BITS PILANI, DUBAI CAMPUS

ACADEMIC – UNDERGRADUATE STUDIES DIVISION

SECOND SEMESTER 2023 – 2024

Course Handout (Part – II)

Date: 5.02.2024

In addition to Part I (General Handout for all courses appended to the Time Table), this portion further specific details regarding the course.

Course No. : BIOT F342 **(3 0 3)**
Course Title : Immunology
Course Instructor : Dr. Sumitra Ramachandran
Instructor-in-charge : **Dr Neeru Sood**

Scope and Objective of the Course: This course has been designed to provide an insight in the concept and latest developments of immunology. Emphasis will be given on developing a molecular, cellular and clinical perspective of the area. Practical aspects of the area will also be considered.

Course Pre/Co- requisite (if any) **& Catalogue / Bulletin Description:** *Given in the Bulletin 2023-24*

Textbook [TB]: Immunology, Qwen, Judith A et al. (7th ed.); Freeman publications, 2013

Reference book(s) [RB]: Cellular and molecular immunology, Abbas, Litchman (5th /6th ed.); Elsevier Publications, 2008

Course Plan / Schedule:

Lec. No.	Learning objectives	Topics to be covered	Chapter No
1-2	Overview	Historical perspective, Innate immunity Adaptive immunity, Immune dysfunction and its consequences,	TB, Ch 1
3-5	Cells and organs of the immune system	Hematopoiesis, Cells of the immune system, Organs of the immune system (only functional aspects)	TB. Ch 2
6-7	Antigens & Antibodies	Immunogenicity vs Antigenicity, Factors, Epitopes, Antibody structure, Antibody Mediated Effector Functions, Classes and Biological Activities, Antigenic Determinant, B cell receptor, Immunoglobulin superfamily, Monoclonal antibodies, Abzymes	T.B. Ch 3, 13, 20
8-10	T cell receptor	Structure, Complex, Accessory molecule	TB Ch 3
11-13	Signaling strategies by B and T cell receptors	Common strategies in signaling pathways, B cell and T cell signal transduction	TB Ch 3
14-16	Cytokines and chemokines	Properties, Receptors, Antagonists, Subsets, Related Diseases, Therapy	TB Ch4
17-19	Innate immunity	Anatomical barriers, connection between Innate and adaptive immunity	TB Ch 5
20-23	The Complement system	Functions, Components of complement, Complement activation, Regulation of complement, Major Histocompatibility complex molecules & genes, Cellular distribution, Disease susceptibility	TB Ch 6, 8
24-26	Organization and Expression of Immunoglobulin Genes	Organization, Rearrangements, Antibody diversity, Class switching, genes and antibody engineering	TB Ch 7
27-29	Antigen processing and presentation	Self MHC restriction, Role of APC, Exogenous and Endogenous antigens	TB Ch 8
30-33	T cell maturation, activation and differentiation	Thymic selection, T cell activation and differentiation	TB Ch11
34-36	B cell generation activation and differentiation	Maturation, Activation Prolifération, Humoral response	TB Ch12
37-38	Effector responses: Cell and Antibody Mediated Effector responses	Antibody-Mediated Effector Functions, Cytotoxic T cells, Natural Killer cells, ADCC, Experimental assessments	TB Ch13

39-41	Hypersensitivity reactions	Type I, Type II, Type III, Type IV	TB Ch 15
42-44	Tolerance & Autoimmunity	Organ specific & Systemic Autoimmune diseases, Animal models, Treatment	TB Ch16
45-46	Transplantation immunology	Basis, Clinical Transplantation	TB Ch16
47-48	Immune Response to Infectious Disease	Viral Bacterial, Protozoal and Parasitic diseases, Emerging Infectious diseases, Bioterrorism	TB Ch17
49-50	Vaccines	Active and Passive Immunization, Designing for Active Immunization, Whole organism vaccines, Macromolecules, Recombinant-vector and DNA vaccines, Multivalent Subunit vaccines	TB Ch17
51-52	AIDS and other immuno deficiencies	Primary and secondary immunodeficiency's, (concept only), AIDS	TB Ch 18
53-54	Cancer and Immune system	Origin, Malignant Transformation, Oncogenes and Cancer induction, Tumor of the Immune system, tumor antigens, tumor evasion and cancer Immunotherapy	TB Ch 19

