

GENERIC ELECTIVE COURSE -19**Immunology: Understanding the body's defense Systems****Zoo-GE -19****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	Department offering the course
		Lectures	Tutorial	Practical/ Practice			
Immunology: Understanding the body's defense System Zoo-GE-19	4	2	0	2	As per the Program Eligibility	Biology in Class 12th	Zoology

Learning Objectives**The learning objectives of this course are to:**

- Describe the general difference between the innate and the adaptive immune system.
- Broadly describe how the innate and the adaptive immune systems mature in the body, how they interact with each other, and how they function in protecting the host from infections.
- Impart an in-depth knowledge on how our immune system fights with infection and foreign substances that can harm our body.
- Acquire knowledge of the immunogenicity of biomolecules.

Learning Outcomes

By studying this course, students will be able to:

- Have an in-depth understanding of the innate and the adaptive immune system.
- Gain experimental skills and techniques frequently used in research in immunology.
- Develop essential skills in experimental design, techniques and execution, which are relevant to immunology.
- Comprehend and analyze the different cellular and humoral components of the immune system.

- Appreciate the contribution of various components of immune system in health and disease including basis of vaccination, autoimmunity, immunodeficiency and hypersensitivity

SYLLABUS

THEORY 30 Hrs

UNIT- 1: Basics of Immunology 5 hrs

History and scope of immunology; Types of immunity: innate and adaptive, Humoral and cell-mediated immunity, Active and Passive immunity; Cells and organs of the immune system, overview of Haematopoiesis.

UNIT- 2: Antigens and Antibodies 7 hrs

Antigenicity, immunogenicity; Structure and types of antibodies; Antigen-antibody interactions (agglutination, precipitation); Monoclonal antibodies production and their therapeutic applications.

UNIT- 3: Immune Response, Mechanisms and Immunological Disorders 11 hrs

Major Histocompatibility Complex (MHC I & II); Exogenous and endogenous antigen processing; overview of Cytokines and complement system. Immunological Disorders: Hypersensitivity reactions (Gell and Coomb's classification); Autoimmunity and autoimmune diseases (e.g., rheumatoid arthritis, thyroiditis); Immunodeficiency (e.g., SCID, AIDS).

UNIT- 4: Applied Immunology 7 hrs

Vaccines and immunization programs; Principles of immunodiagnostics (ELISA, RIA, Western blot); Basics of Immunotherapy; Transplantation

PRACTICALS 60 hrs

(Laboratory periods: 15 classes of 4 hours each)

1. Study of lymphoid cells and organs in rat/mouse*.
2. Identification of different blood cells using Leishman's/Giemsa/Crystal violet stained blood smear.
3. Blood group determination by ABO kit.
4. Cell counting and viability test (trypan blue dye exclusion test) from splenocytes from rat/mouse/any other species.
5. To understand the antigen and antibody interactions by:

6. Ouchterlony's double immune-diffusion method to study immune-precipitation and interpretation of patterns of identity, non-identity and partial identity.
7. Demonstration of ELISA.
8. FACS

PROJECT WORK

Project on any topic/ Project report on visit to any research institute/laboratory to study the immunological techniques.

Essential/recommended readings

1. Owen, Punt, Stranford, Patricia Jones, Judy Owen (2018). Kuby Immunology (8th ed.). New York, WH: Freeman, ISBN: 978-1319114670
2. Kenneth Murphy, Casey Weaver (2016), Janeway's Immunobiology (9th ed.). Garland Science, ISBN: 978-0815345053
3. Kindt, T. J., Goldsby, R.A., Osborne, B. A. and Kuby, J. (2006) Immunology, VI; Edition, W.H. Freeman and Company.
4. Abul Abbas, Andrew Lichtman, Shiv Pillai (2017). Cellular and Molecular Immunology; Elsevier
5. David, M., Jonathan, B., David, R. B. and Ivan, R. (2006) Immunology, VII Edition, Mosby, Elsevier Publication.

Suggested Readings

1. Peter Parham (2020) The immune System. (5th ed.). Garland Science, ISBN: 978-1285776902
2. Ivan Roitt, Ivan Roitt, and R. M. Hay (2016) Immunology (9th Edition) Blackwell Science.
3. Singh, I. K. and Sharma, P. [Eds.] (2022) An Interplay of Cellular and Molecular Components of Immunology. Taylor & Francis group, CRC Press.
4. Singh, I. K. and Sharma, P. [Eds.] (2022) Essentials of Immunology, Laboratory Manual; Prestige Publishers.
5. Kaur, H., Toteja, R., and Makhija, S. (2021) Textbook of Immunology, I.K International Publishing House and Wiley India Ltd.

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