

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
		5	Biophysical Techniques-Practical	2	1
II	III	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


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

SEMESTER - II

COURSE 3: MICROBIOLOGY

Theory

Credits: 3

3 hrs/week

Course Objectives:

1. To introduce the history and development of microbiology along with contributions of key scientists.
2. To explain the principles and applications of different types of microscopy.
3. To study the structure, morphology, and special features of bacteria, including staining techniques.
4. To provide knowledge on microbial nutrition, growth, cultivation, and methods of microbial control.
5. To introduce viruses, their structure, replication, classification, and transmission with examples of human diseases.

Learning Outcomes:

After completing this course, students will be able to:

1. Summarize the historical contributions of Pasteur, Koch, and Jenner in microbiology.
2. Differentiate between light, phase contrast, dark field, fluorescent, and electron microscopy.
3. Describe bacterial morphology, cell structures, plasmids, endospores, and staining methods.
4. Identify nutritional requirements, growth phases, and apply sterilization and disinfection techniques.
5. Explain the structural organization, replication strategies, and transmission of viruses including modern examples.

Syllabus

UNIT I

History, Development and Microscopy

History and development of microbiology: contributions of Louis Pasteur, Robert Koch and Edward Jenner. Microscopy: Compound microscopy: Numerical aperture and its importance, resolving power, oil immersion objectives and their significance. Principles and applications of dark field, phase contrast, fluorescent microscopy. Electron microscopy: Principle, ray diagram and applications, TEM and SEM, comparison between optical and electron microscope, limitations of electron microscopy.

UNIT II

Bacteria: Bacterial morphology and subcellular structures, general morphology of bacteria, shapes and sizes, generalized diagram of typical bacterial cell. Slime layer and capsule, difference between the structure and function. Cell wall of Gram +ve and Gram -ve cells. General account of flagella and fimbriae. Chromatin material, plasmids; definition and kind

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of plasmids (conjugative and non-conjugative) F, R, and Col plasmids. Endospores: Detailed study of endospore structure and its formation, germination, basis of resistance. Staining: Acidic, Basic and Neutral stains. Simple and Gram Staining, Acid fast staining, Flagella staining, Endospore staining.

Unit III

Microbial Nutrition: Basic nutritional requirements. Composition of Natural and Synthetic Media. Selective and Differential media, Enriched media, Enrichment media. Factors Affecting Growth of Microbes: pH, Temperature, Salinity. Classification of microorganisms based on nutrition and temperature.

UNIT IV

Microbial growth and control: Growth rate and generation time, details of growth curve and its phases. Measurement of growth. Pure cultures and cultural characteristics. Maintenance of pure culture. Microbial Control: Sterilization (Physical and chemical methods of sterilization), disinfection, sanitization, germicide, microbistasis, antiseptics and antimicrobials.

UNIT V:

Viruses: Properties and General characteristics of Viruses. Classification of viruses on the basis of nucleic acids composition. Basic Structure of Lamda and M13 DNA Virus. Brief idea of lytic cycle and lysogeny. **Viral Transmission:** Different modes (dengue, SARS-CoV-2) and their preventive measures.

Reference books:

- Pelczar, M.J., Chan, E.C.S. and Krieg, N.R. – *Microbiology* – Tata McGraw-Hill Publishing Company.
- Prescott, L.M., Harley, J.P. and Klein, D.A. – *Microbiology* – McGraw-Hill Higher Education.
- Cappuccino, J.G. and Sherman, N. – *Microbiology: A Laboratory Manual* – Pearson Education.
- Willey, J.M., Sherwood, L.M. and Woolverton, C.J. – *Prescott's Principles of Microbiology* – McGraw-Hill.
- Tortora, G.J., Funke, B.R. and Case, C.L. – *Microbiology: An Introduction* – Pearson Education.
- Powar, C.B. and Dagainawala, H.F. – *General Microbiology* – Himalaya Publishing House.
- Ananthanarayanan, R. and Paniker, C.K.J. – *Textbook of Microbiology* – Universities Press (for medical aspects).

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SEMESTER - II

COURSE 3: MICROBIOLOGY

Practical

Credits: 1

2 hrs/week

Practical Component:

1. Cleaning and preparation of glassware
2. Observation of permanent slides using microscope
3. Preparation of nutrient agar medium for bacteria
4. Preparation of PDA medium for fungal culture
5. Sterilization techniques (autoclave, hot air oven, filter)
6. Isolation of bacteria from soil
7. Simple staining technique
8. Differential staining technique
9. Microbial counting by Haemocytometer
10. Identification of different bacteria
11. Motility test by hanging drop
12. Biochemical identification of bacteria
13. Preparation of pure culture by slab, slant, streak culture

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

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