

Course Code	Course Name	Credits
26ZY501	CELL BIOLOGY	04

Course Objectives

- To understand the structure and function of cells and cellular organelles.
- To explain the molecular organization of prokaryotic and eukaryotic cells.
- To study cell membrane structure, transport mechanisms, and cell signaling.
- To understand cell division, cell cycle regulation, and cellular communication.
- To develop knowledge of modern techniques used in cell biology research.

Learning Outcomes

- Explain the structure and functions of cells and their organelles.
- Differentiate prokaryotic and eukaryotic cellular organization.
- Interpret mechanisms of membrane transport and intracellular communication.
- Describe the stages and significance of cell division.
- Apply basic cell biology concepts and laboratory techniques in biological sciences.

Unit 1 – Cell Structure and Organization (12 Hrs.)

Cell theory and its modern concepts. Types of Cells, Prokaryotic and Eukaryotic cell- structure. Differences between Prokaryotic and Eukaryotic cell. Cell Components. Plasma membrane, Cytoplasm, Cell inclusions and Cytoskeleton.

Unit 2 – Structural organization of organelles (12 Hrs.)

Structure and functions of nucleus, Nucleolus, Endomembrane System, Endoplasmic reticulum, Golgi apparatus, Lysosomes and peroxisomes, Mitochondria. Ribosomes and Vacuoles.

Unit 3 - Cell Membrane and Cellular Transport (12 Hrs.)

Plasma Membrane: Fluid mosaic model, Chemical composition and properties. Membrane Transport- Diffusion, Osmosis, Active transport and Facilitated diffusion. Bulk Transport- Endocytosis, Exocytosis, Phagocytosis and pinocytosis. Cell Communication- Cell signaling, Receptors and signal transduction

Unit 4 – Cell Cycle and Cell Division (12 Hrs.)

Cell Cycle- Interphase, G1, S, and G2 phases. Regulation of cell cycle. Mitosis - Stages of mitosis and its significance. Meiosis - Stages of meiosis and its significance. Cell Death- Apoptosis and Necrosis.

Unit 5 - Cancer Cell Biology (12 Hrs.)

Characteristics of cancer cells; oncogenes and proto-oncogenes; tumor suppressor genes; cell cycle regulation and apoptosis in cancer; carcinogenesis and metastasis; angiogenesis; molecular basis of cancer; diagnosis and therapeutic approaches including chemotherapy, radiotherapy, immunotherapy, and targeted therapy.

Reference Books:

6. Dubey, RC., (2014). Advanced Biotechnology. S. Chand Publication.
7. Kumaresan, V (2014). Animal Biotechnology. Saras Publications.
8. BD Singh, (2014) Biotechnology: Expanding Horizons, Kalyani Publishers
9. U.Satyanarayan and U Chakrapani, (2014) Biotechnology, Books & Allied Ltd.
10. P.K. Gupta: Biotechnology and Genomics, Rastogi publishers (2017).

Websites and eLearning Sources:

<https://openstax.org/details/books/biology-2e>
<https://www.biologydiscussion.com/cell-biology>
<https://www.easybiologyclass.com/category/cell-biology/>