



GUJARAT TECHNOLOGICAL UNIVERSITY
Master of Science (Integrated-Biotechnology)

Semester: 2

Subject Name: Cell Biology

Subject Code: 1320402

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	0	0	4	70	30	0	0	100

Prerequisite:

Students need to have some basic knowledge of basic physics and the principals of basic physics.

Rationale:

This course is designed for the students to identify the molecules present in living cells. This would help in gaining the deep knowledge on application of techniques for research purposes also.

Course Content:

Unit No.	Content	No. of Hours	Weightage (%)
1	The Cell structural organization Cell theory, structure of prokaryotic and eukaryotic cells; plant and animal cells. Cell membrane and component of cell: Organisation of cell membrane, lipid and protein constituents, membrane transporters, cytoskeleton, cell wall, nucleus, mitochondria, chloroplast, endoplasmic reticulum, Golgi apparatus, peroxisome, vacuole, lysosome, ribosome, centrosome, glyoxisome and the ultra-structure of cytoplasm.	10	16
2	Structure of Nucleus Nuclear membrane, nuclear pore, nucleolus, chromatin, structure of nucleic acids. Mitochondria – Ultra structure and function; Biogenesis of mitochondrial Genomes, Chloroplast – Ultra structure and function, Genome biogenesis. Ribosomes detailed structure and its function with involvement in protein synthesis. Vacuoles, Lysosomes structure and functions	12	20
3	Cytoskeleton structure and functions Overview of the Major Functions of Cytoskeleton. Microtubules: Structure, Composition and functions, Composition, Assembly and Disassembly, Structure, composition and functions of Centrioles and Basal bodies, Microtubules in Cilia and Flagella. Microfilaments and Intermediate filaments: Structure and Composition; Endoplasmic reticulum: Structure, function including role in protein segregation. Golgi complex: Structure, biogenesis and functions including role in protein secretion	15	25
4	The life cycle of cells	10	16



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	Cell division in prokaryotes and eukaryotes, mitosis and meiosis, and regulation of cell cycle by mitogens, cyclins, and Cdks. Apoptosis in multicellular organisms		
5	Cell signalling and Signal transduction pathways Primary and secondary signaling molecules. Autocrine, paracrine, and endocrine signal. Signal amplification, Introduction to major signaling pathways. G-protein coupled signal transduction pathway involving cAMP, cGMP, IP3, DAG, and Ca ²⁺ as second messengers.	13	23
	Total Hours:	60	

Textbook:

1. Molecular Biology of the cell by Albert et al.4th Edition, Garland Science, Taylor & Francis Group. 2002.
2. Cell Biology by C.B. Powar. Himalaya Publishing House, Mumbai.2004.

Reference Books:

1. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology by P.S. Verma and V.K. Agarwal.S.Chand & Company Ltd.Ram Nagar, New Delhi. 2007.
2. Cytology by P.S. Verma and V.K. Agarwal. Pub:S.Chand & Company Ltd.Ram Nagar, New Delhi. 2006.

Course Outcomes:

No.	Course Outcomes	RBT Level*
1	Correlate the functions of different organelles of the cell	RM , UN
2	Examine contemporary issues in related fields	RM , UN
3	Perceive recent developments in the field	RM, UN
4	Able to apply scientific knowledge to address the nature problems.	UN,AP

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Suggested Course Practical List:

List of Laboratory/Learning Resources Required

1. <https://nptel.ac.in/courses/102103012>
2. https://onlinecourses.swayam2.ac.in/cec19_bt12/preview