

CELL BIOLOGY

Contact Hours

Theory = 32
Practical = 32
Total = 64

Credit Hours:

Theory = 2.0
Practical = 1.0
Total = 3.0

Course Objectives:

The objectives of the course are:-

1. To explain the basic concepts of cell biology.
2. To understand cellular structure, composition of the organelles, cell growth and cellular division.
3. To explain how macromolecules and organelles govern the dynamic organization, function of living cells.

Course Learning Outcomes:

Upon successful completion of the course, the student will be able to:

1. **ACQUIRE** the basic concepts of cell biology.
2. **UNDERSTAND** the metabolic processes of cells in terms of cellular organelles, membranes, and biological molecules.
3. **ABILITY** to understand the role of macromolecules regulating cellular processes.
4. **FORMULATE** the critical thinking skills and knowledge on cell.

Course Outline:

1. **Introduction cell structure and function**
 - a. Cell theory
 - b. Comparison of plant and animal cells
 - c. Comparison of prokaryotic and eukaryotic cells
2. **Cell membranes**
 - a. Structural models

- b. Chemical composition and function
3. **Cell Organelles (structure and function)**
 - a. Endoplasmic reticulum
 - b. Golgi Bodies
 - c. Mitochondria
 - d. Lysosomes
 - e. Peroxisomes
 - f. Ribosome
4. **Nucleus**
 - a. Structure and function
 - b. Nuclear membrane
 - c. Chromatin
5. **Cytoskeleton**
 - a. Structure and types
 - b. Function of cytoskeleton
6. **Cellular transport**
 - a. Diffusion and osmosis
 - b. Facilitated and active transport
 - c. Endocytosis and exocytosis
7. **Cellular reproduction**
 - a. Cell cycle
 - b. Mitosis
 - c. Meiosis

Practical:

1. Microscopy
2. staining techniques (Gram staining)
3. Identification of cell organelles (prepared slides)
4. Preparation of temporary whole mount.
5. Preparation of permanent whole mount.
6. Squash preparation of onion root tip for mitotic stages.
7. Study of mitotic and meiotic stages (prepared slides)

Teaching Methodology:

- Lecturing
- Written Assignments
- Practical
- Guest speaker

Assessment:

Mid Term (40%)

- Written (Long Questions, Short Questions, MCQs) 50%
- Presentation 20%
- Assignments 20%
- Report Writing 10%

Final Term (60%)

- Written (Long Questions, Short Questions, MCQs) 50%
- Presentation 20%
- Assignments 20%
- Report Writing 10%

Books Recommended:

1. Alberts, B., Bray, D., Lewis, J., Raff, M., Roberts, K., Watson, J.D. 2017. Molecular Biology of the Cell. 6th Edition. Garland Publishing Inc., New York.
2. Harvey Lodish, Arnold Berk, Chris A. Kaiser, Monty Krieger, Anthony Bretscher, Hidde Ploegh, Angelika Amon, Kelsey C. Martin. 2016. Molecular Cell Biology. W. H. Freeman Publishers, Scientific American Inc.
3. Geoffrey M.C., Robert E.H. 2007. The cell: A Molecular Approach, Sinauer Associates, INC.
4. Karp, J. 2005. Cell and Molecular Biology, Concepts and Experiments, Jhon Wiley and Sons, INC.
5. De Robertis, E. D. P. 2017. Cell and Molecular Biology, 8th edition, Lea & Febiger, New York.