

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 2: BIOLOGICAL CHEMISTRY

Theory

Credits: 3

3 hrs/week

Course Objectives:

1. To introduce students to the structure and properties of nucleic acids and their biological significance.
2. To explain the chemistry and classification of carbohydrates, lipids, porphyrins, heme, and chlorophylls.
3. To provide knowledge on amino acids, protein structure, and conformational analysis.
4. To develop understanding of enzyme classification, kinetics, inhibition, and mechanisms of action.
5. To describe bioenergetics, ATP, and central metabolic pathways including glycolysis, TCA cycle, and oxidative phosphorylation.

Learning Outcomes:

After completing this course, students will be able to:

1. Describe the chemical structure and structural variations of nucleic acids.
2. Classify and explain the structures and functions of carbohydrates, lipids, and porphyrins.
3. Explain the properties and structural organization of proteins using the Ramachandran plot.
4. Analyze enzyme kinetics, substrate specificity, and different types of enzyme inhibition.
5. Understand the principles of bioenergetics and summarize major energy-yielding metabolic pathways.

Syllabus

UNIT I

Nucleic Acids: Chemical structure and base composition of nucleic acids (DNA and RNA). Chargaff's rules. Watson Crick Model (B-DNA), deviations from Watson-Crick model. Alternative forms of DNA (A-DNA and Z-DNA). Forces stabilizing nucleic acid structures, (hydrogen bonds and hydrophobic associations).

UNIT II

Carbohydrates: Definition, classification, nomenclature of carbohydrates, structures of monosaccharides, disaccharides and polysaccharides. Concept and examples of heteropolysaccharides.

Lipid: Structure of saturated and unsaturated fatty acids, triglycerides, phospholipids, Chemistry of Porphyrins, Heme and Chlorophylls.

UNIT III

Amino acids and Proteins: Structure of amino acids occurring in proteins, classification of amino acids (pH based, polarity based and nutrition based) physico-chemical properties of amino acids. Primary, Secondary, Tertiary & Quaternary structure of proteins. Ramachandran Plot.

UNIT IV

Enzymes: Terminology: Active site, allosteric site, Holoenzyme, apoenzyme, coenzyme, substrate, inhibitor, activator, modulator etc. Classification and nomenclature of enzymes. Substrate Specificity (bond specificity, group specificity, absolute specificity, stereospecificity), lock and key and induced fit models. Enzyme kinetics: Michaelis-Menten equation, effect of substrate concentration, effect of enzyme concentration, effect of pH and temperature, temperature. Enzyme inhibition (reversible inhibition types – competitive, uncompetitive and non-competitive), brief idea of irreversible inhibition.

UNIT V

Bioenergetics: Concept of free energy, Entropy, Enthalpy & Redox Potential. Concept of high energy bonds (structure of ATP). Glycolysis, Krebs's cycle, Gluconeogenesis: Bypass reactions., Electron transport chain, Oxidative phosphorylation.

Reference books:

- Lehninger, A.L., Nelson, D.L. and Cox, M.M. – *Principles of Biochemistry* – W.H. Freeman and Company.
- Voet, D. and Voet, J.G. – *Biochemistry* – John Wiley & Sons.
- Stryer, L. – *Biochemistry* – W.H. Freeman and Company.
- Satyanarayana, U. and Chakrapani, U. – *Biochemistry* – Elsevier / Books and Allied (Indian edition).
- Zubay, G. – *Biochemistry* – Wm. C. Brown Publishers.
- Garrett, R.H. and Grisham, C.M. – *Biochemistry* – Brooks/Cole, Cengage Learning.
- Conn, E.E. and Stumpf, P.K. – *Outlines of Biochemistry* – John Wiley & Sons.

Ch. Jayaram

SEMESTER - I

COURSE 2: BIOLOGICAL CHEMISTRY

Practical

Credits: 1

2 hrs/week

Practical Component:

1. Introduction to basic instruments (Principle standard operation procedure) demonstration and record
2. Calculation of molarity, normality, and molecular weight of compounds.
3. Qualitative analysis of carbohydrates (sugars)
4. Quantitative analysis of carbohydrates
5. Quantitative estimation of protein - Lowery method
6. Estimation of DNA by diphenylamine reagent
7. Estimation of RNA by orcinol reagent
8. Assay of protease activity
9. Preparation of starch from potato and its hydrolyzation by salivary amylase

C.P. Jeyapalan

**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