C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

DEPARTMENT OF LIFE SCIENCES

COURSE: B.Sc. **SEMESTER: I**

SUBJECT NAME: Cell Biology **SUBJECT CODE: 4SC01CEB1**

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			Total Marks
					Sessional Exam		University Exam		Internal		University	
Th	Tu	Pr	Total		Marks	Hrs	Marks	Hrs	Pr	TW		
4	0	4	8	6	30	1.5	70	3	20	10	70	200

Objectives:- The objective of this course is that the students can learn about basics of cell biology.

Prerequisites:- Basic knowledge of Biological Sciences.

Course outline:-

Sr. No.	Course Contents	Hours
1	**Structure and organization of Cell** Cell Organization-Eukaryotic (Plant and animal cells) and prokaryotic. Plasma membrane: Structure and transport of small molecules Cell Wall: Eukaryotic cell wall, Extra cellular matrix and cell matrix interactions, Cell-Cell Interactions-adhesion junctions, tight junctions, gap junctions, and plasmodesmata (only structural aspects). Mitochondria, chloroplasts and peroxisomes. Cytoskeleton: Structure and organization of actin filaments, association of actin filaments with plasma membrane, cell surface protrusions, intermediate filaments, microtubules.	14
2	**Nucleus** Nuclear envelope, nuclear pore complex and nuclear lamina Chromatin-Molecular organization Nucleolus **Protein Sorting and Transport** Ribosomes, Endoplasmic Reticulum-Structure, targeting and insertion of proteins in the ER, protein folding, processing and quality control in ER, smooth ER and lipid synthesis, export of proteins and lipids Golgi Apparatus- Organization, protein glycosylation, protein sorting and export from Golgi Apparatus Lysosomes	16
3	**Cell Signaling** Signaling molecules and their receptors Function of cell surface receptors Pathways of intra-cellular receptors-Cyclic AMP pathway, cyclic GMP and MAP kinase pathway	14

4	**Cell Cycle, Cell Death and Cell Renewal** Eukaryotic cell cycle and its regulation, Mitosis and Meiosis Development of cancer, causes and types Programmed cell death Stem cells Embryonic stem cell, induced pleuripotent stem cells	16

Learning Outcomes:- The students are expected to

- Identification of cell structure and their organization, cell cycle, cell depth and cell renewal.
- Cell signaling, nucleus and Protein Sorting and Transport.

Books Recommended:-

1. 'Becker's World of the Cell', **J. Hardin, G. Bertoni and L. J. Kleinsmith**, 8th Ed., *Pearson* (2010).
2. 'Cell and Molecular Biology: Concepts and Experiments', **G. Karp**, 6th Ed., *John Wiley and Sons. Inc.* (2010).
3. 'Cell and Molecular Biology', **De Robertis EDP and De Robertis EMF**, 8th Ed., *Lipincott Williams and Wilkins*, Philadelphia (2006).
4. 'The Cell: A Molecular Approach', **G. M. Cooper and R. E. Hausman**, 5th Ed., *ASM Press & Sunderland*, Washington DC; Sinauer Associates, MA (2009).

SEMESTER: I

Cell Biology Practical

Objectives:- The objective of this course is that the students can learn about basics of cell biology.

Prerequisites:- Basic knowledge of Biological Sciences.

Course outline:-

Sr. No.	Course Contents
1	Study a representative plant and animal cell by microscopy.
2	Study of the structure of cell organelles through electron micrographs
3	Cytochemical staining of DNA-Feulgen
4	Demonstration of the presence of mitochondria in striated muscle cells/cheek epithelial cell using vital stain Janus Green B
5	Study of polyploidy in Onion root tip by colchicine treatment.
6	Identification and study of cancer cells by photomicrographs.
7	Study of different stages of Mitosis.
8	Study of different stages of Meiosis.
9	Study of Pro-karyotic cell.
10	Study of Eu-karyotic cell.
11	Study of Nucleus.
12	Study of mitochondria.

Learning Outcomes:- The students are expected to

- Identification of cell structure and their organization, cell cycle, cell depth and cell renewal.
- Cell signaling, nucleus and Protein Sorting and Transport.

Books Recommended:-

1. 'Becker's World of the Cell', **J. Hardin, G. Bertoni and L. J. Kleinsmith**, 8th Ed., *Pearson* (2010).
2. 'Cell and Molecular Biology: Concepts and Experiments', **G. Karp**, 6th Ed., *John Wiley and Sons. Inc.* (2010).
3. 'Cell and Molecular Biology', **De Robertis EDP and De Robertis EMF**, 8th Ed., *Lipincott Williams and Wilkins*, Philadelphia (2006).
4. 'The Cell: A Molecular Approach', **G. M. Cooper and R. E. Hausman**, 5th Ed., *ASM Press & Sunderland*, Washington DC; Sinauer Associates, MA (2009).