

## Cell Biology

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Upon completion of this course, students will be able to:

UNIT I: Cell: Introduction and classification of organisms by cell structure, cytosol, compartmentalization of eukaryotic cells, cell fractionation. Cell Membrane and Permeability: Chemical components of biological membranes, organization and Fluid Mosaic Model, membrane as a dynamic entity.

1. Recall the basic structure of a cell and classify organisms based on cell structure.
2. Describe the composition and functions of cytosol in the cell.
3. Explain the compartmentalization of eukaryotic cells and its significance.
4. Demonstrate the process of cell fractionation and its applications.
5. Analyze the chemical components of biological membranes and relate them to membrane organization.
6. Illustrate the Fluid Mosaic Model of the cell membrane and discuss its dynamic nature.

UNIT II: Subcellular organelles: Lysosomes, vacuoles and microbodies: Structure, functions and dysfunction. Ribosomes: Structures and function including role in protein synthesis. Mitochondria: Structure, function and dysfunction. Nucleus: Structure and function. Endoplasmic reticulum: Structure, and function including role in protein segregation.

1. Describe the structure and functions of lysosomes, vacuoles, and microbodies.
2. Analyze the role of ribosomes in protein synthesis within the cell.
3. Illustrate the structure, functions, and dysfunction of mitochondria.
4. Explain the structure and functions of the nucleus in a cell.
5. Evaluate the structure and functions of the endoplasmic reticulum, including its role in protein segregation.

UNIT III: Cytoskeleton and cell motility: Structure and function of microtubules, microfilaments, intermediate filaments.

1. Compare and contrast the structure and functions of microtubules, microfilaments, and intermediate filaments.
2. Analyze the role of the cytoskeleton in cell motility and organization.

UNIT IV: Extracellular matrix: composition, molecules that mediate cell adhesion, cell-cell junctions, membrane receptors for extracellular matrix proteins, regulation of receptor function and signal transduction.

1. Identify the composition of the extracellular matrix and its significance in cell function.
2. Explain the molecules that mediate cell adhesion and cell-cell junctions.
3. Discuss membrane receptors for extracellular matrix proteins and their regulation.
4. Analyze the mechanisms of receptor function and signal transduction in the cell.

UNIT V: Cell Division, Cancer & Apoptosis: Mitosis and Meiosis. Cancer as dysregulation of cell division, characteristics of cancer cells, agents promoting carcinogenesis. Apoptosis: definition, pathways and significance.

1. Describe the processes of mitosis and meiosis in cell division.
2. Explain how cancer is a result of dysregulation of cell division and identify the characteristics of cancer cells.
3. Evaluate the agents that promote carcinogenesis in cells.
4. Define apoptosis, describe its pathways, and discuss its significance in cellular homeostasis.

Select Language 

