



Sri Venkateswara University, Tirupati

**Syllabus for MICROBIOLOGY Major in consonance with Curriculum frame work
w.e.f. AY 2026-27**

COURSE STRUCTURE (for Semester IV)

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
II	IV	8	Basics of Immunology	3	3
			Basics of Immunology-Practical	2	1
		9	Medical Microbiology	3	3
			Medical Microbiology-Practical	2	1
		10	Agricultural Microbiology	3	3
			Agricultural Microbiology-Practical	2	1

Chairman Board of Studies (PG)
MICROBIOLOGY
S.V. UNIVERSITY
TIRUPATI-517 502 A.P.



SRI VENKATESWARA UNIVERSITY, TIRUPATHI

**Syllabus for 4-Year UG Honors in B.Sc. (Microbiology) as Major in
consonance with the Curriculum framework**

**SEMESTER-IV
COURSE 8: BASICS OF IMMUNOLOGY**

Theory

Credits: 3

3 hrs/week

I. Learning Objectives:

1. Outline the basics of immunity, immune cells, and organs.
2. Describe properties, types, and interactions of antigens and antibodies.
3. Illustrate primary and secondary immune responses through cell-mediated and humoral pathways.
4. Classify hypersensitivity, autoimmune, and immunodeficiency disorders.
5. Evaluate vaccination principles, immunological diagnostic techniques, and monoclonal antibody production.

II. Course Outcomes: On completion of this course, students will be able to:

1. Differentiate innate and adaptive immunity, major immune cells, and lymphoid organs.
2. Describe antigens, antibody classes, and structures, and antigen-antibody interactions.
3. Illustrate MHC function, T and B cell activation, and effector mechanisms of CTLs, NK cells, antibodies, and complement.
4. Categorize hypersensitivity reactions and summarize autoimmune and immunodeficiency diseases.
5. Distinguish types of vaccines, implement immunological techniques, and assess applications of monoclonal antibodies.

III. Syllabus of Theory:

Unit 1: Introduction to Immunology:

9 Hrs

- 1.1. Definition, Contributions of the scientists – Edward Jenner, Karl Landsteiner, Elie Metchnikoff, MacFarlane Burnet, Neils K Jerne, and Susumu Tonegawa.
Types of Immunity: Innate and acquired Immunity.
- 1.2 Cells of the Immune System: Structure and functions of Macrophages, Neutrophils, Basophils and Eosinophils, Lymphocytes (B cells, T cells, NK cells), Dendritic Cells.
- 1.3 Organs of the Immune System: Primary (Bone marrow, Thymus, bursa fabricius) and Secondary (Lymph nodes, Spleen, and lymphoid tissues) Lymphoid organs.

Unit 2: Antigens and Antibodies**9Hrs**

- 2.1 Antigens: Definition, Types (Exogenous, Endogenous, Autoantigens), Characteristics (Foreignness, Molecular size, Heterogeneity, and solubility); Haptens, Epitopes (T & B cell epitopes); T-dependent and T-independent antigens; Adjuvants
- 2.2 Antibodies (Immunoglobulins): Basic structure (Heavy and Light Chains, Fab and Fc regions); Antigenic determinants on antibodies (Isotypic, allotypic, idiotypic); Classes of Immunoglobulins (IgG, IgM, IgA, IgE, IgD)
- 2.3 Antigen-Antibody Interaction: Specificity, Avidity, Affinity; Functions of Antibodies: Immune complex formation and elimination -Agglutination, Precipitation, Neutralization; Complement fixation, Phagocytosis

Unit 3: Generation of Immune Response**9 Hrs**

- 3.1 Primary and Secondary Immune Response; concept of Major Histocompatibility Complex.
- 3.2 Cell Mediated Immune Response (Self MHC restriction, T cell activation, Co-stimulatory signals); Killing Mechanisms by CTL and NK cells, Introduction to Tolerance
- 3.2 Humoral Immunity: Generation of Humoral Immune Response (Plasma and Memory cells) Complement System in brief: Components and functions of complement (lysis, opsonization, and inflammation)

Unit 4: Hypersensitivity and Immunological Disorders**9 Hrs**

- 4.1 Hypersensitivity Reactions (Gell and Coombs Classification):
- 4.2 Autoimmune Disorders: Rheumatoid Arthritis, Systemic Lupus Erythematosus
- 4.3 Immunodeficiency Disorders: Primary (e.g., SCID) and Secondary (e.g., AIDS) immunodeficiencies

Unit 5: Vaccines and Immunotechnology**9 Hrs**

- 5.1 Principles of Vaccination: Active vs Passive Immunization; Types of Vaccines (Live Attenuated, Inactivated, Subunit, mRNA-based); Adjuvants in Vaccines
- 5.2 Diagnostic Immunological Techniques: Principles of Precipitation, Agglutination, Immunodiffusion, ELISA, and Immunofluorescence.
- 5.3 Monoclonal Antibodies: Production (Hybridoma technology); Applications in diagnostics and Therapy.

IV. Co-curricular activities:

- 1. Participate in quizzes or debates on vaccines, autoimmune diseases, or emerging immunology topics.
- 2. Create 3D models or posters of immune cells, antigen-antibody interactions, or hypersensitivity mechanisms.
- 3. Visit a diagnostic lab or vaccine research center, or attend a guest lecture by an immunologist.

V. Reference Books:

1. Abbas, A. K., Lichtman, A. H., & Pillai, S. (2007). *Cellular and Molecular Immunology* (6th ed.). Saunders Publication, Philadelphia.
2. Delves, P., Martin, S., Burton, D., & Roitt, I. M. (2006). *Roitt's Essential Immunology* (11th ed.). Wiley-Blackwell Scientific Publication, Oxford.
3. Goldsby, R. A., Kindt, T. J., & Osborne, B. A. (2007). *Kuby's Immunology* (6th ed.). W.H. Freeman and Company, New York.
4. Murphy, K., Travers, P., & Walport, M. (2008). *Janeway's Immunobiology* (7th ed.). Garland Science Publishers, New York.
5. Peakman, M., & Vergani, D. (2009). *Basic and Clinical Immunology* (2nd ed.). Churchill Livingstone Publishers, Edinburgh.
6. Richard, C., & Geoffrey, S. (2009). *Immunology* (6th ed.). Wiley-Blackwell Publication.

SEMESTER-IV

COURSE 8: BASICS OF IMMUNOLOGY

Practical Credits: 1 2 hrs/week

I. Course Outcomes: On successful completion of this practical course, the student shall be able to:

1. Identify human blood groups and perform serum separation.
2. Conduct total and differential leukocyte counts.
3. Learning of immunological techniques such as immunodiffusion and DOT-ELISA.

II. Laboratory/Field exercises:

1. Identification of human blood groups.
2. Perform a total leukocyte count of the blood sample.
3. Perform a differential leukocyte count of the blood sample.
4. Separate serum from the blood sample (demonstration).
5. Perform immunodiffusion by the single immuodiffusion/RID/ Ouchterlony method.
6. Perform Dot ELISA.

**4- Year UG Honours, Major
Syllabus
(2026-27)
Semester-IV**

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