DISCIPLINE SPECIFIC ELECTIVE COURSE -21
Evolutionary Immunobiology of Animals
Zoo-DSE-21

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)
		Lectures	Tutorial	Practical/ Practice		
Evolutionary Immunobiology of Animals **ZOO-DSE-21**	**4**	**3**	**0**	**1**	**As per the Program Eligibility**	**Basic understanding of Animals.**

Learning Objectives

The Learning Objectives of this course are as follows:

- To improve basic understanding about evolution of the immune system in different animals and group specific immunological adaptations.
- To increase student understanding about the evolution of complexity in the immune system as well as immunological repertoire among animals.
- To help students analyze immunological manifestations during experimentation and research.

The Learning Outcomes of this course are as follows:

After studying this course, learners can:

- Understand the basic organization of the immune system among different groups of animals.
- Gain knowledge about the evolution of primitive formsof the immune system and their functioning among invertebrates.
- Enhance student proficiency in understanding of immune system organization and their pathology in perturbation.

SYLLABUS 45 hrs

Unit 1: Evolution of innate immunity: 15 hrs

Basics of unicellular to metazoan immunity, evolution of immunological armament across the animal phyla, hematopoiesis and functions of hemocytes in invertebrates (Insects, Crustaceans, Molluscs and Tunicates) humoral factors of tunicates. Evolution of Drosophila Toll-1 receptors and mammalian Toll-like receptors and antimicrobial host-defense of *Drosophila*.

Unit 2: Evolution of adaptive immunity: 14 hrs

Origin and evolution of adaptive immunity in animals, a comparative account of lymphocyte development in vertebrates, humoral and cell mediated immunity in vertebrates, recognition of self/non-self, development of immunological memory. Major lymphoid organs and their distribution in fishes, nonspecific defense reaction of fishes. Peripheral lymphoid organs CALT, GALT, BALT, HALT and mural nodules in birds and other vertebrates.

Unit 3: Evolution of Cytokines in Vertebrates 08 hrs

Evolutionary Diversification of Cytokines. Pro-inflammatory, inflammatory and antimicrobial mediators of vertebrates and their functions.

Unit 4: Major Histocompatibility Complex 08 hrs

Genomic organization of MHC genes in vertebrates, evolution of Major Histocompatibility Complex in Teleosts.

PRACTICALS 30 hrs

(Laboratory periods: 15 classes of 2 hours each)

1. Identification of organs of the immune system in Fishes, Amphibians, Aves and Mammals through slides/photographs.
2. Histological study of organs of the immune system of vertebrates.
3. Staining and identification of plasmatocytes of *Drosophila*.
4. Identification of different types of cells in the stained blood smears of Fish/Frog.
5. Study of techniques for the identification and quantification of cytokines and their expression.

Essential/Recommended readings:

1. Evolutionary Concepts in Immunology by Robert Jack, Louis Du Pasquier. Publisher: Springer Nature Switzerland.
2. Evolution and Comparative Immunology of Immune Systems in Marine Organisms by Gyri T. Haugland, Sissel Jentoft, Monica Hongroe Solbakken. Publisher: Frontiers.

Suggestive readings

1. The Evolution of the Immune System Conservation and Diversification by Davide Malagoli. Publisher: Academic Press.
2. Roitt's Essential Immunology by Peter J. Delves, Seamus J. Martin, Dennis R. Burton, Ivan M. Roitt. Publisher: Wiley.
3. Veterinary Immunology by Ian R. Tizard. Publisher: Elsevier.

NOTE: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.