

LS 475-Immunology (2 credits)
Niti Puri

S No	Topics	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	4
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	2
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	4

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