

SRI VENKATESWARA UNIVERSITY: TIRUPATI

Syllabus for 4-Years UG Honours in B.Sc. (Biotechnology) as Major in Consonance with Curriculum framework w.e.f. AY 2025 -26

Year	Semester	Course	Title of the Course	No.of Hrs week	No.of Credits
I	I	1	Introduction to Cell Biology and Genetics	3	3
			Introduction to Cell Biology and Genetics- Practical	2	1
		2	Biological Chemistry	3	3
			Biological Chemistry-Practical	2	1
	II	3	Microbiology	3	3
			Microbiology-Practical	2	1
		4	Basic Immunology	3	3
			Basic Immunology-Practical	2	1
			Biophysical Techniques	3	3
II	III	5	Biophysical Techniques-Practical	2	1
		6	Basic Molecular Biology	3	3
			Basic Molecular Biology-Practical	2	1
		7	Genetic Engineering	3	3
			Genetic Engineering-Practical	2	1
	IV	8	Bioinformatics, Biostatistics & Bioethics	3	3
			Bioinformatics, Biostatistics & Bioethics- Practical	2	1
		9	Basics of Plant Biotechnology	3	3
			Basics of Plant Biotechnology-Practical	2	1

A. L. Srinivasan

CHAIRPERSON
BOARD OF STUDIES
DEPARTMENT OF BIOTECHNOLOGY
SRI VENKATESWARA UNIVERSITY
TIRUPATI - 517 502, A.P. INDIA.

SEMESTER - I

COURSE 1: INTRODUCTION TO CELL BIOLOGY AND GENETICS

Theory

Credits: 3

3 hrs/week

Course Objectives:

1. To introduce students to the structure and function of prokaryotic and eukaryotic cells.
2. To provide knowledge on cellular organelles and their roles in cell physiology.
3. To explain the principles of genetics, including Mendelian laws and chromosome organization.
4. To describe mutagenesis, DNA damage, and repair mechanisms.
5. To create awareness about the cell cycle, cancer biology, and cell signaling processes.

Learning Outcomes:

After completing this course, students will be able to:

1. Identify and describe the structure of different types of cells and their components.
2. Explain the functions of cell organelles and mechanisms of cell transport.
3. Apply Mendelian principles and recognize deviations in inheritance patterns.
4. Analyze causes of mutations and describe DNA repair mechanisms.
5. Compare normal and cancer cells, and explain the regulation of cell cycle and apoptosis.

Syllabus

Unit I

Cell as a basic unit of living organism; Cell wall Structure, chemical composition and function. Glycocalyx. Structure and Function of Cell membranes; Brief description of viral, bacterial, fungal, plant and animal cells.

Unit II

Sub-cellular organization of eukaryotic cell: Nucleus, nuclear envelope, transport across nuclear membrane; Nucleolus; cytosol, endoplasmic reticulum, chloroplast, mitochondria, vacuoles, ribosomes, peroxisomes, lysosome and golgi complex; Cell Transport: Active and Passive transport, phagocytosis, pinocytosis, exocytosis. Chromosomes: Morphology, Structural Organization; Specialized chromosomes- Salivary gland & lamp brush chromosomes.

Unit III

Mendel Experiments, Mendel Laws and Deviations: Incomplete Dominance and Co-dominance; Concept of multiple alleles; Structure of prokaryotic and Eukaryotic chromosomes. Eukaryotic chromosome organization, histone proteins.

Ch. L. Jagan

Unit IV

Mutagenesis - Spontaneous and induced (Chemical and physical) mutations; Mutations- point mutations, frameshift mutations; Factors affecting DNA damage; Repair Mechanisms - Light induced repair, Excision repair and mismatch repair and SOS repair.

Unit V

Phases of the eukaryotic cell cycle - Mitosis and Meiosis; Regulation of cell cycle-checkpoints. Basics of Cancer Development (Concept of Angiogenesis and Metastasis) and Cancer causative agents. Proto- oncogenes, oncogenes. Differences between cancer cell and normal cell. Programmed Cell Death. Introduction to cell signaling.

Reference books:

- Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts and Peter Walter – *Molecular Biology of the Cell* – Garland Science.
- Geoffrey M. Cooper and Robert E. Hausman – *The Cell: A Molecular Approach* – ASM Press & Sinauer Associates.
- Gerald Karp – *Cell and Molecular Biology: Concepts and Experiments* – John Wiley & Sons.
- De Robertis, E.D.P. and De Robertis, E.M.F. – *Cell and Molecular Biology* – Saunders College Publishing.
- Snustad, D.P. and Simmons, M.J. – *Principles of Genetics* – John Wiley & Sons.
- Gardner, E.J., Simmons, M.J. and Snustad, D.P. – *Principles of Genetics* – John Wiley & Sons.
- Lodish, H., Berk, A., Kaiser, C.A., Krieger, M., Scott, M.P., Bretscher, A., Ploegh, H. and Matsudaira, P. – *Molecular Cell Biology* – W.H. Freeman and Company.

Ch. Jayaram

SEMESTER - I

COURSE 1: INTRODUCTION TO CELL BIOLOGY AND GENETICS

Practical

Credits: 1

2 hrs/week

Practical Component:

1. Principle and utilization of microscope
2. Preparation of blood smear and observation of cells
3. Study of divisional stages in mitosis
4. Study of divisional stages in meiosis
5. Observation of differences between stained bacterial cells and cells in onion peels
6. Observation of permanent slides of bacterial, fungal, plant and animal cells
7. Problem solving in genetics
8. Human Karyotype analysis
9. Simple Mendelian traits in humans and pedigree analysis

Chifan

4- Year UG Honours, Major
Syllabus
(2025-26)
Semester-I

Model Question Paper

Time : 3hrs

Marks:75

Part-A

Answer any Five Questions. Each Question carries 3 Marks.

5x3=15

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

Answer the following questions. Each question carries 12 Marks

5x12=60

11. a) Unit-I
(Or)
b) Unit-I

12. a) Unit-II
(Or)
b) Unit-II

13. a) Unit-III
(Or)
b) Unit-III

14. a) Unit-IV
(Or)
b) Unit-IV

15. a) Unit-V
(Or)
b) Unit-V