

Category I

BSc. (Honours) Biological Science (Sri Venkateswara College)

DISCIPLINE SPECIFIC CORE COURSE – 4:

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		
Cell Biology (BS-DSC-201)	4	2	0	2	Class XII pass with Biology and chemistry, as one of the papers in Class XII	NIL

Learning Objectives

The Learning Objectives of this course are as follows:

- To introduce the students to the basic concepts and processes in cyto-biology.
- To understand the structure and function of cell organelles, how they communicate with each other and how division and regulation takes place in cells.
- The practical content of this course is designed to understand the cell measurement methods, cell division, staining procedure and tonicity through different laboratory exercises.

Learning outcomes

On successful completion of course, the student will:

- Understand the cell and its biology which will help them to get an insight into the origin of cells, cellular structure, various components of cells and functions.
- Understand the chemical composition, physicochemical and functional organization of organelle.
- Demonstrate the knowledge of common and advanced laboratory practices in cyto-biology.
- Acquire knowledge about how cells divide by means of meiosis and mitosis and will be able to correlate different factors which control cell cycle progression.

SYLLABUS OF DSC-1

UNIT – I Overview of Cell and Cell membrane

(07 Hours)

History of cell biology, cell theory, Structure and functions of membrane, models of membrane structure, transport across membranes (with examples): simple diffusion, facilitated diffusion, active transport (Na^+/K^+ pumps, Co-transport, proton pumps) and passive transport. Phagocytosis, pinocytosis, exocytosis.

UNIT – II Cell Organelles

(13 Hours)

Mitochondria, chloroplast and nucleus: Ultrastructural organization and functions, marker enzymes, transport mechanisms in mitochondria and chloroplasts (Tim/Tom; Tic/Toc); and transport via nuclear pore complex.

Endomembrane system: Ultrastructural organization and functions of Rough and smooth endoplasmic reticulum, Golgi apparatus and lysosomes (GERL complex), tonoplast.

Glyoxysomes and Peroxisomes: Structure and function.

UNIT – III Cytoskeletal System

(03 Hours)

Structure and organization of microfilaments, intermediate filaments, microtubules, their functions in plants and animals (in brief).

UNIT – IV Cell wall and extracellular matrix

(04 Hours)

Cell wall organization (Primary and secondary cell wall), components of cell wall, Extracellular Matrix and Cell junctions, adhesive junctions, gap junctions and tight junctions, plasmodesmata. Function of cell wall.

UNIT – V Cell Division

(03 Hours)

Overview of cell cycle. Regulation: Various checkpoints and the role of cyclins and Cdks (Cyclin dependent kinases). Overview of mitosis and meiosis and their significance

Practical component – 60 Hours

1. Estimation of cell size by micrometry/ camera lucida
2. To study plasmolysis and deplasmolysis in a cell/ Isolation of protoplast from tomato and its survival in hypo, hyper and isotonic solution
3. Study the effect of organic solvent/temperature on membrane permeability.
4. Demonstrate the phenomenon of protoplasmic streaming.
5. Study of ultrastructure of a cell (Plasma membrane, Nucleus, Nuclear Pore Complex, Chloroplast, Mitochondrion, Golgi bodies, Endoplasmic reticulum, Lysosomes) through electron micrographs.

6. Study of cytoskeletal structures through photographs.
7. Study of different stages of mitosis by temporary preparation of onion root tips.
8. Study of different stages of meiosis by temporary preparation /permanent slides.
9. Staining and visualisation of mitochondria by Janus green stain

Essential/recommended readings

1. Becker, W. M., Kleinsmith, L. J., Bertni, G. P. (2009). *The World of the Cell* (7thEd.). Pearson Benjamin Cummings Publishing, San Francisco.
2. Cooper, G.M. and Hausman, R.E., (2009). *The Cell: A Molecular Approach*. (7th ed.). ASM Press & Sunderland (Washington DC), Sinauer Associates, MA.
3. Karp, G., (2010). *Cell and Molecular Biology: Concepts and Experiments* (8th ed.). John Wiley & Sons
A Guidebook to mechanism in organic chemistry (2003) 6 th ed., Sykes, P. New York: John Wiley & Sons. Inc

Suggested readings

1. EDP De Robertis, and RE De Robertis (2009). *Cell and Molecular Biology* (8th Ed.). Lippincott Williams and Wilkins, Philadelphia.
2. Nelson, D.L. and Cox, M.M. (2017). *Lehninger: Principles of Biochemistry* (7th ed.). W.H. Freeman & Company (New York).

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

DISCIPLINE SPECIFIC CORE COURSE – 5

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		
Diversity of Life Forms-II (BS-DSC-202)	4	2	0	2	Class XII pass with Biology and chemistry, as one of the papers in Class XII	NIL

Learning Objectives

The Learning Objectives of this course are as follows: