

Course Code	Course Name	Credits
26ZY010	BASICS OF CELL BIOLOGY	04

Course Objectives

- To understand the fundamental concepts and principles of cell biology.
- To explain the structure and functions of cellular organelles and membranes.
- To develop knowledge on cell division, cell communication, and cellular metabolism.
- To analyze the molecular and physiological processes occurring within cells.
- To enhance observation, analytical thinking, and laboratory skills related to cell biology.

Learning Outcomes

- Explain the structure and functions of cells and cellular organelles.
- Differentiate prokaryotic and eukaryotic cells based on structural and functional characteristics.
- Examine the processes of cell division, transport, and cellular communication.
- Analyze cellular activities and their significance in growth, development, and metabolism.
- Apply cell biology concepts and laboratory techniques in biological studies and research.

Unit 1 – Cell as Basic Unit of Life (12 Hrs.)

Cell Theory: Cell Shape, Size and Number. Cell Types: Eukaryotic and Prokaryotic; Similarities and Differences Eukaryotic Cell: Ultrastructure - Animal cell. Prokaryotic Cell: Ultrastructure - Bacteria. Plasma Membrane: Structure - Fluid Mosaic Model.

Unit 2 – Membrane structure and function (12 Hrs.)

Plasma membrane: chemical composition, structure and function of membrane proteins, membrane lipid and membrane fluidity, membrane dynamics. membrane transport. Junctional complexes. Cell communication: General principle of cell communication. cell adhesion and role of different cell adhesion molecules.

Unit 3 - Intracellular organelles (12 Hrs.)

Structure and functions of nucleus, mitochondria, endoplasmic reticulum (rough and smooth ER), ribosomes, Golgi apparatus and lysosomes.

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

Nucleus: Nuclear envelope, Nuclear pore complex, Nucleolus. Chromatin: Structure: Heterochromatin and Euchromatin (nucleosome). Eukaryotic Chromosome - Ultrastructure. Nucleosome. Mitosis and its significance. Meiosis and its significance. Cell cycle and its regulation. Comparison between Mitosis and Meiosis. Synaptonemal Complex.

Unit 5 - Cancer Biology (12 Hrs.)

Biology of cancer cell, characteristics of normal and cancer cells; Genetic rearrangements in progenitor cells, oncogenes, alterations in cell structure and function during cancer development; regulation of cell cycle and loss of cell cycle control in cancer cells; apoptosis and evasion of programmed cell death; angiogenesis and metastasis. oncogenes, tumor suppressor genes, metastasis.

Reference Books:

1. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology. VIII Edition. Lippincott Williams and Wilkins, Philadelphia.
2. Cooper, G.M. and Hausman, R.E. (2009). The Cell: A Molecular Approach. V Edition. ASM Press and Sunderland, Washington, D.C.; Sinauer Associates, MA.
3. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. (2009). The World of the Cell. VII Edition. Pearson Benjamin Cummings Publishing, San Francisco.
4. Bruce Albert, Bray Dennis, Levis Julian, Raff Martin, Roberts Keith and Watson James (2008). Molecular Biology of the Cell, V Edition, Garland publishing Inc., New York and London.
5. Karp, G. (2014). Cell Biology. VII Edition. John Wiley and Sons. Singapore Pvt. Ltd.

Websites and eLearning Sources:

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