

<b>Year and Sem:</b> P2S1	<b>Course Code:</b> B217	<b>Course Name:</b> Biology	<b>No. of Credits:</b> 4	<b>L-T-P:</b> 2-2-1
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## SYLLABUS

### **UNIT-I: CLASSICAL GENETICS AND MOLECULAR GENETICS**

**Mendelian Genetics:** Introduction to Heredity, Mendel and His Peas, Alleles and Genes; Punnett Squares, The Law of Segregation, The Law of Independent Assortment, Probabilities in Genetics; **Non-Mendelian Genetics:** Variations on Mendel's Laws (Overview), Multiple Alleles, Incomplete Dominance and Codominance, Pleiotropy and Lethal Alleles, Polygenic Inheritance and Environmental Effects; **The Chromosomal Basis of Inheritance:** Boveri-Sutton Chromosome Theory, Thomas Hunt Morgan and Fruit Flies, Genetic Linkage and Mapping; **Sex Linkage, Chromosomal Mutations and Non-nuclear Inheritance:** Sex-linked Traits, X-linked Inheritance, X-inactivation, Aneuploidy and Chromosomal Rearrangements, Inheritance of Mitochondrial and Chloroplast DNA.

### **UNIT-II: CHEMISTRY OF LIFE**

**Chemical Bonds and Reactions:** Ionic, Covalent, and Hydrogen Bond; **Macromolecules: Introduction to Macromolecules: Carbohydrates:** Molecular Structure of Glucose and Fructose, Dehydration Synthesis of a Condensation Reaction, Hydrolysis; **Lipids:** Molecular Structure of Triglycerides (Fats) Saturated Fats, Unsaturated Fats and Trans Fats; Lipid Overview; **Nucleic Acids:** Molecular Structure of DNA and RNA; Antiparallel Structure of DNA Strands; **Introduction to Proteins and Amino Acids,** Peptide Bond Formation.

### **UNIT-III: DNA AS THE GENETIC MATERIAL**

**Discovery of DNA:** DNA as the "Transforming Principle", Classic Experiments, Hershey and Chase: DNA is The Genetic Material; The Discovery of the Double Helix Structure of DNA; **DNA Replication:** Modes of DNA Replication: Meselson-Stahl Experiment, Molecular Mechanism, Leading and Lagging Strands, DNA Proofreading and Repair, Telomeres and Telomerase.

### **UNIT-IV: CENTRAL DOGMA (DNA TO RNA TO PROTEIN)**

**Introduction to Gene Expression (Central Dogma):** RNA Transcription and Translation. The Genetic Code, One Gene, One Enzyme; **Transcription:** Overview, Stages. Transcription and m-RNA Processing, Eukaryotic Pre-m-RNA Processing; **Translation:** Overview, t-RNAs and Ribosomes, Stages, Overview of Protein Structure, Tertiary Structure of Proteins, Protein Targeting.

### **UNIT-V: GENE REGULATION**

**Gene Regulation in Prokaryotes (Bacteria) Operons:** Overview, The LAC Operon, The TRP Operon; **Gene Regulation in Eukaryotes:** Overview, Transcription Factors, Regulation after Transcription.

### **UNIT-VI: BIOTECHNOLOGY**

**Introduction to Biotechnology: DNA Cloning:** Overview, Restriction Enzymes and DNA Ligase, Bacterial Transformation and Selection, **DNA Analysis Methods:** Polymerase Chain Reaction (PCR) Gel Electrophoresis, DNA Sequencing; **Stem Cells:** Embryonic Stem Cells.

**PRACTICALS:**

1. Problems related to Monohybrid Cross
2. Problems related to Dihybrid Cross
3. Estimation of Sugar and Starch
4. Estimation of Protein and Fats
5. Extraction of DNA
6. Demonstration of PCR
7. Demonstration of Gel Electrophoresis
8. Demonstration of Paper chromatography

**REFERENCES:**

1. [www.khanacademy.org](http://www.khanacademy.org)
2. NCERT (Biology) and Telugu Academy (Zoology and Botany)
3. Molecular genetics by david freifelder
4. Molecular Biology of the Gene, 7th Edition. James D. *Watson*, Cold Spring Harbor Laboratory.
5. Biotechnology by B.D. Singh