Course Learning Outcomes (CLOs)

Upon successful completion of this course, students should be able to:

- **CLO1** Describe the components of the immune system, including cells, tissues, organs, and their functions *(knowledge)*
- **CLO2** Students should be able to recognize and compare the different types of immune responses, including innate and adaptive immunity, humoral and cellular immunity, the role of cytokines and chemokines and genetic basis of immune responses, MHC, *(Comprehension)*
- **CLO3** Familiarity with basic laboratory techniques commonly used in immunological research, such as ELISA, flow cytometry, immunoblotting, and cell culture methods. *(Application)*
- **CLO4** Analyze the interactions between the immune system and pathogens, Understanding the mechanisms underlying immune-mediated diseases and disorders, including autoimmune diseases, hypersensitivity reactions, immunodeficiencies, and transplantation immunology *(Comprehension)*
- **CLO5** Explain the principles of vaccination, including types of vaccines, mechanisms of action, vaccine development, and the importance of immunization in public health *(Application)*

Evaluation scheme:

EC No	Evaluation Components	Nature of Component	Duration	Weightage %	Date & Time	Venue
1	Quiz 1	Closed book	20 min	8	13.03.24 (W2)	To be announced
2	Mid sem	Closed book	90 mins	30	29.03.24 (FN)	
3	Quiz 2	Closed book	To be announced	7	02.05.24(Th1)	
4	Assignments*	Open book		15	1st week of May	
5	Comprehensive Examination	Closed/Open Book	3 hours	40	29.05.24 (AN)	

***Assignments:** Assignment and presentations will be conducted towards the end of the semester. Weightage will be 15%.

Mapping of CLOs, PLOs, and CECs

CLOs	PLOs	Evaluation Components (ECs)				
		EC1	EC2	EC3	EC4	EC5
CLO1	1,2	✓	✓		✓	✓
CLO2	1,2	✓	✓		✓	✓
CLO3	1,2,3			✓	✓	✓
CLO4	1,2	✓	✓		✓	✓
CLO5	1,2,3		✓	✓	✓	✓

Mid-sem Grading: Mid-sem grading will be displayed after two evaluation components or earlier whenever about 35-40 % of evaluation components are completed.

Note: A student will be likely to get "NC", if he / she does not appear / appear for the sake of appearing for the evaluation components / scoring zero in pre-compre total.
Scoring zero in the lab component / Abstaining from lab classes throughout

Makeup and Attendance policies:
Make-ups are not given as a routine. It is solely dependent upon the genuineness of the circumstances under which a student fails to appear in a scheduled evaluation component. In such circumstances, prior permission should be obtained from the I/C. The decision of the I/C in the above matter will be final.

Attendance: Every student is expected to be responsible for regularity of his/her attendance in classrooms and laboratories, to appear in scheduled tests and examinations and fulfill all other tasks assigned to him/her in every course. A student should have a minimum of 60% of attendance in a course to be eligible to appear for the Comprehensive Examination in that course. For the students under the purview of Academic Counseling Board (ACB), the Board shall prescribe the minimum attendance requirement on a case-to-case basis. Attendance in the course will be a deciding factor in judging the seriousness of a student, which may be directly / indirectly related to grading.

General timings for consultation: T9 will be the chamber consultation hour for on-campus students, however students can meet the concerned instructor by prior appointment mutually convenient for both (One student at a time).

General instructions: Students should come prepared for classes and carry the text book(s) or material(s) as prescribed by the Course Faculty to the class.
Notices: All notices concerning the course will be displayed on the respective Notice Boards or Google classroom.

Instructor – In- Charge
BIOT F342

Dr. Neeru Sood/Singh Professor, Chamber No: 321, Contact No: +9714 4200700 Ext. 113,
e-mail: sood@dubai.bits-pilani.ac.in Mobile No: +971503752805

Dr Sumitra Ramachandran, Mobile No +971509140537 Email - sumitra16@gmail.com