

Course Code	Course Title	L	T	P	C
1151BT106	Cell Biology	4	0	0	4

- Course Category** : *Program Core*
- a. Preamble** : *Cell Biology enables comprehension of cellular structure and their interactions*
- b. Prerequisite Courses** : *Biology for Engineers*
- c. Related Courses** : *Microbiology*
- d. Course Outcomes** : *Upon the successful completion of the course, students will be able to:*

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Understand basics of Cell structure and Organelle function	K2
CO2	Enable the comprehension of Cellular reproduction/division and signaling pathways	K2
CO3	Understand role of signal pathways and importance of hormones.	K2
CO4	Become competent with different techniques for studying cells	K3
CO5	Understand Cell culture methods.	K3

COs		PROGRAMME OUTCOMES											
		1	2	3	4	5	6	7	8	9	10	11	12
CO1	Understand basics of Cell structure and Organelle function	H	L	L	L	L	H	H	L	L	L	L	M
CO2	Enable the comprehension of Cellular reproduction/division and signalling pathways	L	H	L	H	M	L	L	L	L	L	M	M
CO3	Understand role of signal pathways and importance of hormones.	L	L	H	H	V	M	L	L	M	M	L	L
CO4	Become competent with different techniques for studying cells	H	L	L	L	L	H	H	L	L	L	L	M
CO5	Understand Cell culture methods.	L	L	L	H	H	L	L	L	L	L	M	H

*e. Course Content:*

**UNIT I: CELL BIOLOGY, ORGANELLE STRUCTURE AND FUNCTION**

Introduction to cell biology, origin and evolution, physical and chemical composition of cells, structural organization of prokaryotic and eukaryotic cells, Organization of membrane, membrane proteins, cell organelles–mitochondria, nucleus, ribosome, endoplasmic reticulum, Golgi bodies.

**UNIT II: CELLULAR INTERACTIONS**

Cell cycle, Mitosis, Meiosis, Molecules controlling cell cycle, Cell transport mechanisms, passive and active transport, sodium potassium pump, ATPase pump, endocytosis, Exocytosis, entry of virus and toxins into cells, cell signaling basics, endocrine and Paracrine cell signaling models, signal transduction cascade, role of signaling molecules, receptors, Adhesion junctions, Tight junctions, Gap junctions, Plasmodesmata.

**UNIT III: CELL SIGNAL TRANSDUCTION**

Signaling molecules, pathways of intracellular signal transduction, signal amplification, models, CAMP, role of IP<sub>3</sub>, G-proteins, Hormones as signals and their chemical classification, Peptide hormones, Protein hormones, Lipid and phospholipids derived hormones, Mechanism and action of different hormones.

**UNIT IV: TECHNIQUES FOR CELL STUDY**

Cell fractionation, flow cytometry, Identification methods of cells by Microscopy, SEM, TEM, Immunostaining.

**UNIT V: CELL CULTURE**

Methods for culture of prokaryotic and eukaryotic cells, study of cell line, types, generation, maintenance of cell lines, techniques in cell culture, explant, primary cultures, three dimensional cultures, role of matrix for cell growth.

**TEXT BOOKS**

1. Lodish, Harvey et al., “Molecular Cell Biology”, 5th Edition, W.H.Freeman, 2005.
2. Cooper, G.M. and R.E. Hansman “The Cell : A Molecular Approach”, 4th Edition, ASM Press, 2007.
3. Alberts, Bruce et al., “Molecular Biology of the Cell”, 4th Edition, Garland Science (TaylorsFrancis), 2002.
4. Sadava, D.E. “Cell Biology : Organelle Structure and Funtion”, Panima Publishing, 2004.
5. Rastogi, S.C. “Cell Biology” 2nd Edition, New Age International, 2002.

**REFERENCES**

1. Becker, W.M. et al., "The World of the Cell", 5th Edition, Pearson Education, 2003.
2. Campbell, N.A., J.B. Reece and E.J. Simon "Essential Biology", 3rd Edition, Pearson International, 2007.
3. Alberts, Bruce et al., "Essential Cell Biology", 2nd Edition, Garland Press (Taylor & Francis), 2004.