1. **Molecules and their Interaction Relevant to Biology:** Structure and functions of biomolecules; Carbohydrates; Fatty acids; Lipids; Amino acids; Proteins; Nucleic acids – DNA, mRNA, tRNA, rRNA; Hormones; Vitamins; Enzymes; Bioenergetics; Cell metabolism; Protein-protein and protein-DNA interactions

2. **Cellular Organization:** Cell theory; Cell as basic unit of life; Hierarchy of cell organization; Structure and organization of prokaryotic and eukaryotic cells; Structure and function of cell organelles; Biомembranes; Cytoskeletal elements; Chromosome structure; Karyotype; Chromatin organization; Cell Cycle

3. **Fundamental Processes:** Photosynthesis; Cellular respiration; Movement through cell membrane; Nutrition; Blood clotting; Human physiological systems; Replication; Transcription; Translation; DNA repair mechanisms; Plant physiology; Bacterial growth; Microbial genetics; Secondary metabolites

4. **Developmental Biology and Evolution:** Stages of development; Mechanism of differentiation; Germ layers; Potency; Morphogenetic movements; Early and late development in model organisms; Cell division; Gametogenesis and fertilization in animals and flowering plants; Embryology; Seed germination; Dormancy; Evolution and natural selection; Mendel’s law of heredity; Evidences of DNA as genetic information carrier; Hardy-Weinberg law; Extra-chromosomal inheritance; Sex-linked inheritance in humans; Mutations

5. **Plant and Animal Biotechnology:** Plant tissue culture techniques; Totipotency; Organogenesis and Somatic embryogenesis; Suspension culture; Protoplast isolation and somatic hybridization; Production of secondary metabolites; Basic techniques in animal cell and organ culture; Bioreactors for large scale culture of animal cells; Stem cells; Transgenieplants and animals

6. **Immunology and Vaccines:** Immunity; Antigen; Structure of antibody; Hapten; Antigen-antibody interaction; Introduction to antigen presentation; Role of MHC; Complement system; Bacterial diseases of humans; Types of vaccines; Immunization; Recombinant vaccines

7. **Computational Biology:** Databases and tools; Nucleotide sequences; Protein Sequences; Protein Structure.

8. **Diversity of Life Forms:** General characteristics of life forms; General characteristics of bacteria, fungi, algae, Microbial growth curve; plant and animal viruses; Classification of plantand animal kingdom

9. **Ecological Principles and Environmental Biology:** Ecosystem; Ecological relationships; Habitat and niche; Ecology of ecosystems; Air, water and soil pollution; Greenhouse effect and global warming; Noise pollution; Pollution abatement; Wastewater treatment; Disposal of solid wastes; Biogeochemical cycles of elements; Bioremediation; Bioleaching; Biopesticides; Biofertilizers

10. **Applied Biology:** Basics of fermentation technology; Microbes in industry; Biosensors; Biofuels; Principles of gene cloning; Methods of gene transfer; Application of biology in agriculture, health, industry and environment sectors

11. **Methods in Biology:** Basics of Centrifugation; Electrophoresis; Chromatography; Microscopy; UV-Visible spectrophotometry; Radiotracer technique; PCR; DNA sequencing; Southern blotting; Tests of significance; Analysis of variation; Correlation and regression; Hybridoma technology; Basic techniques in bioinformatics

12. **Inheritance Biology:** Mendelian principles; Extensions of Mendelian principles; Gene mapping methods; Extra chromosomal inheritance; Human genetics; Mutations; Structural and numerical alterations of chromosomes