biology, Jones & Bartlett Publishers.

Joint Registrar

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