Birla Institute of Technology & Science, Pilani
Hyderabad Campus

FIRST SEMESTER 2021-2022

Course Handout Part - II

01-08-2021

In addition to Part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No.: **BIO G514**
Course Title: **Molecular Immunology**
Instructor-in-Charge: **Dr. Trinath Jamma**
Instructor: **Dr. Trinath Jamma, K. Vaishali, Lokesh Kumar Sahoo, Nikhil P T**

Description : This course will deal extensively with topics like molecular basis of T and B cell antigen recognition and activation. Immunity to microbes and diseases caused by humoral and cell mediated immune responses will be covered and emphasis placed on congenital and acquired immunodeficiencies. Advanced topics like antibody engineering will be discussed with the help of review articles.

Scope and Objective of the Course: Immunity to microbes & diseases caused, humoral & cell-mediated immune responses elicited against infectious & commensal microbes will be covered with emphasis on congenital and acquired immune-deficiencies. The course will deal extensively with topics like development of T and B cells, molecular basis of T and B cell-antigen recognition and activation and also the subsequent effector functions of T and B cells. Advanced topics like antibody engineering will be discussed with the help of review articles. The course intends to familiarize the students with modern concepts in immunology. The endeavor will be to highlight concepts in immunology, which would have an influence on understanding the fascinating entity, which comprises the body's immune system and ancillary procedure of therapy.

Textbooks: Cellular and Molecular Immunology, Abbas, Lichtman, Pober, 7th Ed., Harcourt Brace & Company Asia, Saunders.

Reference Books: Immunology 6th Ed. (2007) Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne, Janis Kuby.

Lecture No..	Learning Objectives	Topics to be covered	Chapter in TB/RB
1-2	Introduction to Immunology	An overview of Immunology	Ch.1(TB), Ch.1(RB)
3-5	Cells and Tissues of the Immune system	Cells and lymphoid organs (primary and secondary) involved in the immune system	Ch.2(TB), Ch.2(RB)
6-8	Details about Antibodies & Antigen	Characteristics and Components of Antibodies and Antigens	Ch.5 (TB) Ch.4 (RB)
9-10	Details of the MHC	Major Histocompatibility Complexes (Class I, Class II, etc)	Ch. 6 (TB) Ch. 8 (RB)
11-13	Presentation & processing of Antigens to T Lymphocytes	T Lymphocytes, Antigen recognition & Activation	Ch. 6, Ch. 8
14-17	Expression of Ig genes. Maturation of B Lymphocytes	Immunoglobulin genes rearrangement and B Lymphocyte development	Ch. 8 (TB) Ch. 5 (RB)
18-20	Development & Maturation of T cells	T cell maturation in thymus, differentiation And effector functions	Ch. 9 (TB), Ch.10 (RB)
21-22	Components of complement	Classical, alternate pathway & Lectin pathway and	Ch. 12 (TB)

	system	their regulation	Ch. 7 (RB)
23-26	How immune responses are regulated: T and B lymphocytes	Positive selection and negative selection of lymphocytes, differentiation of T & B cells, T-dependent and T-independent activation of B lymphocytes	Ch. 10(TB), Ch. 10 (RB), Ch. 11(TB), Ch. 11(RB)
27-29	Cytokines	Classification, JAK-STAT signaling, Cytokine Therapies	Ch .10 (TB), Ch. 12(RB)
30-32	Issues related to self tolerance and autoimmunity	Organ specific, Systemic autoimmunity	Ch. 14(RB) Ch. 16(RB)
33-34	Hypersensitivity	Type I, II, III, IV hypersensitivity	Ch. 15(RB)
35-37	AIDS and other Immunodeficiency disorders	Primary and Secondary Immunodeficiency disorders	Ch. 20(TB), Ch. 20 (RB)
38-40	Immunity to microbes	Immunity to microbes (Bacteria, viruses, fungi, parasites)	Ch. 15 (TB), Ch. 18 (RB)

Evaluation Scheme

Component	Duration	Weightage (%)	Date &Time	Nature of component
Surprise Quiz	10 min	15	During Class hours	OB
Experimental design	20 min	10	During Class hours	OB
Lab Practical	120 min	20	During Lab hours	OB
Mid Semester Exam	90 min	25	To announced	OB
Comprehensive Exam	120 min	30	17/12 AN	OB (17/12/2021: AN)

List of experiments:
1. Single immunodifussion assay
2. Double immunodifussion assay
3. Rocket immunoelecctrophoresis
4. Immune cell activation using bacterial ligands (monitor the change in morphology)
5. Quantification of immune cell effector mediators by microtitre assay (NO assay)
6. Separation of cellular proteins by SDS-PAGE (12% Gel)
7. Western Transfer onto PVDF membrane (Semidry/Wet transfer)
8. Antibody based detection of antigens (ECL method)
9. Immunoprecipitation of antigens, SDS-PAGE and detection of antigens by CBB staining
10. Cytokine measurement by ELISA (Sandwich ELISA)
11. Flowcytometry based enumeration of immune cells (surface staining)
12. Immunohistochemical detection of antigens

Note: Depending on the availability of resources 10-12 experiments will be conducted

Chamber Consultation Hour: To be announced in the class.
Notices: Notices concerning the course will be displayed on the **CMS** or **Biological Sciences Department** Notice Board**.**
Make-up Policy: No make-ups without prior intimation or only in case of hospitalization.

Note on academic honesty and integrity policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Dr. Trinath Jamma
INSTRUCTOR-IN-CHARGE
BIO G514, Molecular Immunology