

III	Students will learn about glycogen synthesis, breakdown and glycogen storage diseases.	Traditional chalk and black board method, Audio visual presentation. Classroom discussion	Internal assessment tests will be conducted, presentations will be assessed along with practical assessment.
IV	The students will learn about overview, enzymes and regulation of citric acid cycle. They will also learn briefly about hormonal regulation of carbohydrate metabolism and diseases associated with metabolic irregularities.	Revision of the previous classes will be conducted. Traditional chalk and black board method, Audio visual presentation	Assessment through midterm examination and internal assessment test.

(**Assessment tasks enlisted here are indicative in nature)

4. Keywords

Metabolism, Carbohydrates, Glycolysis, Citric acid cycle, Gluconeogenesis, Glycogenolysis. Glycogenesis, Pentose Phosphate Pathway

DISCIPLINE SPECIFIC CORE COURSE – 6:

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Basic Concepts of Cell Biology	04	02	-	02	-	-

Learning Objectives

This course will acquaint the students to the subject of Cell Biology and the types of cell divisions seen in the living system. It deals with the details of cell organelles and cell wall. It also explains the molecules which make up the matrix and the proteins which make the framework of the cell as cytoskeleton elements. It also introduces the various tools and techniques of cell biology which are used to study the cell.

Learning outcomes

After the completion of the course, the students will have:

- insights into the basic structure and function of the cell and cellular organelles.
- introduction to the concept of model systems, cell division and cell to cell interaction
- understanding of the structural framework of the cell as cytoskeletal structures
- knowledge of various techniques used in cell biology experiments

SYLLABUS OF DSC-3

B.Sc. (HONOURS) BIOCHEMISTRY (NEP STRUCTURE) BCH-DSC-203 : BASIC CONCEPTS OF CELL BIOLOGY SEMESTER - II

2.2 Course Content

Theory

Credits: 2

Total weeks : 15

Unit 1: Tools of cell biology

(2 weeks)

Light microscopy, phase contrast microscopy, Inverted Microscope Histochemical Staining Techniques.

Unit 2: Structure and Function of Cell Organelles

(6 weeks)

Prokaryotic and eukaryotic cell (Plant and Animal Cell): Structural Features. Nucleus: Nuclear envelope, Nuclear pore complex. Nuclear Import and Export of biomolecules. Rough Endoplasmic Reticulum; Smooth Endoplasmic Reticulum; Golgi Apparatus; Lysosomes; Mitochondria; Chloroplasts and peroxisomes. Cell Division: Mitosis and Meiosis. Types of internalization procedures in the cell: Endocytosis, Pinocytosis and Phagocytosis

Unit 3: Extracellular matrix and Cell Junctions

(3 weeks)

Cell matrix proteins. Cell-matrix interactions and cell-cell interactions. Adherens junctions, tight junctions, gap junctions, desmosomes, hemidesmosomes, focal adhesions and plasmodesmata

Unit 4: Cytoskeletal proteins

(4 weeks)

Introduction to Cytoskeletal Proteins. Structure, assembly and function of Microtubule, Microfilament and Intermediate filament.

2.3 Practical:

Credits: 2

Total weeks : 15

1. Differentiate prokaryotic and eukaryotic cells and visualization of animal, plant cell, bacteria cells by light microscope

2. Study of Mitosis and Identification of different stages of mitosis in onion root tip.
3. Study of Meiosis and Identification of different stages of meiosis in grasshopper testis.
4. Micrographs of different cell components (dry lab).
5. Cells as experimental models: Study life cycle of one animal model drosophila/ zebrafish/ nematode.
6. Cytochemical staining of any one biomolecule (Protein/Polysaccharide/RNA)

2.4 Essential readings:

1. The Cell: A Molecular Approach (2013) 6th ed., Cooper, G.M. and Hausman, R.E., ASM Press & Sunderland (Washington DC), Sinauer Associates, MA, ISBN:978-0-87893-300-6.
2. Cell and Molecular Biology: Concepts and Experimentation (2016) 8th Edition, Gerald Karp Janet Iwasa and Wallace Marshall, John Wiley and Sons, Singapore, ISBN: 978-1-118-88384-6

Suggested readings:

1. Molecular Biology of the Cell (2008) 5th ed., Alberts, B., Johnson, A., Lewis, J., and Enlarge, M., Garland Science (Princeton), ISBN:0-8153-1619-4 / ISBN:0-8153-1620-8.
2. Molecular Cell Biology (2012) 7th ed., Lodish, H., Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D. and Darnell, J., W.H. Freeman & Company (New York), ISBN:13:978-1-4641-0981-2 / ISBN:10: 1-4641-0981-8.

3. Teaching Learning Process and Assessment Methods

Facilitating the Achievement of Course Learning Outcomes**

Unit No	Learning Outcomes	Teaching Methods	Assessment Method
1	Students will understand the principle of functioning of various types of microscopy. They will be able to distinguish between various types of Light microscopy. They will understand how cells can be stained and studied under the microscopy	They will be taught through explanation through lectures, chalk and board explanation, Powerpoint Presentation, Videos, Modelling	Assignments, Quizzes, Research reports.
2	Students will understand cell division in somatic and reproductive cell. They will be able to differentiate one cell organelle to another in terms of structure and function. They will understand different modes of internalization into the cell.	They will be taught through explanation through lectures, chalk and board explanation, Powerpoint Presentation, Videos, Modelling	Assignments, Quizzes, Research reports.
3	Students will be able to distinguish between Cell wall of prokaryotes and eukaryotes. They will understand the composition of Cell Matrix, Understand the structure and function of various cell to cell interactions. They will be able to	They will be taught through explanation through lectures, chalk and board explanation, Powerpoint Presentation, Videos,	Assignments, Quizzes, Research reports.

	differentiate between the different cell junctions.	Modelling	
4	Students will be able to understand the cytoskeletal framework of the cell, the structure and function of three important cytoskeletal proteins, how the organization of these protein change as per the cell division, mobility and transport of organelles, the concept of treadmilling and dynamic instability	They will be taught through explanation through lectures, chalk and board explanation, Powerpoint Presentation, Videos, Modelling	Assignments, Quizzes, Research reports.

(Assessment tasks enlisted here are indicative in nature)**

4. Keywords:

Cell Organelles, Mitosis, Meiosis, Prokaryote, Eukaryote, Cell Wall, Cell Matrix, Cell Junctions, Cytoskeleton Proteins, Treadmilling, Dynamic Stability, Microscopy, Histology