

BSc. (Life Science) - Zoology Component (Semester - VI)

DISCIPLINE SPECIFIC CORE COURSE-18 (Zoo-LS-DSC-18):– Basics of Immunology

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical		
Basics of Immunology Zoo-LS-DSC-18	04	02	Nil	02	Passed Class XII with Chemistry/ Biology/ Biotechnology	NIL

Learning Objectives

The learning objectives of this course are as follows:

- to understand the components and functions of immune system of the body.
- to learn how the immune system responds to various infections and foreign substances that adversely affect our body.
- to help comprehend the concept of hypersensitivity and vaccines.
- to acquaint the students on the role of immune system in prevention and altered response to diseases.

Learning Outcomes

By studying this course, students will be able to

- acquire knowledge of immunogenicity and antigenicity.
- better understand innate and acquired immunity.
- appreciate and analyze the various humoral and cellular components of the immune system.
- comprehend the role of immune system in health and disease.
- gain knowledge of autoimmunity, immunodeficiency and hypersensitivity.
- have an enhanced understanding of vaccine and vaccination.

SYLLABUS OF DSC- 18

UNIT-1: Immune System and its components

6 hrs

Instructional and clonal selection theory; Innate immunity: components and defensive barriers of innate immunity. Adaptive immune system: Components and attributes of acquired immunity, humoral and cell mediated immunity, active and passive immunity, primary and secondary immune response.

UNIT- 2: Antigens, Immunogens and Antibodies

8 hrs

Antigens and immunogens; antigenicity and immunogenicity; factors affecting immunogenicity; antigenic determinants (B- and T-cell epitopes); concepts of

antigen recognition by B- and T-cells. Structure and function of different classes of antibodies.

UNIT- 3: Antigen Processing and Presentation

4 hrs

Structure and functions of MHC (MHC I & MHC II); endogenous and exogenous pathways of antigen processing and presentation.

UNIT- 4: Cytokines & Complement System

4 hrs

Properties and functions of cytokines; Pathways of complement activation and its biological consequences.

UNIT- 5: Role of immune system in Prevention of Diseases

8 hrs

Gell and Coomb's classification of hypersensitivity; autoimmunity; immune dysfunctions and immunodeficiency with suitable examples. Vaccines and their types.

Practical:

60 hrs

(Laboratory periods: 15 classes of 4 hours each)

1. To study the structure and function of lymphoid organs of the immune system.
2. Histological study of spleen, thymus and lymph nodes through slides/ photomicrographs.
3. To study haematopoiesis and role of cells in immune response through flowchart.
4. To study various types of blood cells using Leishman's/Giemsa/Crystal violet stained blood smear.
5. Cell counting and viability test (trypan blue dye exclusion test) from splenocytes* from rat/mouse/any other species.
6. To understand the antigen and antibody interactions by
 - i) ABO Blood group antigen determination by heamagglutination test.
 - ii) Ouchterlony's double immunodiffusion method.
 - iii) Production of monoclonal antibodies by HAT selection.
 - iv) Demonstration of ELISA.
 - v) Demonstration of Immunoelectrophoresis.
 - vi) FACS
 - vii) RIA
7. Project on any topic/ Project report on visit to any research institute/laboratory to study the immunological techniques

Essential/recommended readings

1. Kindt, T. J., Goldsby, R.A., Osborne, B. A. and Kuby, J. (2006) Immunology, VI Edition, W.H. Freeman and Company
2. David, M., Jonathan, B., David, R. B. and Ivan, R. (2006) Immunology, VII Edition, Mosby, Elsevier Publication.

3. Janeway's Immunobiology 9th Edition, by Kenneth Murphy, Casey Weaver, Garland Science
4. Kenneth Murphy, Casey Weaver (2016) Janeway's Immunobiology; 9th Edition, Garland Science
5. Abbas, K. Abul and Lichtman H. Andrew (2003) Cellular and Molecular Immunology, V Edition, Saunders Publication.

Suggestive readings

1. Punt, J., Stranford, S., Jones, P., Owen, J.A. (2018) Kuby Immunology, VIII Edition, WH Freeman and Company
2. 1. Singh, I. K. and Sharma, P. [Eds.] (2022) An Interplay of Cellular and Molecular Components of Immunology. Taylor & Francis group, CRC Press.
3. Kaur, H., Toteja, R., and Makhija, S. (2021) Textbook of Immunology, I.K International Publishing House and Wiley India Ltd
4. Singh, I. K. and Sharma, P. [Eds.] (2022) Essentials of Immunology, Laboratory Manual; Prestige Publishers.
5. Hay, F.C., Westwood, O.M.R (2005) Practical Immunology– Fifth Edition. John Wiley and Sons Ltd.

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