DISCIPLINE SPECIFIC ELECTIVE COURSE –DSE-18

Course title& Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Advanced Immunology (BS-DSE-18)	**4**	**2**		**2**	Class XII pass with Biology	**NA**

Learning Objectives:

This course covers advanced topics in immunology for students who already have a basic knowledge of immunology. The course is designed to understand the mechanisms in humoral and cell mediated immune responses during altered host conditions either due to changes in self or upon infection. Thus, central topics are allergy, autoimmunity, transplantation and immunodeficiency disorders.

2.1 Learning Course Outcomes

At the end of the course the students should be able to

- understand and explain the basis of immunological tolerance, autoimmunity, and transplantation
- understand the principles governing vaccination and the mechanisms of protection against infectious diseases
- understand and explain the basis of allergy and allergic diseases
- understand regulation of immune response and use of monoclonal antibodies as therapeutics

2.2. Theory

Credits: 2 **Total Hours: 30**

Unit I- Tolerance & Autoimmunity **No. of Hours: 5**

Tolerance , B cell tolerance and T cell tolerance, Central and Peripheral Tolerance, Organ specific and systemic autoimmune diseases; mechanisms for the induction of autoimmunity and treatment,

Unit II -Hypersensitivity & Immunodeficiency Disorders **No. of Hours: 10**

Hypersensitivity, Gell and Coombs classification; representative examples of type I, II, III and IV Hypersensitivity, Allergy, Hypersensitive reactions against innocuous antigens, and potentially harmful antigens. Immunodeficiency primary (humoral and cell mediated) and secondary immunodeficiency, treatment.

Unit III -Transplantation immunology & **Vaccines** **No. of Hours: 8**

Typing of tissues; characteristics of graft rejection; major and minor histocompatibility antigens; alloreactivity of T cells; Graft Vs host disease (GVHD), Xenotransplantation and privileged

sites, Immunosuppressive drugs, Vaccines: types of vaccines-live attenuated, inactivated organisms, toxoids, subunit vaccines, DNA vaccines and recombinant vector vaccines; Active and Passive Immunization; requirements for an effective vaccine and recommended childhood vaccination schedules in India.

Unit IV- Immunoregulation and Immunotherapy **No. of Hours:7**

Regulatory T cells**,** Immunoregulation Regulation by Cytokines, Hypothalamus-Pituitary Immune Axis, Hybridoma Technology for Production of Monoclonal Antibodies, Chimeric and humanized Monoclonal Antibodies, Therapeutic Applications of Monoclonal Antibodies.

2.3 PRACTICALS

1. Immuno-electrophoresis
2. Active and Passive agglutination
3. Isolation of lymphocytes from blood/spleen
4. Cytotoxic Assay
5. Phagocytic activity of Macrophages
6. Hybridoma Production (video)

3. Essential Reading

1. Kuby Immunology (2007) 6th ed., Kindt, T.L., Goldsby, R.A. and Osborne, B.A,W. H. Freeman and Company (New York), ISBN:13: 978-0-7167-8590-3/ ISBN: 10:0-7617-8590-0
2. Immunology: A Short Course (2009)6th ed., Coico, R. And Sunshine, G., John Wiley & Sons, Inc (New Jersey), ISBN: 978-0-470-08158-7.

Suggested Textbooks:

1. Janeway's Immunobiology (2012) 8th ed., Murphy, K., Mowar, A.,and Weaver, C.T., Garland Science (London & new York), ISBN: 978-0-8153-4243-4
2. Cellular and Molecular Immunology (2021), 10th edition, .Abbas, A.K., Lichtman, A.H., Shiv Pillai, Elsevier, ISBN: 9780323757485

4. Teaching Learning Process and Assessment Methods

Unit No.	Course Learning Outcomes	Teaching and Learning Activity	Assessment Tasks
I	Students will understand the concepts of tolerance and induction of autoimmunity that leads to autoimmune disorders	Teaching will beconducted both through Traditional chalk talk mode, presentations and case studies	Students will be asked questions related to the topic and class discussion will be held

II	Students will learn about various types of hypersensitivity and immunodeficiency disorders	Teaching will beconducted both through Traditional chalk talk mode, presentations and case studies	Assignment will be given and class discussion will be held
III	Students will learn about the immunological basis of transplantation and learn about vaccines	Teaching will beconducted both through Traditional chalk talk mode, presentations and case studies	Quiz and classroom discussions will be held
IV	Students will understand regulation of immune responses and immunotherapy	Teaching will beconducted both through Traditional chalk talk mode, presentations and case studies	Mid semester test will be held and assignments will be given

5. Keywords

Tolerance, Autoimmunity, Hypersensitivity, Immunodeficiency, Transplantation, Vaccines, Immunoregulation, Immunotherapy