GUJARAT TECHNOLOGICAL UNIVERSITY

B.E Semester: 3

Bio-Technology

Subject Code 130402
Subject Name CELL BIOLOGY

Sr.No	Course content
1.	**UNIT I Introduction to cell** **Organization of Cell: Prokaryotic and Eukaryotic cells** Introduction to akaryotic, prokaryotic and eukaryotic cells. Structure of prokaryotic and eukaryotic cells. Origin and evolution of cell (from molecules to first cell, from prokaryotes to eukaryotes, from single cells to multicellular organisms. Comparison of prokaryotic and eukaryotic cells on structural, functional and evolutionary basis.
2.	**UNIT II Cell Biology of Prokaryotic cells (Part I)** **Cell wall :** types, component and development, Cell **membrane:** components and development, **Cytoplasm/Cytosol :** components, nature and importance, Chromosomes nature of existence and complexities, **Plasmid** nature of existence and stability
3.	**UNIT III Cell Biology of Prokaryotic cells (Part II)** **Granules** types and causes of generation **Vacuoles** types and causes of generation **Mesosomes** development and importance **Cilia, Flagella And Pili:** structure, chemical composition, ultra structure physiology and ciliary movement **Ribosomes** types, structure chemical composition **Gas Vesicles :** Structure and function **Endospores:** Formation and germination
4.	**UNIT IV Cell Biology of Eukaryotic Cells (Part I)** **Cell wall** evolution, structure, development types and role **Cell membrane** evolution, structure, chemical composition, development, role and function **Cytoplasm/Cytosol :** physical nature, chemical organization, types of compounds - inorganic and organic Nucleus, nuclear envelope , nuclear pore, nucleoplasm, nucleolus, genetic material, nuclear proteins their development, history, evolution and role in life. **Chromosome :** morphology, chemical composition, organization of Eukaryotic chromosome (solenoid model)
5.	**UNIT V Cell Biology of Eukaryotic Cells (Part II)** **Mitochondria** evolution, structure, development, component and mitochondrial control **Plastids:** evolution, types, Chloroplast: structure, development, component and control, Light Reaction, Dark Reaction

	Endoplasmic reticulum evolution, structure, types, role and function. **Golgi -** Evolution, structure, chemical composition,role and function. **Lysosomes** evolution, structure, chemical composition, types (primary lysosomes, heterophagosomes, autophagosomes, residual bodies) lysosomes in plants (Vacuoles, spherosomes, aleurone grain), role and function. **Cytoskeleton:** Nature, Intermediate filaments, Microtubules, Actin filaments, Actin binding proteins **Microbodies : Peroxisomes :** History, structure, types,biogenesis, functions. **Microbodies : Glyoxysomes :** Functions **Ribosomes :** History, occurrence, types, structure, chemical composition, dissociation and reconstitution, biogenesis, function **Centrioles and basal bodies:** Occurrence, structure, chemical composition, origin and function.

CELL BIOLOGY PRACTICALS

1. Introduction to laboratory equipments.
   A) Cleaning and sterilization of glasswares.
   B)Disposal of laboratory wastes and cultures.
2. Basic microbe handling techniques.
3. Introduction to microbial staining.
4. Microscopic observation of various morphological forms of bacteria by simple (monochrome) staining.
5. Microscopic observation of various morphological forms of bacteria by negative staining.
6. Microscopic observation of various morphological forms of bacteria by differential staining (Gram's technique).
7. To perform spirochete staining.
8. To perform cell wall staining.
9. To perform acid fast staining.
10. To perform spore (endospore) staining
11. To perform capsule staining
12. To perform metachromatic granule staining
13. To perform flagella staining
14. Techniques for cultivation of bacteria.
15. Techniques for isolation of microorganisms
16. Isolation of bacteria using selective and differential media.
17. Enumeration of bacterial growth by viable count technique.

Reference Books:

1. Molecular Biology of the Cell, by Alberts
2. Genes VIII by Benjamin Lewin
3. Cell Biology by C.B.Pawar
4. Cell Biology by De Roberties
5. Cell Biology, Genetics… by P.S.Verma