

MBTCR 8201T: Advanced Immunology

Total Marks: [CIA-20 + EndSem – 80]

No. of Credits	6
Theory/Composite	Theory
No. of periods assigned	6 Theory

Course description/objective:

Our immune system can be used to combat multiple diseases, including viral infections as well as cancer. Keeping this in mind, after an introductory module in Immunology in Semester IV, we have this Advanced Immunology where we educate our students on special topics like hypersensitivity, autoimmunity and transplantation, immunodeficiency disorders, cancer immunobiology, etc. We have also included various viral pathogens, host's immune responses to them and viral evasion strategies to give a better understanding of dealing with the emerging viral infections.

Syllabus:

Module A: (24 marks)

(2 classes/week)

Unit I: Allergy, Hypersensitivities, and Chronic Inflammation: Gell and Coombs Classification; Allergy or Type I Hypersensitivity; Antibody-Mediated Cytotoxic (Type II) Hypersensitivity; Immune Complex-Mediated (Type III) Hypersensitivity; Delayed-Type (Type IV) Hypersensitivity (DTH); Chronic Inflammation.

Unit II: Infectious Diseases: Bacterial infections: Immune Responses to Extracellular and Intracellular Bacteria; Bacterial Evasion of Host Defense Mechanisms; Emerging and Re-emerging Infectious Diseases.

Unit III: Immunodeficiency Disorders: Primary Immunodeficiencies, including Combined Immunodeficiencies; Secondary (acquired) Immunodeficiencies, including AIDS.

Unit IV: Cancer and the Immune System: terminology and common types of cancer; malignant transformation of cells; tumor antigens; the immune response to cancer; cancer immunotherapy.

Module B: (56 marks)

Section A:(24 marks)

(2 classes/week)

Unit V: Cytokines: general properties of cytokines and chemokines, six families of cytokines and associated receptor molecules, cytokine antagonists, cytokine-related diseases (cytokine storm), cytokine-based therapies.

Unit VI: T-cells: development, activation, differentiation and memory; T cell effector responses; Treg cells; alloreactive T cells.

Unit VII: Tolerance, Autoimmunity and Transplantation: establishment and maintenance of central and peripheral tolerance; autoimmunity – organ-specific and systemic autoimmune diseases, proposed mechanisms of onset of autoimmune disorders, immune-suppression treatments of autoimmune

diseases; transplantation – immunological principles leading to graft rejection, target-specific or general immune-suppressive therapy for prevention of graft rejection.

Section B :Immune Response to Viral Pathogens(32 marks) (2 classes/week)

Unit VIII:General immune responses to viral infection: innate immune response (intracellular nucleic acid sensors and interferons, NK cells), adaptive immune response (neutralising antibodies, cytotoxic T cells), other cell-mediated immunities important for viral control and clearance, different immune evasion strategies adopted by viruses.

Unit IX: Human viral pathogens: their structure, replication, mechanisms of transmission, and interaction with the immune system – Adenovirus, Herpes virus, Lentivirus, Ebola virus

Unit X: Treatment for viral diseases: therapeutic (antiviral drugs), prophylactic (vaccines – active immunisation), immunotherapy (cytokine-based therapies, monoclonal antibodies - passive immunisation)

Textbooks:

1. Owen JA, Punt J, Stranford SA. (2013). Kuby Immunology. 7th edition W.H. Freeman and Company, New York.
2. Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential Immunology. 11th edition Wiley-Blackwell Scientific Publication, Oxford.
3. Murphy K, Travers P, Walport M. (2008). Janeway's Immunobiology. 7th edition Garland Science Publishers, New York.
4. Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6th edition Saunders Publication, Philadelphia.
5. Introduction to Modern Virology. Dimmock, Easton and Leppard (6th ed.)
6. Basic Virology. Wagner & Hewlett (2 nd ed.)
7. Principles of Virology. Flint, Enquist, Racaniello & Skalka (3 rd ed.)

Q.Paper Structure for End Sem Theory

Module A (24 marks):

1 compulsory question of 8 marks;
Any 2 out of 3 questions, of 8 marks each.

Module B (24 marks):

1 compulsory question of 8 marks;
Any 2 out of 3 questions, of 8 marks each.

Module C (32 marks):

1 compulsory question of 8 marks;
Any 2 out of 3 questions, of 12 marks each.