

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 4: BASIC IMMUNOLOGY

Theory

Credits: 3

3 hrs/week

Course Objectives:

1. To introduce the fundamentals of the immune system, immune cells, and immune organs.
2. To explain the structure, types, and diversity of antibodies and the nature of antigens.
3. To describe mechanisms of humoral and cell-mediated immunity, cytokines, and MHC molecules.
4. To provide knowledge about hypersensitivity, autoimmunity, vaccination, and different types of vaccines.
5. To familiarize students with immunological techniques and applications of monoclonal antibodies.

Learning Outcomes:

After completing this course, students will be able to:

1. Explain the organization of the immune system and differentiate innate and acquired immunity.
2. Describe antibody structure, types, and antigenic determinants.
3. Analyze mechanisms of humoral, cell-mediated, and NK cell-mediated immune responses.
4. Differentiate between types of hypersensitivity and explain the principles and applications of vaccination.
5. Apply knowledge of immunological techniques for antigen-antibody interactions and monoclonal antibody production.

Syllabus

UNIT I

Immune System: History and Scope of Immunology. Types of Immunity: Innate and Acquired. Cells of immune system: T cells, B cells. Organs of the Immune system: Bone marrow, spleen, thymus, MALT, lymph node.

UNIT II

Antibody and Antigen: Antibodies: Structure and Types of Antibodies (IgG, IgM, IgA, IgE, IgD). Monoclonal and Polyclonal antibodies. Antibody diversity. Antigens: Types of Antigens. Antigenicity (factors affecting antigenicity). Antigenic determinants – adjuvants and haptens, epitopes.

U. Jayaram

UNIT III

Immunity: Humoral immunity. Cell-mediated immunity – T Cell-mediated immunity, NK cell-mediated immunity, ADCC. Brief description of cytokines and interleukins. Major Histocompatibility Complex (MHC) – Structure and functions of Class I and Class II MHC molecules.

UNIT IV

Hypersensitivity and Vaccination: General features of hypersensitivity, various types of hypersensitivity. Autoimmunity. Vaccination: Discovery, principles, and significance. Types of Vaccines – Live, attenuated, killed, toxoids, recombinant-based (mRNA and Protein).

UNIT V

Immunological Techniques: Antigen-antibody reactions: Precipitation, agglutination, complement fixation, immunodiffusion – Radial immune diffusion, Ouchterlony double immune diffusion, ELISA, RIA, immunoelectrophoresis, Rocket electrophoresis. Hybridoma technology: Monoclonal antibodies and their applications in immunodiagnostics.

Reference books:

- Kuby, J. – *Immunology* – W.H. Freeman & Company.
- Abbas, A.K., Lichtman, A.H. and Pillai, S. – *Cellular and Molecular Immunology* – Elsevier.
- Roitt, I., Brostoff, J. and Male, D. – *Immunology* – Mosby Publications.
- Ananthanarayanan, R. and Paniker, C.K.J. – *Textbook of Microbiology* – Universities Press (for immunology basics).
- Kindt, T.J., Goldsby, R.A. and Osborne, B.A. – *Kuby Immunology* – W.H. Freeman.
- Delves, P.J., Martin, S.J., Burton, D.R. and Roitt, I.M. – *Roitt's Essential Immunology* – Wiley-Blackwell.

Ch. Jayashree

SEMESTER - II

COURSE 4: BASIC IMMUNOLOGY

Practical

Credits: 1

2 hrs/week

Practical Component:

1. Antigen-antibody reaction-determination of Blood group, Cross reactivity
2. Pregnancy test
3. Widal test
4. Ouchterlony immunodiffusion
5. Radial immuno diffusion
6. ELISA
7. Production of antibodies and their titration

Chitra Singh

**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