



FIRST SEMESTER 2020-2021

Course Handout Part - II

01-08-2020

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. Ruchi Jain Dey**

Lab Instructors: **Naresh Patnaik & Dwaipayan Bhattacharya**

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 immune deficiencies. 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.

(These books are available for purchase through online vendors)

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 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	Ch. 12 (TB)

	system	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 and animal models	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)
41-42	Antibody engineering and Issues related to molecular manipulation of the immune response	Monoclonal antibody production and therapeutic applications, chimeric antibodies	Class notes/ Research articles

Evaluation Scheme

Component	Duration	Weightage (%)	Date & Time	Nature of component
Test 1	30 min	15% (45M)	During Class hours	OB
Test 2	30 min	15% (45M)	During Class hours	OB
Test 3	30 min	15% (45M)	During Class hours	OB
Lab Evaluation	120min	15% (45M)+15% (45M)	During Lab hours	OB
Comprehensive Exam	120 min	25 (75M)	05/12 AN	OB

List of experiments:

1. Single immunodiffusion assay
2. Double immunodiffusion assay
3. Rocket immunoelectrophoresis
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
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 6-8 experiments will be taken up.

Chamber Consultation Hour: To be announced in the class.

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Notices: Notices concerning the course will be displayed on the **CMS**

Make-up Policy: No make-ups without prior intimation are allowed. In case of hospitalization, make up may be considered only with appropriate justification and approval from the course instructors.

It is expected that each student registered in a course in First Semester 2020-2021 shall acquire a computer with the desired hardware, software along with an Internet connection. High-speed broadband access is highly recommended for the optimal learning experience.

Google Meet Link for every lecture as well as the lab hour will be shared one day a priori via CMS

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**