

## LS 475—IMMUNOLOGY (2 credit)

Niti Puri

S.No.	Topics	Contact Hours
1.	Introduction to Immune System, organs, cells and molecules involved in Innate and Adaptive Immunity. Mechanisms of barrier to entry of microbes/pathogens	2
2.	Hematopoiesis and its regulation: Differentiation of stem cells to different cellular elements in blood, role of cytokines.	1
3.	Introduction to inflammatory reaction: chemokines, adhesion molecules, migration of leukocytes to the site of infection, phagocytosis and microbicidal mechanisms. Immediate hypersensitivity: role of eosinophils, and mast cells. Asthma. IgE receptor, prostaglandins and leukotrienes	3
4.	Receptors of innate immunity: Toll-like receptors and sensing of PAMPs, signal transduction, opsonization, Fc receptors	2
5.	Antigens, antigenicity, and immunogenicity. B and T cell epitopes	1
6.	Antibody structure and function (classification of immunoglobulins, immunoglobulin domains, concept of variability, isotypes, allotypes and idiotypic markers). Antigen-antibody interactions	2
7.	Immunoglobulin genes, VJ/VDJ rearrangements and genetic mechanisms responsible for antibody diversity, affinity maturation, allelic exclusion. Class switching, receptor and soluble forms of immunoglobulin	2
8.	Hybridoma, monoclonal antibodies, and antibody engineering	1
9.	Immunological Techniques (antibody generation, detection of molecules using ELISA, RIA, Western blot, immunoprecipitation, flowcytometry, immunofluorescence microscopy etc)	1
10.	The complement system: classical and alternative pathways	2
11.	Major Histocompatibility Complex: genetic organization of H2 and HLA complexes. Class I and class II MHC molecules, structure and function. Antigen processing and presentation pathways	2
12.	Differentiation and activation of B cells, BCR and pre BCR, receptor editing, T cell help	1

13.	T cell receptors, $\alpha\beta$ and $\gamma\delta$ T cells, receptor diversity. Activation of T cells, APC-T cell interaction, Th1/Th2 cells and cytokines. T cell differentiation in thymus, thymic selection and tolerance to self, MHC restriction, super antigens	<b>4</b>
14.	Cell-mediated effector functions: Cytotoxic T cells, Natural Killer Cells, ADCC, NK cell receptors, inverse correlation with target MHC expression, missing self hypothesis, cytotoxicity reaction	<b>2</b>
15.	Topics like Applications of immunological principles (vaccines, and diagnostics); tumor and transplantation Immunology; and diseases of relevance to the immune system (autoimmunity and immunodeficiency) etc. would be discussed in context of the basic immunological mechanisms as assignments/tutorials	<b>4</b>

**Suggested reading:**

1. Roitt's Essential Immunology
2. Immunobiology: The immune system in health and disease by Charles Janeway et al
3. Kuby Immunology
4. Relevant review articles/research papers/handouts provided in the course