

LS 429A			Immunology			2 Credits		
Name of the Faculty: Dr. Niti Puri*								
Sr.No.		Topic					Faculty Name/ 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; HSCs in transplantation and gene therapy.					1	
3.		Introduction to inflammatory reaction: chemokines, adhesion molecules, migration of leukocytes to the site of infection, phagocytosis and evasion strategies and oxidative and non-oxidative 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, antibody engineering and their applications					1	
9.		Immunological Techniques (antibody generation, detection of molecules using ELISA, RIA, Western blot, immunoprecipitation, ChIP assay, flow cytometry, immunofluorescence microscopy etc)					1	
10.		The complement system: classical and alternative pathways, their regulation and deficiencies					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; lipid antigen presentation					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) 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