Course code	Course Title	C	H	I	E	T
17P3BMC7	**GENETICS, CELL AND MOLECULAR BIOLOGY**	**5**	**6**	**25**	**75**	**100**

Objectives:

To understand the basic tenets of inheritance and variations of traits of organisms from one generation to other.

Learning Outcome:

Learners can accomplish principles of inheritance, functional compartmentalization of a cell and expression aspects of genes

Unit I (20 hr)

Meiosis and its significance in inheritance. Mendelian laws: law of segregation and law of independent assortment with examples. Multiple alleles. Pleiotropy. Gene interactions – complementary genes and epistasis. Linkage and crossing over. Chromosome mapping. Sexlinkage, sexlimited and sexinfluenced traits. Population genetics: gene pool and gene frequency – Hardy-Weinberg law.

Unit II (15 hr)

Structure and chemistry of plant cell organelles. Organelle genetics – leaf varigation in plants, cytoplasmic male steritilty in maize. Metabolic defects in yeast.

Unit III (20 hr)

Central dogma of molecular biology. DNA as the genetic material – experimental proofs. Topology of nucliec acids, chromosome structure in prokaryotes and eukaryotes. C- value paradox, DNA denaturation kinetics. Replication of DNA in prokaryotes and eukaryotes.

Unit IV (20 hr)

Gene structure and Gene expression – transcription in prokayotes and eukaryotes. Post transcriptional modifications, translation in prokayotes and eukaryotes. Regulation of gene expression in prokaryotes (Operon concept – lac, ara and trp) and eukaryotes – (rbcl gene in plants), RNAs in gene regulation – RNAi, siRNA and miRNA.

Unit V (15 hr)

Mutation and its types – mutagens and molecular basis of mutation, DNA repair mechanisms. Natural gene transfer mechanisms in bacteria – Transformation, Transduction and Conjugation. Recombination mechanisms – homologous, site specific and transposition.

Reference

1. Deroberties E.D and De Robertis E.M.F. 2002. Cell and molecular biology 8th edition. Lee and Fab international edition, Philadelphia.
2. Lewin B. 2000. Gene VII, Oxford University Press, Newyork, USA.
3. Karp, G. 1999. Cell and molecular biology. Concept and experiments. John Wiley and Sons, Inc, USA
4. Powar C.B. 2003. Cell Biology. Himalaya Publishing House.
5. Verma P.S and Agarwa, V.K,Genetics. 2004. S.Chand Publications
6. Monroe Strickburger. 1985. Genetics, 3rd Edition, Macmilan Publishers
7. Gardener EJ *et al.*,2008. Principles of Genetics. 8th Edition. Wiley-India student edition.
8. David Friefieder.2002. Essentials of Molecular biology, 4th Edition, Jones and Barlett Publishers, Massachusetts.
9. https://WWW.news-medical.net.
10. https://WWW.elsevier.com.

Practicals

1. Solving problems in genetics given in the syllabus
2. Chromosome mapping in eukaryotes.
3. Population genetics
4. Illustration of different types of microscopes
5. Illustration of specimen preparations for Electron microscope observations.
6. Illustration of cell organelles
7. Karyotyping and Idiograms
8. Bacterial transformation and conjugation